VALIDATION REPORT

IRANI BIOMASS ELECTRICITY GENERATION PROJECT IN BRAZIL

REPORT NO. 2004-1301

REVISION NO. 03

DET NORSKE VERITAS

VALIDATION REPORT

Date of first issue: 2004-11-03	Project No.: 28624550 (13)
Approved by: Einar Telnes Technical Director	Organisational unit: DNV Certification, International Climate Change Services
Client: Celulose Irani	Client ref.: David Denton

DET NORSKE VERITAS AS

DNV Certification

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 945 748 931 MVA

Summary:

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the "Irani Biomass Electricity Generation Project" in Brazil on the basis of UNFCCC and host Party criteria for CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to the Kyoto Protocol criteria and the simplified modalities and procedures for small-scale CDM project activities. This validation report summarizes the findings of the validation.

The validation consisted of the following three phases: i) a desk review of the project design and the baseline and monitoring plan, ii) follow-up interviews with project stakeholders and iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

In summary, it is DNV's opinion that the "Irani Biomass Electricity Generation Project", as described in the revised and resubmitted project design documentation of July 2005, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the simplified baseline and monitoring methodology for category I.D and III.E small-scale CDM project activities. Hence, DNV requests the registration of the "Irani Biomass Electricity Generation Project" as CDM project activity. Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of the participating Parties, including confirmation by the DNA of Brazil that the project assists in achieving sustainable development.

Report No.: 2004-1301	Subject Group: Environment, Climate
Report title: Irani Biomass Electricity Generation Project in Brazil	
Work carried out by: Luis Filipe Tavares, Michael Lehmann	
Work verified by: Einar Telnes	

Date of this revision: 2005-07-26	Rev. No.: 03	Number of pages: 15

Indexing terms

Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Verification Market Sector Process Industry

☒ No distribution without permission from the client or responsible organizational unit

☐ free distribution within DNV after 3 years

☐ Strictly confidential

☐ Unrestricted distribution

Table of Content *Page*

Abbreviations

ANEEL	Brazilian Electricity Agency (Agência Nacional de Energia Elétrica)
BM	Build margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
DOC	Degradable organic carbon
DOC_f	Fraction DOC dissimilated to landfill gas
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
MCF	Methane correction factor
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
N-NE	North-Northeast
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OM	Operating margin
ONS	National Electricity System Operator (Operador Nacional do Sistema)
PDD	Project Design Document
S-SE-CO	South-Southeast-Midwest
UNFCCC	United Nations Framework Convention on Climate Change

1 INTRODUCTION

Celulose Irani has commissioned Det Norske Veritas Certification Ltd. (DNV) to validate the Irani Biomass Electricity Generation Project at Vargem Bonita, Santa Catarina State, Brazil (hereafter called "the project").

The validation team consists of the following personnel:

Mr Luis Filipe Aboim Tavares	DNV Rio de Janeiro	Team leader, GHG auditor
Mr Michael Lehmann	DNV Oslo	Energy sector expert
Mr Einar Telnes	DNV Oslo	Internal verifier

1.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords, the simplified modalities and procedures for small-scale CDMM project activities and the relevant decisions by the CDM Executive Board. The validation team has, based on the recommendations in the Validation and Verification Manual /9/, employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 GHG Project Description

The project activity consists of the construction and operation of a 9.43 MW biomass generation plant that will generate a part of the electricity required by the Celulose Irani plant in the paper manufacturing process. The project activity involves displacing more carbon intensive electricity from the grid with electricity generated by GHG neutral biomass (wood chips and wood residue).

The project also involves 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.

During the first seven year crediting period starting on 1 September 2004, the project's expected annual emission reductions from the grid-electricity displacement component is 17 351 tCO_2e prior to the planned production expansion in 2008 and 27 316 tCO_2e onwards. The emission

reductions for the methane avoidance component of the proposed project activity is estimated as 148 002 tCO_2e annualy.

2 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design and the baseline and monitoring methodology
II follow-up interviews with project stakeholders
III the resolution of outstanding issues and the issuance of the final validation report and opinion.

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

i) mistakes have been made with a direct influence on project results;
ii) CDM or host Party requirements have not been met; or
iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The term *Clarification* may be used where additional information is needed to fully clarify an issue.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /9/. The protocol shows, in a transparent manner, 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 validation 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 three tables. The different columns in these tables are described in Figure 1.

The completed validation protocol for the "Irani Biomass Electricity Generation Project" is enclosed in Appendix A to this report.

2.1 Review of Documents

The initial Project Design Document (PDD) /1/ submitted by Celulose Irani on 18 August 2004, the revised PDDs of October 2004 /2/ and December 2004 /3/ and the final PDD of July 2005 /4/ were reviewed. In addition, spreadsheets documenting the calculation of the combined margin /5/ and a spreadsheet documenting the cash flow calculations were reviewed /6/.

Others documents, such as Environmental Impact Assessment, the Environmental Installation Licence and the Invitation for Comments by Local Stakeholders were reviewed during the site visit.

Validation Protocol Table 1: Mandatory Requirements			
Requirement	***Reference***	***Conclusion***	***Cross reference***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*This is either acceptable based on evidence provided (**OK**), or a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Validation report.*	*Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.*

Validation Protocol Table 2: Requirement checklist				
Checklist Question	***Reference***	***Means of verification (MoV)***	***Comment***	***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 seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.	*Gives reference to documents where the answer to the checklist question or item is found.*	*Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.*	*The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.*	*This is either acceptable based on evidence provided (**OK**), or a **Corrective Action Request (CAR)** due to non-compliance with the checklist question (See below). **Clarification** is used when the validation team has identified a need for further clarification.*

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Draft report corrective action requests and requests for clarification	***Ref. to checklist question in table 2***	***Summary of project participants' response***	***Validation conclusion***
If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.	*Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.*	*The responses given by the project participants during the communications with the validation team should be summarised in this section.*	*This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".*

Figure 1 Validation protocol tables

2.2 Follow-up Interviews

On 17 December 2004, DNV performed interviews with Celulose Irani /10//11//12/ and Ecosecurities /13/ during a site visit at Celulose Irani at Vargem Bonita, Santa Catarina State, to confirm and to resolve issues identified in the document review.

The main topics of the interviews were:

- Environment licenses conditioning compliance,
- Supply of biomass (wood waste) used to generate electricity,
- Verification that current practise is landfilling of biomass by Irani and other suppliers of wood waste,
- Verification of process to treat the wood waste.

2.3 Resolution of Clarification and Corrective Action Requests

The validation identified two *Corrective Action Requests* and seven requests for *Clarification* which were in November 2004 presented to the project participants in the form of a draft validation report. Subsequently, Celulose Irani provided clarifications and additional information and submitted revised PDDs /2//3//4/ and spreadsheets for the calculation of the combined margin /5/ and the calculation of the cash flow /6/. The response provided by project participants and the revised PDDs sufficiently addressed the requests for *Clarifications* and *Corrective Action Requests*.

To guarantee the transparency of the validation process, the concerns raised by DNV and the response provided by the project participants are documented in Table 3 of the Validation Protocol in Appendix A.

3 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the project design as documented and described in the PDD of July 2005.

3.1 Participation Requirements

The project participants are Celulose Irani (Brazil), EcoSecurities (UK), Shell Trading International Limited (UK) and Showa Shell Sekiyu K.K. (Japan). All Parties involved, i.e., Brazil, the United Kingdom and Japan meet the requirements to participate in the CDM.

The project will be funded by Celulose Irani and the validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.

3.2 Project Design

The project is a renewable energy project activity with an output capacity of less than 15 MW, i.e. 9.43 MW. The project also avoids methane emissions with project emissions being less than 15 kilotonnes of carbon dioxide equivalent annually, i.e. 7 230.4 tCO_2e per year. Hence, the Irani Biomass Electricity Generation Project qualifies as a category I.D and category III.E small-scale CDM project activity (Renewable Energy Projects / Renewable electricity generation for a grid and Other project activities/Avoidance of Methane, respectively) as outlined in Appendix B of the simplified modalities and procedures for a small-scale CDM project activities /7/.

Category I.D comprises projects that "that supply electricity to an electricity distribution system". The electric energy generated by the project will be used by the Celulose Irani Plant and will reduce the imports from grid electricity. Hence, as this project activity reduces grid electricity imports and thus avoids marginal fossil fuel based electricity generation in the same way as projects supplying all their electricity to the grid, it is DNV's opinion that the project can apply the simplified baseline and monitoring methodology for category I.D small-scale CDM project activities.

The simplified modalities and procedures give no further guidance on which project emissions to include for determining whether a project meets the small-scale eligibility threshold for category III.E, i.e. the project emissions shall be less than 15 000 tCO_{2e} per year. The selected definition of the project emissions being the CH_4 and N_2O emissions due to incomplete combustion of biomass with an exclusion of biogenic CO_2 emissions from the combustion of biomass is in line with other approved CDM baseline and monitoring methodologies.

The project design represents good practise. 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. 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 utilised in a boiler to generate electricity. As a result, the project avoids landfilling the biomass residues.

3.3 Baseline and additionality

The project has two baseline components. The first baseline is established according to the simplified baseline methodology for category I.D small-scale CDM project activities (Renewable Energy Projects / Renewable electricity generation for a grid). The baseline emission coefficient is determined as the average of the approximate operating margin (OM) and the build margin (BM), i.e. the combined margin, in accordance with the simplified baseline methodology for category I.D small-scale CDM project activities /7/.

The initial determination of the combined margin emission coefficient was based on an International Energy Agency (IEA) study on the Brazilian electricity grid carried out in 2002 (using data from 2000) /8/. The IEA study was based on installed capacity of plants built up to 2004 and assumptions regarding the plant efficiency and load factor. However, the IEA study did not calculate the combined margin as required by the simplified baseline methodology for category I.D small-scale CDM project activities and DNV requested the project participants to recalculate the combined margin emission coefficient.

Recently the project participants managed to obtain more accurate data on the Brazilian electricity grid from the National Electricity System Operator (ONS) and recalculated the combined margin emission coefficient based on actual electricity generation data provided by ONS for the South-Southeast-Midwest (S-SE-CO) grid. Average plant efficiencies for different power plant types established in the IEA study on the Brazilian grid and IPCC carbon emission factors for specific fuels were applied to calculate plant specific emission coefficients.

Although the applied ONS data only covers 76.4% of the installed capacity in the S-SE-CO grid, the recalculation of the operating and build margin emission coefficient based on actual dispatch data for the years 2001-2003 represents an improvement of the data quality compared to the original data from the IEA study. Data for the years 2001-2003 are the most recent statistics available and the data was verified against the data published on the ONS website. 2004 data was not publicly available at the time of writing this report.

The recalculated combined margin emission coefficient of 0.521 tCO_2e/MWh is calculated in accordance with the simplified baseline methodology for category I.D small-scale CDM project and is appropriate due to the following:

- *Operating margin*: The operating margin calculated based on generation data from power plant dispatched by ONS is 0.949 tCO_2e/MWh. No electricity generation data is publicly available for the remaining 23.6% of power plants which electricity is not dispatched through ONS. However, these plants are not likely to be affected by a CDM project. These operate either based on power purchase agreements which are not under control of the dispatch authority, or they are located in non-interconnected systems to which ONS has no access.
- *Build margin*: The build margin emission coefficient calculated for only power plants dispatched by ONS is 0.094 tCO_2e/MWh and thus more conservative than the emission coefficient calculated based on IEA data (0.421 tCO_2e/MWh) or the combination of IEA and ONS data (0.205 tCO_2e/MWh).
- *Project electricity system*: Even though the S-SE-CO grid is connected with the North-Northeast (N-NE) grid, the energy flow between N-NE and S-SE-CO grids are heavily

limited by the transmission line capacity. Given the relative small capacity of the project, it is hence deemed appropriate to consider data on the S-SE-CO grid only.

The second baseline component is established according to the simplified baseline methodologies for category III.E small-scale CDM project activities (Other Projects Activities / Methane Avoidance). The amount of methane produced from decay of biomass landfilled in absence of the project is determined using adequate IPCC default emission factors.

The additionality of the project is demonstrated through a barrier test considering two scenarios: the scenario without the project (baseline) and the implementation of the project. The test considers financial/economic barriers, technical barriers and prevailing business practice. Upon request, an investment analysis considering all savings and expenses associated to the project was presented. The analysis shows that the carbon revenues increase the IRR from 9.95% to 23,28%. Moreover, it is demonstrated that the installation of shredder and set of sieves to allow use sawdust and over size wood waste is not prevailing business practise. DNV acknowledges that the project without CER revenues is lower than the levels regarded as acceptable for other investments in Brazil. Although Celulose Irani already operates two old biomass power plants, the new boiler has different conditions of operation, using the wood waste which is not readily utilised to generate electricity. Hence, it is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions attributable to the project are additional.

3.4 Monitoring Plan

The project applies the monitoring methodology established according to the simplified monitoring methodology for category I.D and category III.E small-scale CDM project activities. The main parameters are electricity generated and biomass burned in the cogeneration unit. These parameters are consistent with the simplified monitoring methodology. Upon request, the PDD was revised to clarify how the net electricity produced by the new cogeneration plant and the quantity of waste wood purchased will be monitored.

Detailed responsibilities and authorities for project management, procedures for monitoring and reporting, and QA/QC procedures are assured through ISO 9001 certification of Celulose Irani. However, these procedures were not implemented yet and should be assessed during the periodic verification of emission reductions.

3.5 Calculation of GHG Emissions

The baseline calculations are according to two approaches. The first approach is according to the simplified baseline methodology for category I.D small-scale CDM project activities, i.e. the average of the approximate operating margin (OM) and the build margin (BM), which is calculated ex ante based on 2001-2003 data from ONS for the S-SE-CO grid.

The second approach is according to the simplified baseline methodology for category III.E small-scale CDM project activities:

$$BE_y = Q_{biomass} * CH4\_IPCC_{deca}y * GWP\_CH_4$$

Where:

BE_y = Baseline methane emissions from biomass decay (tonnes of CO_2 equivalent)
$Q_{biomass}$ = Quantity of biomass treated under the project activity (tonnes)
CH_4_GWP = GWP for CH_4 (tonnes of CO_2 equivalent/tonne of CH_4)

and

CH4_IPCCdecay = (MCF * DOC * F * 16/12)

Where:

CH_4_IPCC$_{decay}$ = CH_4C CH_4 emission factor for decaying biomass in the region of project activity (tonnes of CH_4/tonne of biomass or organic waste)
MCF = methane correction factor (fraction) (default is 0.4)
DOC = degradable organic carbon (fraction, see equation below or default is 0.3)
DOCF = fraction DOC dissimilated to landfill gas (default is 0.77)
F = fraction of CH_4 in landfill gas (default is 0.5)

The methane avoidance was determined using IPCC default MCF for unmanaged, shallow (< 5 m waste) landfills, a DOC of 0.3 for wood waste and a the IPCC default DOC_f of 0.77. The selection of these factors is reasonable.

3.6 Leakage Effects

Possible leakage effects related to the use of biomass are not discussed according to paragraph 8 of the simplified baseline and monitoring methodologies for small-scale CDM project activities, which require that leakage shall be considered in the case of project activities using biomass. However, it was demonstrated that the biomass used by the project is currently not used by other users. Furthermore, the renewable energy technology used is not equipment transferred from another activity. No leakage effects are thus expected to be caused by the project.

Part of wood waste is purchased from several suppliers and transported by truck. DNV requested an assessment of the emissions resulting from transporting biomass. The project proponents have demonstrated that these emissions are not significant.

3.7 Environmental Impacts

According to Brazilian Environment Legislation it is necessary to acquire an Environmental License for a new facility which could have potential environment impact. The licence is obtained in three steps: Preliminary Environment License at design phase, Installation Environment License at construction phase and Operation Environment License at operation phase. Celulose Irani has received the Preliminary Environment License number 709/2003 and Installation Licence number 481/04 from FATMA (State Environment Agency). All licenses and conditional clauses were verified during the site visit. According to the Brazilian procedures, an Operational Environmental Licence can only be obtained after construction of the project is completed. The Operational Environmental Licence will thus need to be verified during the first verification of emission reductions.

3.8 Comments by Local Stakeholders

According Resolution 1 of the Brazilian Inter-ministerial Commission for Global Climate Change, the CDM project should invite selected local stakeholders to comment on the project. The relevant stakeholders were invited by letters, which were verified during the site visit.

Three comments that were supportive of the project were received and there was thus no need to modify the project.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

DNV Certification published the PDD of June 2004 on the DNV Climate Change web site (http://www.dnv.com/certification/ClimateChange) and stakeholders were through the UNFCCC CDM web site invited to provide comments within a 30 days period from 19 September 2004 to 19 October 2004. One comment was received in this period. The comment (in unedited form) and how DNV has taken due account of the comment received is given below.

Comment by: Axel Michaelowa, Hamburg Institute of International Economics (HWWA)
Inserted on: 2004-09-28
Subject: Unconvincing barrier test and data for baseline calculation

Comment:

The project proponent does not provide convincing evidence for the existence of a prohibitive investment barrier. The prevailing practice test alone is insufficient.

The baseline data suffer from the same problems I have flagged concerning the UTE Barreiro S.A. Renewable Electricity Generation Project.

[*Comment on UTE Barreiro S.A. Renewable Electricity Generation Project*: The use of the IEA study BM data is not acceptable, as the IEA in 2001/2 could obviously not calculate the BM according to the 2004 rules for the BM (EB revision of March 2004 changing the rules for the BM). The latter tends to overestimate the baseline emission factor.]

How DNV has taken due account of the comment received:

Both issues raised by the comment were considered in DNV's validation of the project. Further evidence for an investment barrier was presented and the combined margin was recalculated according the simplified baseline for category I.D small-scale CDM project activities. The project proponents revised the PDD and submitted complementary spreadsheets (see section 3.3 of this validation report).

5 VALIDATION OPINION

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the "Irani Biomass Electricity Generation Project" at Vargem Bonita Santa Catarina State, Brazil (hereafter called "the project"). The validation was performed on the basis of UNFCCC criteria for small-scale CDM project activities and relevant Brazilian criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to the Kyoto Protocol criteria for the CDM, the CDM modalities and procedures as agreed in the Marrakech Accords, the simplified modalities and procedures for small-scale CDM project activities and relevant decisions by the CDM Executive Board.

The proposed thermoelectric power project with a capacity of 9.43 MW will generate electricity utilizing biomass of wood chips and wood waste from eucalyptus and pinus production in Irani forests. Utilising biomass waste instead of landfilling it, the project will also avoid methane emissions.

The project is not expected to have considerable environmental impacts. A preliminary Environmental License and Installation Environment License was received from the State Environment Agency FATMA as required by Brazilian law and the subsequent Operation Environment License is expected to be issued after project start.

By promoting renewable energy, the project is in line with the current sustainable development priorities of Brazil.

Being a renewable energy project activity with an output capacity of less than 15 MW and having less than 15 000 tCO_2e project emissions the project meets the criteria for Renewable electricity generation for the grid (Category I.D) and Methane avoidance (Category III.E) as defined in Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

Category I.D comprises projects that "that supply electricity to an electricity distribution system". The electric energy generated by the project will be used by the Celulose Irani Plant and will reduce the imports from grid electricity. Hence, as this project activity reduces grid electricity imports and thus avoids marginal fossil fuel based electricity generation in the same way as projects supplying all their electricity to the grid, it is DNV's opinion that the project can apply the simplified baseline and monitoring methodology for category I.D small-scale CDM project activities.

The simplified modalities and procedures give no further guidance on which project emissions to include for determining whether a project meets the small-scale eligibility threshold for category III.E, i.e. the project emissions shall be less than 15 000 tCO_{2e} per year. The selected definition of the project emissions being the CH_4 and N_2O emissions due to incomplete combustion of biomass with an exclusion of biogenic CO_2 emissions from the combustion of biomass is in line with other approved CDM baseline and monitoring methodologies.

The project applies the appropriate simplified baseline methodologies proposed for the above mentioned small-scale project activity categories. A combined margin emission coefficient of 0.521 tCO_2e/MWh is calculated in accordance with the simplified baseline methodology for category I.D small-scale CDM project activities, i.e. the average of the approximate operating

margin and the build margin. The determination of this combined margin emission coefficient is based on actual electricity generation data provided by the National Electricity System Operator (ONS) for the years 2001- 2003 in the South-Southeast-Midwest (S-SE-CO) grid.

The second baseline component is established according to the simplified baseline methodologies for category III.E small-scale CDM project activities. The amount of methane produced from decay of biomass landfilled in absence of the project is determined using adequate IPCC default emission factors.

The additionality of the project is demonstrated through a barrier test. Upon request, an investment analysis considering all savings and expenses associated to the project was presented. DNV acknowledges that the project without CER revenues has an IRR lower than the levels regarded as acceptable for other investments in Brazil. Although Celulose Irani already operates two old biomass power plants, the new boiler has different conditions of operation, using the wood waste which is not readily utilised to generate electricity. Hence, it is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions attributable to the project are additional.

By displacing fossil fuel-based electricity with electricity generated from a renewable source and by avoiding landfilling of biomass, the project results in reductions of CO_2 emissions and the avoidance of CH_4 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. Given that the project is implemented as designed, the project is likely to achieve the estimated amount of emission reductions.

The monitoring plan sufficiently specifies the monitoring requirements of the main project indicators. Detailed responsibilities and authorities for project management, procedures for monitoring and reporting, and QA/QC procedures are assured through ISO 9001 certification of Celulose Irani, however these procedures were not implemented yet and should be assessed on verification phase.

In summary, it is DNV's opinion that the "Irani Biomass Electricity Generation Project", as described in the revised and resubmitted project design documentation of July 2005, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the simplified baseline and monitoring methodology for category I.D and III.E small-scale CDM project activities. Hence, DNV requests the registration of the "Irani Biomass Electricity Generation Project" as CDM project activity.

Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of the participating Parties, including confirmation by the DNA of Brazil that the project assists in achieving sustainable development.

6 REFERENCES

Documents provided by the Project Participants i.e. the CDM-PDD, confirmation by the host Party on contribution to sustainable development and written approval of voluntary participation from the DNAs of the participating Parties:

/1/ Irani Biomass Electricity Generation Project PDD, version June 2004

/2/ Irani Biomass Electricity Generation Project PDD, version October 2004

/3/ Irani Biomass Electricity Generation Project PDD, version December 2004

/4/ Irani Biomass Electricity Generation Project PDD, version July 2005

/5/ Spreadsheet of Calculation of Combined Margin (ONS database SSC 2001-2003 v.05.xls), 26 May 2005.

/6/ Spreadsheet of Calculation of Cash flow (Irani CashFlow 15-dec-04.xls), 15 December 2004.

Background documents related to the design and/or methodologies employed in the design or other reference documents:

/7/ Appendix B of the simplified modalities and procedures for small-scale CDM project activities, *Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories,* (Version 05 of 25 February 2005).

/8/ Martina Bosi: *Road-Testing Baselines for Greenhouse Gas Mitigation Projects in the Electric Power Sector* (OECD and IEA Information Paper COM/ENV/EPOC/IEA/SLT(2002)6). October 2002. Available at http://www.oecd.org.

/9/ International Emissions Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): Validation and Verification Manual. Available at http://www.vvmanual.info.

Persons interviewed:

/10/ Odivan Carlos Cargnin – Celulose Irani – Diretor Financeiro

/11/ Leandro Lexis Farina – Celulose Irani - Gerente Qualidade

/12/ Ruy Micheil Filho – Celulose Irani - Gerente Engenharia / Coordenador Planta

/13/ Pablo Fernandez – Ecosecurities

- o0o -

APPENDIX A

VALIDATION PROTOCOL FOR SMALL-SCALE CDM PROJECT ACTIVITIES

Table 1 Mandatory Requirements for Small Scale Clean Development Mechanism (CDM) Project Activities

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference/Comment
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art. 12.2	OK	Table 2, Section E.4.1
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	-	Table 2, Section A.3 Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written confirmation by the DNA of Brazil that the project assists in achieving sustainable development.
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art. 12.2.	OK	Table 2, Section E.4.1
4. The project shall have the written approval of voluntary participation from the designated national authority of each party involved	Kyoto Protocol Art. 12.5a, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	-	Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of the participating Parties.
5. The emission reductions should be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E.1 to E.4
6. Reduction in GHG emissions must be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5.c, Simplified Modalities and Procedures for Small Scale CDM Project Activities §26	OK	Table 2, Section B.2.1

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference/Comment
7. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance	Decision 17/CP.7	OK	No public funding is involved.
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures § 29	OK	The Brazilian DNA is the Comissão Interministerial de Mudança Global do Clima. The DNA of the UK is the Department for Environment, Food and Rural Affairs. The DNA of Japan is the Liaison Committee for the Utilization of the Kyoto Mechanisms for Environment, Food and Rural Affairs.
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities and Procedures § 30, 31b	OK	Brazil ratified the Kyoto Protocol on 23 August 2002. The UK ratified the Kyoto Protocol on 31 May 2002. Japan accepted the Kyoto Protocol on 4 June 2002.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	OK	The UK's assigned amount is 92% of its 1990 emissions. Japan's assigned amount is 94% of the emission in1990.
11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7	CDM Modalities and Procedures §31b	OK	The UK has in place a national registry and reported on 15 April 2004 its national GHG inventory for the years 1990-2002.

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference/Comment
			Japan has in place a national registry and reported on 24 May 2004 its national GHG inventory for the years 1990-2002.
12. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakesh Accords and shall not be a debundled component of a larger project activity	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	OK	Table 2, Section A.1
13. The project design document shall conform with the Small Scale CDM Project Design Document format	Simplified Modalities and Procedures for Small Scale CDM Project Activities, Appendix A	OK	
14. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and uses the simplified baseline and monitoring methodology for that project category	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22e	OK	Table 2, Section A.1.3, B and D
15. Comments by local stakeholders are invited, and a summary of these provided	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22b	OK	Table 2, Section G
16. If required by the host country, an analysis of the environmental impacts of the project activity is carried out and documented	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22c	OK	Table 2, Section F
17. Parties, stakeholders and UNFCCC accredited NGOs have been invited to comment on the validation requirements and comments have been made publicly available	Simplified Modalities and Procedures for Small Scale CDM Project Activities §23b,c,d	OK	The PDD was published on www.dnv.com/certification/Climate Change. Parties, stakeholders and NGOs were through the UNFCCC CDM website invited to provide comments on the validation

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference/Comment
			requirement during a period of 30 days from 19 September to 19 October 2004. One comment was received on 28 September 2004.

Table 2 Requirements Checklist

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A. **Project Description** The project design is assessed.					
A.1. Small scale project activity It is assess whether the project qualifies as small scale CDM project activity.					
A.1.1. Does the project qualify as a small scale CDM project activity as defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM?	/1/	DR	Being a renewable energy project activity and avoidance of methane emissions, with an output capacity of less than 15 MW, i.e. 9,43 MW and having project emissions of less than 15 kilotonnes of carbon dioxide equivalent annually, i.e. 7,230 tCO2e per year, the project qualifies as a small-scale CDM project activity according to category (i) and (iii) defined in paragraph 6, subparagraph (c) of decision 17/CP.7 on the modalities and procedures for the CDM, and as defined by category I.D and III.E of Appendix B of the simplified modalities and procedures for small-scale CDM project activities. Category I.D comprises projects that "that supply electricity to an electricity distribution system". The electric energy generated by the project will be used by the Celulose Irani Plant and will reduce the imports from grid electricity and thus displace energy from the grid. As this project activity reduces grid electricity imports and thus avoids		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			marginal fossil fuel based electricity generation, DNV is in favour of the project being considered under Category I.D. This is, however, subject to the final acceptance of the CDM Executive Board with regard to whether category I.D can also apply to projects that generate electricity for their own use. Category I.A, i.e. electricity generation by the user, is not applicable to renewable energy projects supplying electricity to users currently connected to the grid. The simplified modalities and procedures give no further guidance on which project emissions to include for determining whether a project meets the small-scale eligibility threshold for category III.E, i.e. the project emissions shall be less than 15 000 tCO_{2e} per year. The selected definition of the project emissions being the CH_4 and N_2O emissions due to incomplete combustion of biomass with an exclusion of biogenic CO_2 emissions from the combustion of biomass is in line with other approved CDM baseline and monitoring methodologies.		
A.1.2. The small scale project activity is not a debundled component of a larger project activity?	/1/	DR	The project is not a debundled component of a larger project activity according to Appendix C of the simplified modalities and procedures for small-scale CDM project activities. No other CDM projects are implemented by Irani.		OK
A.1.3. Does proposed project activity confirm to one of the project categories defined for	/1/	DR	The project is a "Renewable electricity generation for a grid project activity" (Type I.D) and "Methane		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
small scale CDM project activities?			avoidance" (Type III.E) small-scale CDM project activity as defined in the simplified modalities and procedures for small-scale CDM project activities.		
A.2. Project Design Validation of project design focuses on the choice of technology and the design documentation of the project.					
A.2.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/	DR	The project is located at Vargem Bonita City in Santa Catarina State and has as boundaries the limits of the biomass power plant and the treatment of biomass according to paragraph 26 and 92 of the simplified baseline and monitoring methodologies for small scale projects.		OK
A.2.2. Are the project's system (components and facilities used to mitigate GHG's) boundaries clearly defined?	/1/	DR	The project comprises a new 9.34 MW thermoelectric plant on the premises of the Celulose Irani Plant, using biomass from eucalyptus and pinus waste, which on normal conditions is dumped on a landfill and left to decay. The electric energy will be used by the Celulose Irani Plant and will reduce the imports from grid electricity and thus displace electricity from the grid.		OK
A.2.3. Does the project design engineering reflect current good practices?	/1/	DR	The technology appears to represent best practice in the paper industry.		OK
A.2.4. Will the project result in technology	/1/	DR	Not necessarily. Celulose Irani already operates two		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
transfer to the host country?			generation units identical to the project.		
A.2.5. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period? Does the project make provisions for meeting training and maintenance needs?	/1/	DR	Cululose Irani has previous experience with biomass generation units (see A.2.4).		OK
A.3. Contribution to Sustainable Development The project's contribution to sustainable development is assessed					
A.3.1. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	The project is likely to mitigate the environmental impacts of the current biomass landfill.		OK
A.3.2. Will the project create any adverse environmental or social effects?	/1/	DR	Not foreseen.		OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR	The project is in line with current sustainable development priorities in Brazil.		OK
A.3.4. Is the project in line with relevant legislation and plans in the host country?	/1/	DR	The project complies with environmental legislation according to the Preliminary Environmental Licence issued by Environmental Agency (FATMA-SC). However, it could not be verified whether the project has obtained an Operational Environmental License.	~~CL 1~~	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B. **Project Baseline** The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.					
B.1. Baseline Methodology It is assessed whether the project applies an appropriate baseline methodology.					
B.1.1. Is the selected baseline methodology in line with the baseline methodologies provided for the relevant project category?	/1/	DR	The project applies two of the simplified baseline methodologies proposed for this project activity: 1) Category I.D. (Renewable electricity generations for the grid) , i.e. the average of the approximate operating margin and the build margin, and 2) Category III.E (Methane avoidance), i.e. comprises measures that avoid the production of methane from biomass that would have otherwise been left to decay.		OK
B.1.2. Is the baseline methodology applicable to the project being considered?	/1/	DR	Category I.D comprises projects that "supply electricity to an electricity distribution system". The electric energy generated by the project will partly be used by the Irani Plant and will reduce the imports from grid electricity. Hence, as this project activity reduces grid electricity imports and thus avoids marginal fossil fuel based electricity generation in the same way as projects supplying all their electricity to the grid, it is DNV's opinion that the project can apply the simplified baseline and monitoring methodology for category I.D small-		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			scale CDM project activities.		
B.2. Baseline Determination It is assessed whether the project activity itself is not a likely baseline scenario and whether the selected baseline represents a likely baseline scenario.					
B.2.1. Is it demonstrated that the project activity itself is not a likely baseline scenario due to the existence of one or more of the following barriers: investment barriers, technology barriers, barriers due to prevailing practice or other barriers?	/1/ /11/	DR/I	Barriers according to Attachment A of the simplified baseline and monitoring methodologies are presented to demonstrate the additionality of the project, including financial, technical and prevailing practice barriers. The financial evaluation considers only the risk of financing, but does not include savings due to reduced need of purchasing electricity from the grid. An IRR analysis or any other financial analysis is requested to evidence the financial barrier. With respect the presented prevailing practice barrier, the existence of two others cogeneration units indicate that there are no prevailing practise barriers. The additionally of the project is not clearly established and further evidence for the existence of barriers is requested.	~~CAR 1~~	OK
B.2.2. Is the application of the baseline methodology and the discussion and determination of the chosen baseline	/1/ /11/	DR/I	The selected baseline for grid electricity displacement is the average of the build margin and the approximate operating margin. The baseline		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
transparent and conservative?			determination is based on an International Energy Agency (IEA) study for Brazil (Bosi et al, October 2002) in which emission factors for the operation margin and build margin are calculated based on compiled data on 1,479 plants, in operation (1,174) or under construction (305) as of July 3, 2002. The data obtained for the South- Southeast and Mid-West grid (relevant for Irani) were used. In order to adequate the operation margin to the Brazilian grid, with has hydro predominance, a reduction factor was implemented using ANEEL/ONS figures. However this methodology differs from the methodology proposed for category I.D small-scale CDM project activities. It was extracted from the methodology proposed for the Vale do Rosário Project (NM0016-rev). This methodology was eventually approved as AM0015. However, the methodology for calculating the operating and build margin is different from the one originally proposed for the Vale do Rosário Project and hence the one applied by the Irani biomass electricity generation project. The project proponents are thus requested to calculate the operating and build margin according to the methodology given in the simplified baseline and monitoring methodologies for category I.D small-scale CDM project activities. The selected baseline for the methane avoidance component is the CH_4 emissions from disposing the wood waste on a landfill and leaving it to decay. However, the PDD indicates that spontaneous	~~CAR 2~~ ~~CL2~~	

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			combustion of wood waste on the landfill does currently occur. It needs to be clarified to which extent wood waste or CH_4 generated by the wood waste is currently combusted and transferred into CO_2. If significant, the baseline should be adjusted accordingly.		
B.2.3. Are relevant national and/or sectoral policies and circumstances taken into account?	/1/	DR	For renewable energy the Brazilian policy of energy matrix and tendency to implementation of gas cogenerations systems, as well as PROINFA, the Brazilian government programme to promote renewable energy, were considered. For methane avoidance no policy is established with respect to landfill.		OK
B.2.4. Is the baseline selection compatible with the available data?	/1/	DR	Yes		OK
B.2.5. Does the selected baseline represent the most likely scenario describing what would have occurred in absence of the project activity?	/1/ /11/	DR/I	See B.2.1	~~CAR 1~~	OK
C. **Duration of the Project / Crediting Period** It is assessed whether the temporary boundaries of the project are clearly defined.					
C.1.1. Are the project's starting date and operational lifetime clearly defined?	/1/	DR	The project's starting date is 1 September 2004 and the expected operation lifetime of the project is more than 30 years.		OK
C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no	/1/	DR	A crediting time of 7 years starting on 1 September 2004 with two possible renewals is selected.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
renewal)?					
D. **Monitoring Plan** The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed.					
D.1. Monitoring Methodology It is assessed whether the project applies an appropriate monitoring methodology.					
D.1.1. Is the selected monitoring methodology in line with the monitoring methodologies provided for the relevant project category?	/1/	DR	Yes, both selected monitoring methodologies are according to the methodologies established for small scale projects categories I.D and III.E.		OK
D.1.2. Is the monitoring methodology applicable to the project being considered?	/1/	DR	Yes, it complies with the monitoring requirements for small scale projects categories I.D and III.E.		OK
D.1.3. Is the application of the monitoring methodology transparent?	/1/	DR	Yes		OK
D.1.4. Will the monitoring methodology give opportunity for real measurements of achieved emission reductions?	/1/	DR	Yes, to determine the amount of electricity displaced by the project the net electricity produced by the Celulose Irani cogeneration plant is monitored. To determine CH_4 avoidance the total amount of biomass burned is monitored.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
D.2. Monitoring of Project Emissions It is established whether the monitoring plan provides for reliable and complete project emission data over time.					
D.2.1. Are the choices of project emission indicators reasonable?	/1/	DR	The project only results in the emissions of CH_4 and N_2O from incomplete combustion of biomass. CO_2 emissions associated with the combustion of biomass must not be accounted for since biomass is a climate neutral source of energy.		OK
D.2.2. Will it be possible to monitor / measure the specified project emission indicators?	/1/	DR	Yes. The net electricity produced by the Celulose Irani cogeneration plant and the amount of biomass and wood residues used can be easily monitored.		OK
D.2.3. Do the measuring technique and frequency comply with good monitoring practices?	/1/	DR	Yes, the technique and frequency appears good practice.		OK
D.2.4. Are the provisions made for archiving project emission data sufficient to enable later verification?	/1/	DR	Yes		OK
D.3. Monitoring of Leakage It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.					
D.3.1. If applicable, are the choices of leakage indicators reasonable?	/1/	DR	No leakage effects are expected (see E.2.1).		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
D.4. Monitoring of Baseline Emissions It is established whether the monitoring plan provides for reliable and complete project emission data over time.					
D.4.1. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/ /11/	DR/I	The determination of grid electricity displacement is based on the monitoring of electric energy generation. However, it is not clear if the electric energy generation includes the electric energy generation of the new cogeneration unit only or if it also includes electric energy generation by the existing biomass and hydroelectric plants. Methane avoidance is simply calculated based on amount biomass used as combustible. However, the share of biomass waste of Celulose Irani and the share of biomass purchased from third parties needs to be clarified.	~~CL 3~~ ~~CL 4~~	OK OK
D.4.2. Will it be possible to monitor / measure the specified baseline emission indicators?	/1/	DR	See D.4.1	~~CL 3/4~~	OK
D.4.3. Do the measuring technique and frequency comply with good monitoring practices?	/1/	DR	Yes, it appears adequate.		OK
D.4.4. Are the provisions made for archiving baseline emission data sufficient to enable later verification?	/1/	DR	The QMS certified with ISO 9001:2000 is mentioned as tool to comply with this necessity.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
D.5. Project Management Planning It is checked that project implementation is properly prepared for and that critical arrangements are addressed.					
D.5.1. Is the authority and responsibility of project management clearly described?	/1/ /11/	DR/I	The QMS certified with ISO 9001 is mentioned as tool to comply with this necessity. This needs to be verified during the site visit at Celulose Irani.	~~CL6~~	OK
D.5.2. Is the authority and responsibility for registration monitoring measurement and reporting clearly described?	/1/	DR	Ditto		OK
D.5.3. Are procedures identified for training of monitoring personnel?	/1/	DR	Ditto		OK
D.5.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	Ditto		OK
D.5.5. Are procedures identified for calibration of monitoring equipment?	/1/	DR	Ditto		OK
D.5.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR	Ditto		OK
D.5.7. Are procedures identified for monitoring, measurements and reporting?	/1/	DR	Ditto		OK
D.5.8. 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	Ditto		OK
D.5.9. Are procedures identified for dealing with possible monitoring data adjustments and	/1/	DR	Ditto		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
uncertainties?					
D.5.10. Are procedures identified for internal audits of GHG project compliance with operational requirements as applicable?	/1/	DR	Ditto		OK
D.5.11. Are procedures identified for project performance reviews?	/1/	DR	Ditto		OK
D.5.12. Are procedures identified for corrective actions?	/1/	DR	Ditto		OK
E. **Calculation of GHG emission** It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.					
E.1. Project GHG Emissions The validation of predicted project GHG emissions focuses on transparency and completeness of calculations.					
E.1.1. Are all aspects related to direct and indirect project emissions captured in the project design?	/1/	DR	CO_2 emissions associated with the combustion of biomass are not accounted since biomass generation is a climate neutral source of energy. The project only results in the emissions of CH_4 and N_2O from incomplete combustion of biomass, which is accounted for.		OK
E.1.2. Have all relevant greenhouse gases and sources been evaluated?	/1/	DR	Yes, see E.1.1		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
E.1.3. Do the methodologies for calculating project emissions comply with existing good practice?	/1/	DR	Yes, according formulae established by the simplified baseline and monitoring methodologies for small scale project type I.D and III.E.		OK
E.1.4. Are the calculations documented in a complete and transparent manner?	/1/	DR	Yes		OK
E.1.5. Have conservative assumptions been used?	/1/	DR	Yes. Default IPCC CH_4 and N_2O emission factors for the combustion of wood/wood waste in other sectors were selected to calculate project CH_4 and N_2O emissions from the combustion of biomass.		OK
E.1.6. Are uncertainties in the project emissions estimates properly addressed?	/1/	DR	Yes, according formulae established by the simplified baseline and monitoring methodologies for small scale project type I.D and III.E.		OK
E.2. Leakage It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed.					
E.2.1. Are leakage calculation required for the selected project category and if yes, are the relevant leakage effects assessed?	/1/	DR	Possible leakage effects related to the use of biomass are not discussed according to paragraph 8 of the simplified baseline and monitoring methodologies for small-scale CDM project activities, which require that leakage shall be considered in the case of project activities using biomass. However, biomass used by the project is currently not used by other users and the renewable energy technology used is not equipment		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			transferred from another activity. The project is thus not likely to result in significant leakage. Due to the fact that part of the biomass (woodwaste) is purchased from others suppliers, emissions resulting from the transportation of this biomass by truck to Celulose Irani needs to be assessed.	~~CL.7~~	
E.3. Baseline GHG Emissions The validation of predicted baseline GHG emissions focuses on transparency and completeness of calculations.					
E.3.1. Are the baseline emission boundaries clearly defined and do they sufficiently cover sources for baseline emissions?	/1/	DR	Yes, the project considers the boundaries established in the simplified baseline and monitoring methodologies for type I.D and III.E. Data obtained for the South- Southeast and Mid-West grid, from which the plant receives its electricity, were used.		OK
E.3.2. Are all aspects related to direct and indirect baseline emissions captured in the project design?	/1/	DR	All direct baseline emissions are captured. The baseline grid electricity emission factor is established as the average of the operating and build margin. The emissions related to the methane avoidance are determined based on the formula established for small scale project type III.E. Indirect baseline emissions are insignificant according guidelines for small scale project type I.D and III.E.		OK
E.3.3. Have all relevant greenhouse gases and sources been evaluated?	/1/	DR	See E.1.2		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
E.3.4. Do the methodologies for calculating baseline emissions comply with existing good practice?	/1/	DR	Yes, according simplified baseline and monitoring methodologies for small scale type I.D and III.E.		OK
E.3.5. Are the calculations documented in a complete and transparent manner?	/1/	DR	The project proponents are requested to calculate the operating and build margin according to the methodology given in the simplified baseline and monitoring methodologies for category I.D small-scale CDM project activities (see also B.2.2). The methane avoidance was determined using the IPCC default MCF for unmanaged, shallow (< 5 m waste) landfills, a DOC of 0.3 for wood waste and a the IPCC default DOC_f of 0.77. The selection of these factors is reasonable.	~~CAR 2~~	OK
E.3.6. Have conservative assumptions been used?	/1/	DR	The emission factor for grid electric energy generation considers the operating and build margin of the region S-SW grid, and does not consider the grid of Santa Catarina State where there is a higher amount of coal-based generation units.		OK
E.3.7. Are uncertainties in the baseline emissions estimates properly addressed?	/1/	DR	Yes		OK
E.4. Emission Reductions Validation of baseline GHG emissions will focus on methodology transparency and completeness in emission estimations.					
E.4.1. Will the project result in fewer GHG emissions than the baseline case?	/1/	DR	During the first 7 years crediting period, the project's expected annual emission reductions from the grid-electricity displacement component is 17		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			350 tCO_2e prior to planned production expansion in 2008 and 27 316 tCO_2e onwards. The annual emission reductions for the methane avoidance component of the proposed project activity is estimated as 148 002 tCO_2e. Given that the project is able to generate the stated amount of electricity by combusting the stated amount of wood waste, the estimated emission reductions are correctly estimated.		
F. **Environmental Impacts** It is assessed whether environmental impacts of the project are sufficiently addressed.					
F.1.1. Does host country legislation require an analysis of the environmental impacts of the project activity?	/1/	DR	The project has received a Preliminary Environmental Licence by the environmental agency, which was issued after analysing an EIA. However, it could not be verified whether the project has obtained an Operational Environmental License, which is necessary in order to operate.	~~CL 1~~	OK
F.1.2. Does the project comply with environmental legislation in the host country?	/1/	DR	See F.1.1	~~CL 1~~	OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR	Not foreseen. A dust washer to treat the combusted gases will be installed to mitigate the emissions of particulate matter.		OK
F.1.4. Have environmental impacts been identified and addressed in the PDD?	/1/	DR	Yes		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
G. **Comments by Local Stakeholder** Validation of the local stakeholder consultation process.					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR	According Brazilian DNA Resolution 1, letters to main local stakeholders were issued.		OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	These letters are not presented in the PDD and should be verified during the site visit.		
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	Yes, see G.1.1		OK
G.1.4. Is a summary of the comments received provided?	/1/	DR	No comments were received.		OK
G.1.5. Has due account been taken of any comments received?	/1/	DR	See G.1.4		OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants response	Validation team conclusion
CAR 1: The additionally of the project is not clearly established and further evidence for the existence of barriers is requested.	B.2.1 B.2.5	The PDD is being updated to include an investment analysis of the project, so that it can further explain the financial barriers faced. The analysis clearly indicates that without the CERs revenues the project would not take place.	An investment analysis considering all savings and expenses associated to the project, was presented. The analysis shows that the carbon revenues increase the IRR from 9.95% to 15.62%. DNV acknowledges that the project without CER revenues is lower than the levels regarded as acceptable for other investments in Brazil. However, given that Celulose Irani already operates two biomass power plants, it remains to be demonstrated why the existence of these activities does not contradict the claim that the proposed project activity faces an investment barrier. This can be done by comparing the proposed project activity to the other similar activities, and pointing out and explaining essential distinctions between them.
CAR 1 (continued): Given that Celulose Irani already operates two biomass power plants, it remains to be demonstrated why the existence of these activities does not contradict the claim that the proposed project activity faces an investment		The PDD was revised to include complementary information.	OK. During the site visit it was verified that the wood waste normally produced by Irani and other suppliers has inappropriate size to combust in boilers. To accept this biomass, the installation of a new shredder and sieves is necessary to reduce the size of wood with over size and add an adequate

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants response	Validation team conclusion
barrier. This can be done by comparing the proposed project activity to the other similar activities, and pointing out and explaining essential distinctions between them.			proportion of sawdust. The old boiler use wood chips, not sawmill or over size wood and has low effectiveness on fuel consumption. The PDD of December 04 demonstrates that the installation of the shredder and set of sieves is not prevailing business practise.
CAR 2: The baseline determination is based on an International Energy Agency (IEA) study for Brazil (Bosi et al, October 2002) as applied by the methodology proposed for the Vale do Rosário Project (NM0016-rev). This methodology was eventually approved as AM0015. However, the methodology for calculating the operating and build margin is different from the one originally proposed for the Vale do Rosário Project and hence the one applied by the Irani biomass electricity generation project.	B.2.2	Operating Margin: The methodology for category I.D SSC projects states that "the approximate operating margin is the weighted average emissions (in kg CO2equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation." The calculation of the operating margin used in Irani's PDD is more conservative than the required by the I.D methodology for Small Scale Projects. This is because the methodology allows the exclusion of all hydro and Irani's PDD uses 7.6% at the margin Build Margin The methodology for category I.D SSC projects states that "the build margin is the weighted average emissions (in kg	The operating margin is not calculated according to an approved methodology (Note: The approach for identifying the % of hydro that can be excluded from the operating margin proposed by NM0001-rev was not approved and the approach of the consolidated methodology was included in NM0015). However, the small-scale methodology allows to exclude all hydro and does not require an analysis of hydro that must be considered as being part of the operating margin. Therefore, the calculation of the operating margin for the Irani project is more conservative than if calculated with the category I.D small-scale methodology and thus acceptable. It remains to be demonstrated that the build margin calculated for the Irani project is calculated in accordance with

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants response	Validation team conclusion
		CO2equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants." The Built Margin calculated at Irani's PDD uses the 20% most recent existing plants (116 out of 582 plants) since, in the case of, the Brazilian grid, the amount of MWh of 116 plants (20% most recent existing plants) will definitely be higher than the amount MWh of any 5 most recent plants.	the methodology for calculating the build margin given for category I.D small-scale CDM project activities. If the calculation is different, this must be discussed and justified and it must demonstrated that the build margin calculated for the Irani project is more conservative.
CAR 2 (continued): The project proponents are requested to calculate the operating and build margin according to the methodology given in the simplified baseline and monitoring methodologies for category I.D small-scale CDM project activities. If the calculation is different, this must be discussed and justified and it must demonstrated that the combined margin calculated for the Irani project is more conservative.		The Brazilian electricity system nowadays comprises of around 98,8 GW of installed capacity, in a total of 1.420 electricity generation enterprises. Approved methodologies AM0015 and ACM0002 ask project proponents to account for "all generating sources serving the system". In that way, when applying one of these methodologies, project proponents in Brazil should search for, and research, all power plants serving the Brazilian system. In fact, information on such generating sources is not publicly available in Brazil. The national dispatch center, ONS – Operador Nacional do Sistema – argues that dispatching information is strategic to the power agents and therefore cannot be made available. On the other hand,	OK. The operating margin (the weighted average emissions of all generating sources serving the system excluding hydro, geotemal, wind, low-cost biomass nuclear and solar generation) and build margin (most recent 20% capacity additions to the system) were calculated according to the methodology given in the simplified baseline and monitoring methodologies for category I.D small-scale CDM project activities.Although the ONS data only covers 76.4% of the installed capacity in the S-SE-CO grid, the recalculation of the operating and build margin emission coefficient based on actual dispatch data from ONS

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants response	Validation team conclusion
		ANEEL, the electricity agency, provides information on power capacity and other legal matters on the electricity sector, but no dispatch or generation information can be got through this entity. In that regard, project proponents looked for a plausible solution in order to be able to calculate the emission factor in Brazil in the most accurate way. Since real dispatch data is necessary after all, the ONS was contacted, in order to let participants know until which degree of detail information could be provided. After several months of talks, plants' daily dispatch information was made available for years 2001, 2002 and 2003. According to ANEEL, in fact, ONS centralized dispatched plants accounted for 75.547 MW of installed capacity by 31/12/2004, out of the total 98.848,5 MW installed in Brazil by the same date (http://www.aneel.gov.br/arquivos/PDF/Resumo_Gráficos_mai_2005.pdf). Therefore, even though the emission factor calculation is carried out without considering all generating sources serving the system, about 76,4% of the installed capacity serving Brazil is taken into account, which is a fair amount if one looks at the difficulty in getting dispatch information in Brazil. Moreover, the remaining	represents an improvement of the data quality compared to the data from the IEA study on the Brazilian electricity grid carried out in 2002 (using data from 2000). The IEA study was based on installed capacity of plants built up to 2004 and assumptions regarding the plant efficiency and load factor. The revised combined margin emission coefficient of 0.521 tCO_2e/MWh is calculated in accordance with the simplified baseline methodology for category I.D small-scale CDM project activities based on electricity generation data provided by ONS for the S-SE-CO grid in the years 2001-2003 (Data for the years 2001-2003 are the most recent statistics available). Average plant efficiencies for different power plant types established in the IEA study on the Brazilian grid and IPCC carbon emission factors for specific fuels were used to calculate plant specific emission coefficients. The recalculated combined margin emission coefficient of 0.521 tCO_2e/MWh is appropriate due to the following: - Operating margin: The operating

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants response	Validation team conclusion
		23,6% are plants that do not have their dispatch coordinated by ONS, since: either they operate based on power purchase agreements which are not under control of the dispatch authority; or they are located in non-interconnected systems to which ONS has no access. In that way, this portion is not likely to be affected by the CDM projects, and this is another reason for not taking them into account when determining the emission factor. In the end, the approach of having ONS information only in the calculation of the combined margin emission factor for the Brazilian grid appeared to project proponents as the most transparent, conservative and reasonable. The combined margin factor was already revised and corrected. We have adopted the 0.521 tCO2/MWh agreed and also the ERs were corrected. The Brazilian electricity system has been historically divided into two subsystems: the North-Northeast (N-NE) and the South-Southeast-Midwest (S-SE-CO). This is due mainly to the historical evolution, which was naturally developed nearby the biggest consuming centers of the country and to the large distances between these consuming centers. The national dispatch center, ONS –	margin calculated based on generation data from power plant dispatched by ONS is 0.949 tCO_2e/MWh. No electricity generation data is publicly available for the remaining 23.6% of power plants which electricity is not dispatched through ONS. However, these plants are not likely to be affected by CDM project. They operate either based on power purchase agreements which are not under control of the dispatch authority, or they are located in non-interconnected systems to which ONS has no access. Hence, these power plants dispatched by ONS is representative for the operating margin. - Build margin: The build margin emission coefficient calculated for only power plants dispatched by ONS is 0.094 tCO_2e/MWh and thus more conservative than the emission coefficient calculated based on IEA data (0.421 tCO_2e/MWh) or the combination of IEA and ONS data (0.205 tCO_2e/MWh). - Project electricity system: Even though the S-SE-CO grid is connected with the North-Northeast (N-NE) grid, the energy flow between N-NE and S-

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants response	Validation team conclusion
		Operador Nacional do Sistema – and technical papers divides the Brazilian system in two (Bosi, 2000 and Bosi, 2002): Moreover, Bosi (2000) gives a strong argumentation in favor of dividing the grid of large countries: "*For large countries with different circumstances within their borders and different power grids based in these different regions, multi-project baselines in the electricity sector may need to be disaggregated below the country-level in order to provide a credible representation of 'what would have happened otherwise*" Finally, one has to take into account that even though the systems today are connected, the energy flow between N-NE and S-SE-CO is heavily limited by the transmission lines capacity. Therefore, only a fraction of the total energy generated in both subsystems is sent one way or another. The regions S and SE-CO are heavily interconnected. There are 8 large transmissions lines (4 of 230 Kv, 3 of 500Kv and 1 of 750 Kv. Data from *Revista Brazil Energia*, n°276, November 2003. See annexed map) and many small ones, do not presenting significant emissions constrains. On the other hand, the systems N-NE and S-SE-CO presents only one transmission line of 500 Kv, interconnecting Goias to Tocantins. Considering these facts, the project boundary	SE-CO grids are heavily limited by the transmission line capacity. Given the relative small capacity of the project, it is hence deemed appropriate to consider data on the S-SE-CO grid only.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants response	Validation team conclusion
		will be limited to the system S-SE-CO, and not the entire interconnected system. **References:** Bosi, M. *An Initial View on Methodologies for Emission Baselines: Electricity Generation Case Study*. International Energy Agency. Paris, 2000. **Bosi, M. *Road-testing baselines for greenhouse gás mitigation projects in the electric power sector.* International Energy Agency. Paris, 2002.**	
CL 1: It could not be verified whether the project has obtained an Operational Environmental License.	A.3.4 F.1.1 F.1.2	According to the Brazilian procedures, an Operational Environmental Licence can only be obtained after all the project construction is completed. The project is under construction at the moment and the only environmental licence available at this moment is the Preliminary Environmental Licence (the only one that can be issued to the project at this stage).	OK. At the first verification of emission reductions, the verifier will need to verify that the Operational Environmental Licence has been obtained.
CL 2: The PDD indicates that spontaneous combustion of wood waste on the landfill does currently occur. It needs to be clarified to which extent wood waste or CH_4 generated by the wood waste is currently combusted and transferred into CO_2. If significant, the baseline should be adjusted accordingly.	B.2.2	The occurrence of landfill fires is very low, with low extent of damage, and the impact on methane flows negligible. Furthermore, as a common practice in order to protect the region forestry activity, companies have fire brigades to suppress any fire occurrence, including the ones at the landfills.	OK. The clarifications provided by the project participants demonstrate that spontaneous combustion of wood waste on the landfill only seldom occurs and the baseline does not have to be adjusted.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants response	Validation team conclusion
CL 3: It is not clear if the electric energy generation includes the electric energy generation of the new cogeneration unit only or if it also includes electric energy generation by the existing biomass and hydroelectric plants.	D.4.1 D.4.2	The project consists of the construction and operation of the new 9.43 MW biomass plant and the PDD takes into account only the electricity generation of the new cogeneration unit. Existing biomass and hydroelectric plants are the same in baseline and project scenarios and are part of the project. The PDD text will be revised to clarify that issue.	OK. The revised PDD of October 2004 and December 2004 provides the requested clarification.
CL 4: The monitoring of methane avoidance is simple calculated based on amount biomass used as combustible. However, the share of biomass waste of Celulose Irani and the share of biomass purchased from third parties needs to be clarified.	D.4.1 D.4.2	In the baseline, the PDD refers to both the biomass purchased from third parties and that generated by Irani. The PDD and monitoring plan will be amended in order to differentiate them as: - Biomass generated by Irani. - Biomass purchased from third party	OK. The revised PDD of December 2004 provides the requested clarification. It was included on monitoring plan the verification of biomass (wood waste) suppliers. The avoidance of methane emissions by suppliers of biomass will be verified considering current consumption (2003 average purchase of 10.000 ton/month) and new quantity purchase to supply new boiler.
CL 5: The baseline with reference supply of wood waste is not clearly evidenced the availability of fuel	B.1.2	Brasil has a huge wood industry, with more than 1200 sawmills. Most of industries (87%) are located in south region. As an example, Parana and Santa Catarina states represent almost 80% of all Pinus spp. consumption (Sant'anna et.al, 2004).	OK. Verification on site and on the site of some suppliers during the site visit and further clarifications provided by the project proponents sufficiently address the request for clarification. The suppliers SINCOL, DAGOSTINI

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants response	Validation team conclusion
		The Brazilian technologies in sawmills are very poor, and less than 50% of wood is transformed in products. The other 50% are wood residues. Given the large number of sawmills in south region the biomass residue generation is concentrated in south region, creating an excess of biomass residues that the market cannot absorb. According to Brand et.al., more than 20% of residues are not used or sold. Thus, there are many large biomass piles that a left for decay, generating methane during this process. References: Sant'Anna, Mário; Teddy A. Rayzel; Mário C. M Wanzuita, 2004. Indústria consumidora de Pinus no Brasil. Rev. da Madeira. Nº 83 – ano 14 – Agosto de 2004. Brand, Martha A; Flávio J. Simioni; Débora N. H. Rotta; Luiz Gonzaga Padilha Arruda. elatório Final do Projeto " Caracterização da produção e uso dos resíduos madeiráveis gerados na industria de base florestal da região serrana catarinense.".	and LAVRAMA were visited. At IRANI it could be verified that the current practice is dumping the wood waste, esspecially sawmill and bark.
CL 6: The quality control system of IRANI is certified according ISSO 9001:2000, however the procedures related operation of new boilers are not concluded yet.	D.5.1	The QMS will include the new boiler when it started. Including new procedures.	OK. At the first verification of emission reductions, the verifier will need to verify that the Procedures for Quality Management System have been implemented for new boiler.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants response	Validation team conclusion
CL 7: The condition of use part of biomass (woodwaste) purchased from others suppliers, with transportation by truck to Celulose Irani, request more clarification to evidence the significance of this emission	E.2.1	The emission of biomass transportation is around 1.1 tonCO2/y what represent less 0,001% of total emission reduction and less than 0,013 of project emission, and thus are not required to be included.	OK. The clarifications provided by the project participants demonstrate that biomass transportation is not significant to the project.

- o0o -