



VALIDATION REPORT

“20 MW CAPACITY BIOMASS BASED POWER PROJECT OF M/s. SHALIVAHANA GREEN ENERGY LIMITED ” IN INDIA

REPORT No. 2011-9687

REVISION No. 03

DET NORSKE VERITAS



VALIDATION REPORT

Date of first issue: 8 February 2011	ConCert Project No.: PRJC-200301-2009-CCS-IND
Approved by Edwin Aalders	Organisational unit: DNV Climate Change and Environmental Services
Client: Shalivahana Green Energy Limited	Client ref.: Mr. Rajababu

DNV CLIMATE CHANGE
SERVICES AS

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 994 774 352 MVA

Summary:

Project Name: 20 MW Capacity Biomass based Power Project of M/s. SHALIVAHANA GREEN ENERGY LIMITED

Country: India

Methodology: ACM0018

Version: 01.3.0

GHG reducing Measure/Technology: Biomass based electricity generation

ER estimate: 86 353 tCO₂e per year (average) over ten year fixed crediting period

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 submission for registration

☐ Rejected

In summary, it is DNV's opinion that the project activity "20 MW Capacity Biomass based Power Project of M/s. SHALIVAHANA GREEN ENERGY LIMITED" in India, as described in the PDD, version 04 of 11 July 2012, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0018, version 01.3.0. Hence DNV requests the registration of the project as a CDM project activity.

Report No.: 2011-9687	Subject Group: Environment		Indexing terms Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism <input checked="" type="checkbox"/> No distribution without permission from the client or responsible organisational unit <input type="checkbox"/> free distribution within DNV after 3 years <input type="checkbox"/> Strictly confidential <input type="checkbox"/> Unrestricted distribution
Report title: 20 MW Capacity Biomass based Power Project of M/s. SHALIVAHANA GREEN ENERGY LIMITED			
Work carried out by: Astakala Vidyacharan, Ravi Kumar Prabhu, A. Parasuraman			
Work verified by: Indrajit Rana			
Date of this revision: 13 July 2012	Rev. No.: 03	Number of pages: 42	

© 2009 Det Norske Veritas AS

All rights reserved. This publication or parts thereof may not be reproduced or transmitted in any form or by any means, including photocopying or recording, without the prior written consent of Det Norske Veritas AS.



<i>Table of Content</i>	<i>Page</i>
ABBREVIATIONS	II
1 EXECUTIVE SUMMARY – VALIDATION OPINION	1
2 INTRODUCTION	2
2.1 Objective	2
2.2 Scope	2
3 METHODOLOGY	3
3.1 Desk review of the project design documentation	3
3.2 Follow-up interviews with project stakeholders	6
3.3 Resolution of outstanding issues	7
3.4 Internal quality control	9
3.5 Validation team	9
4 VALIDATION FINDINGS	10
4.1 Participation requirements	10
4.2 Project design	10
4.3 Application of selected baseline and monitoring methodology	11
4.4 Project boundary	14
4.5 Baseline determination	15
4.6 Additionality	17
4.7 Monitoring	26
4.8 Algorithms and/or formulae used to determine emission reductions	30
4.9 Environmental impacts	33
4.10 Comments by local stakeholders	33
4.11 Comments by Parties, stakeholders and NGOs	33
Appendix A Validation Protocol	
Appendix B Curricula vitae of the validation team members	



Abbreviations

BFBC	Bubbling Fluidised Bed Combustion boiler
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CERC	Central Electricity Regulatory Authority
CH ₄	Methane
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	DNV Climate Change Services AS
DNA	Designated National Authority
EIA	Environmental Impact Assessment
FAR	Forward Action Request
GCV	Gross Calorific Value
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of approval
MERC	Maharashtra Electricity Regulatory Commission
MNRE	Ministry of new and renewable energy sources
MoEF	Ministry of Environment and Forests
MPERC	Madhya Pradesh State Electricity Regulatory Commission
NCV	Net Calorific value
NEWNE	Northern, Eastern, Western and North-Eastern regional grid of India
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OERC	Orissa Electricity Regulatory Commission
OREDA	Orissa Renewable Energy Development Agency
OSPCB	Orissa State Pollution Control Board
PDD	Project Design Document
SGEL	Shalivahana Green Energy Limited
tCO ₂ e	Tonnes of CO ₂ equivalents
UNFCCC	United Nations Framework Convention on Climate Change
GWP	Global Warming Potential



1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the project activity “20 MW Capacity Biomass based Power Project of M/s. SHALIVAHANA GREEN ENERGY LIMITED” in India. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

The host Party is India and no Annex I Party has yet been identified. India fulfils the participation criteria and has approved the project and authorized the project participant Shalivahana Green Energy Limited. The DNA from India confirmed that the project assists in achieving sustainable development.

The project correctly applies the baseline and monitoring methodology ACM0018, version 01.3.0 “Consolidated methodology for electricity generation from biomass residues in power-only plants”.

The project activity is a grid connected renewable energy generation project using biomass residue fuel displacing equivalent fossil fuel based electricity generation in the connected grid. As a result, the project results in reductions of CO₂ / CH₄ emissions that are real, measurable and gives long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 86 353 tCO_{2e} per year over the selected 10 year fixed 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 project activity “20 MW Capacity Biomass based Power Project of M/s. SHALIVAHANA GREEN ENERGY LIMITED” in India, as described in the PDD, version 04 dated 11 July 2012, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0018, version 01.3.0. Hence, DNV requests the registration of the project as a CDM project activity.

Bangalore and Oslo, 13 July 2012

Astakala Vidyacharan
Validator
DNV Bangalore, India

Edwin Aalders
Approver
DNV Climate Change Services AS



2 INTRODUCTION

Shalivahana Green Energy Limited has commissioned DNV Climate Change Services (DNV) to perform a validation of the “20 MW Capacity Biomass based Power Project of M/s. SHALIVAHANA GREEN ENERGY LIMITED” project in India (hereafter called “the project”). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

2.1 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 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).

2.2 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 and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0018 (version 01.3.0). The validation was based on the recommendations in the Validation and Verification Manual /30/.

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



3 METHODOLOGY

The validation consisted of the following three phases:

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

The following sections outline each step in more detail.

3.1 Desk review of the project design documentation

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

3.1.1 Documentation provided by the project participants

- /1/ SGEL: CDM-PDD for project activity “20 MW Biomass based Power Plant of M/s. SHALIVAHANA GREEN ENERGY Limited” in India, web hosted PDD version 01 dated 2 June 2010 and final version 04 dated 11 July 2012 titled “20 MW Capacity Biomass based Power Project of M/s. SHALIVAHANA GREEN ENERGY LIMITED” in India.
- /2/ SGEL: Extracts of the meetings of Board of Directors deciding to go ahead with the project activity with CDM, dated 21 November 2007
- /3/ SGEL: Agreement with Allsoft Corporation Limited for procurement of Balance of equipment (de-aerator, water treatment plant, ash handling unit, cooling tower etc.), dated 5 January 2009.
- /4/ OREDA: Approval of the project activity, dated 29 June 2007 and final agreement with OREDA dtd. 12 October 2009
- /5/ SGEL: E-mail on intimation on developing the project activity as CDM to UNFCCC, dated 17 November 2008 and confirmation from UNFCCC on receipt of the email on the same day.
- /6/ SGEL: NOC from Nimidha grama panchayat dtd. 15 August 2007
- /7/ IDBI Bank: Loan sanction letter from IDBI Bank, Mumbai, dated 27 September 2008
Uco Bank: Loan sanction letter from UCO Bank dated 16 August 2008.
- /8/ MoEF: Approval of terms of reference for preparation of EIA/EMP from Ministry of Environment & Forests (MoEF) dtd. 1 July 2008.
- /9/ OSPCB: OSPCB notice for public hearing in connection with environment clearance, dtd. 4 October 2008 and Proceedings of Public hearing held on 30 October 2008
- /10/ SGEL: Local stake holder consultation meeting: Invitation, questionnaire and photos, dated 4 February 2009
- /11/ OSPCB: Consent to establish from OSPCB, dtd. 1 June 2009 and consent to operate the plant dated 4 July 2011.
- /12/ SGEL: CDM consultancy agreement with GIFTECH, dtd. 1 February 2009
- /13/ SGEL: Agreement with DNV for validation, dtd. 9 December 2009
- /14/ SGEL: PPA with Tata Power Trading Company Ltd., dtd. 13 September 2007

VALIDATION REPORT

- /15/ *SGEL: Presentation on the project to DNA of India on 31 March 2010*
- /16/ *Department of Water Resources: Permission to draw water from Brahmani river, dtd. 5 May 2010*
- /17/ *SGEL: Letter of Intent placed on Cethar Vessels (P) Limited for supply of boiler dated 11 July 2008 and final Purchase order for supply of boiler placed on Cethar Vessels dated 31 January 2009*
- /18/ *SGEL: Purchase order for supply of turbine and generator on Triveni Engineering & Industries Limited dated 31 March 2009*
- /19/ *Vimta Labs: Biomass analysis reports, April-May 2007*
- /20/ *Pioneer Enviro Laboratories & Consultants Pvt. Ltd.: EIA report on the project activity, dated 30 October 2008*
- /21/ *Nisar & Kumar, Chartered Accountants.: The certificate on the actual cost incurred in the project activity, dated 28 February 2011*
- /22/ *SGEL: The financial analysis spread sheet, dated 2 June 2010 and final version 04 dated 11 July 2012*
- /23/ *SGEL: Emission reduction calculation spread sheet, dated 2 June 2010 and final version 03 dated 2 December 2011*
- /24/ *Shameer Financial Services Pvt. Ltd: Detailed Feasibility Report dated September 2007*
- /25/ *Environment & Energy Management Group: A report on Biomass Resource Assessment, 2008-09*
- /26/ *SGEL: Power purchase agreements signed with Orissa GRIDCO dated 30 December 2010*
- /27/ *SGEL: Quotations received from vendors for supply of biomass, October 2009*
- /28/ *GRIDCO: Commissioning certificate no. S.E.P.P-I-471/2010/10701(8) dated 23 Dec 2011*

3.1.2 Letters of approval

- /29/ *Ministry of Environment & Forests (DNA of India): Letter of approval dated 18 August 2010*

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

- /30/ *CDM Executive Board: Validation and Verification Manual, version 1.2*
- /31/ *CDM Executive Board: Consolidated methodology electricity generation from biomass residues in power –only plants, ACM0018, version 01.3.0*
- /32/ *CDM Executive Board: Tool for demonstration and assessment of additionality, version 5.2*
- /33/ *CDM Executive Board: Tool to calculate the emission factor for an electricity system, version 1.1 and 2*
- /34/ *CDM Executive Board: Guidance on Assessment of Investment Analysis, version 5*
- /35/ *CDM Executive Board: Guidance on the demonstration and assessment of prior*



- consideration of the CDM, version 4*
- /36/ *CDM Executive Board: Glossary of CDM terms, version 5*
- /37/ *CDM Executive Board: Combined tool to identify the baseline scenario and demonstrate additionality version 3.0.1*
- /38/ *CDM Executive Board: Tool to determine the remaining lifetime of equipment, version 1*
- /39/ *CDM Executive Board: General guidance on leakage in biomass project activities, version 03, EB 47 Annex 28*
- /40/ *CDM Executive Board: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion, version 2*
- /41/ *CDM Executive Board: Tool to calculate baseline, project and/or leakage emissions from electricity consumption, version 1*
- /42/ *CDM Executive Board: Guidelines for the reporting and validation of plant load factors, EB 48 Annex 11*

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

- /43/ *RBI: Weekly statistical supplement on Cash Reserve Ratio and Interest Rates, dated 4 January 2008 <http://www.rbi.org.in/scripts/PublicationsView.aspx?id=11068>*
- /44/ *India's Initial National Communication – Chapter 2 – 'Greenhouse Gas Inventory Information, dated 16 June 2004: The national values of emission factor of coal*
- /45/ *MNRE: Scheme for promotion of grid interactive power generation projects based on renewable energy technologies. <http://www.mnre.gov.in/scheme-main-shp.htm>*
- /46/ *OERC: Tariff order on biomass projects dated 14 September 2010 and 23 September 2011*
- /47/ *Indian Income Tax Act 1961, Section 32 (Rule 5) Appendix 1 and Section 80-1A, paragraph 2.0*
- /48/ *MPERC: Tariff order for procurement of biomass based generation, dated 7 August 2007. <http://www.mperc.nic.in/Biomass-order-7-8-07.pdf>*
- /49/ *MERC: Tariff order for biomass based generation, dated 8 August 2005.*
- /50/ *CERC: Oder on renewable energy tariff regulations, dated 9 November 2010 http://www.cercind.gov.in/2010/November/Signed_Order_256-2010_RE_Tariff_FY_11-12.pdf*
- /51/ *CEA: The Central Electricity Authority (CEA) CO2 Baseline database Version 5 Nov 2009. http://cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm*
- /52/ *Society of Indian Automobile Manufacturers : Data on density of diesel <http://www.siamindia.com/scripts/Diesel.aspx>*
- /53/ *Renewable energy web sites of Indian states:
http://www.nedcap.gov.in/Biomass_Energy.aspx?ID=31
http://www.credacg.org/bpg_projects_commissioned.htm
<http://www.kredltest.in/Bioreport.aspx>
www.mprenewable.nic.in/abcd.xls
http://www.mahaurja.com/PDF/Biomass_Proj_StatusC.pdf
<http://peda.gov.in/eng/tender/web-bm-Apr11.pdf>*



<http://www.teda.in/index.php?r=site/index&id=208i9U4E3U>

<http://www.rrecl.com/>

- /54/ India's Initial National Commission: Chapter 2 – Greenhouse Gas Inventories
- /55/ Chattisgarh Renewable Energy Commission: Tariff order of 2008
- /56/ Energy Alternatives India: Gasification and combustion technologies for biomass based generation of electricity <http://www.eai.in/ref/ae/bio/bppm/gas/gasification.html>
- /57/ Reserve Bank of India: Survey of Professional Forecasters: Results of the Fifth Round (Q2:2008-09) <http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/88112.pdf>
<http://www.eai.in/ref/ae/bio/bppm/com/combustion.html>

The hyperlinks to the web sites referred in the table above were checked and verified on 7 February 2012.

3.2 Follow-up interviews with project stakeholders

On 15 December 2010, DNV visited the project site at village Nimdha, Dhenkanal district of Orissa state in India and performed interviews with project stakeholders.

	Date	Name	Organization	Topic
/58/	15 Dec 2010	Mr. N. Kiran Kumar, Head, Energy & Environment Mr. KSV Mallikarjuna, DGM Projects Mr. M. Chander, AGM Administration (Accounts & Stores)	Shalivahana Green Energy Limited	<ul style="list-style-type: none"> ➤ Project baseline ➤ Project additionality and barriers ➤ Project description and technical specification of main equipment ➤ CDM consideration ➤ Emission reduction calculations and data used therein. ➤ Monitoring and verification procedure and management systems. ➤ Review of the stakeholder consultation process. ➤ Environmental consents ➤ DNA approval of the project
/59/	15 Dec 2010	Mr. Srikanta Debari Mr. Baba Gangaram Mr. Basant Kumar Sahoo Mr. Ajay Kumar Sahoo	Sarpanch, Nimidha village Husk Supplier Farmer Contractor	<ul style="list-style-type: none"> ➤ Sustainable development of the region ➤ Availability of biomass in the region ➤ Local employment generation

The difference between the web hosted and the final PDD are:



- The barrier analysis discussion has been removed by PP in response to the CAR 6 raised by DNV.
- CERs were revised to 86 353 tCO₂/year from the earlier 90 462 tCO₂/year in response to the CL 5.
- Start date of the project activity is corrected from 13 September 2007 to 11 July 2008, which is the date of first major financial commitment, in response to the CL 2.
- The start date of crediting period has been revised from 1 April 2011 to 1 April 2012.
- Corrections based on the issues raised in the Request for Review by EB.

3.3 Resolution of outstanding issues

The objective of this phase of the validation was to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency, a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

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

The validation protocol consists of four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "20 MW Capacity Biomass based Power Project of M/s. SHALIVAHANA GREEN ENERGY LIMITED" in India is enclosed in Appendix A to this report.

Table 2 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 2 are listed in Table 3 of the protocol, and changes to the description of the project design as a result of these findings will be addressed in Table 3. Table 2 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 CDM requirements have not been met;
- (c) There is a risk that emission reductions cannot be monitored or calculated.

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

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



Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities		
Requirement	Reference	Conclusion
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) if a requirement is not met.

Validation Protocol Table 2: 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 corrective action request (CAR) is raised when project participants have made mistakes, the CDM requirements have not been met or there is a risk that emission reductions cannot be monitored or calculated. A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A forward action request (FAR) during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.

Validation Protocol Table 3: 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 4: 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 final validation report has undergone a technical review performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation team

<i>Role</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>	<i>Type of involvement</i>						
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 1.1 competence	Financial expertise
Team leader (Validator)	Astakala	Vidyacharan	India	✓		✓	✓			
Validator	Prabhu	Ravi Kumar	India	✓	✓	✓			✓	
Expert	A.	Parasuraman	India	✓		✓				✓
Technical reviewer	Rana	Indrajit	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 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, version 04 dated 11 July 2012.

4.1 Participation requirements

The project participants are Shalivahana Green Energy Limited of host Party of India and no Annex I Party has yet been identified for the project at this stage. The host Party (India) meet all relevant participation requirements.

A letter of approval (LoA) /29/ was issued by DNA of India on 18 August 2010, authorizing Shalivahana Green Energy Limited of host Party India as project participant and confirming that the project assists in achieving sustainable development. The title of the project mentioned in the web hosted PDD is slightly different from the title in LoA. DNV raised CAR 2 on the issue, based on which the PP corrected the project title in updated PDD. DNV confirms that title in the web hosted PDD and that in revised PDD denotes the same project activity.

The letter of approval was received from the project participant. DNV does not doubt the authenticity of the letters of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM /30/.

4.2 Project design

The project is located at Nimdha village, on Sambalpur – Cuttack road, Orissa State, India. The nearest major town Denkhanal is at a distance of 40 km. The geographical coordinates of the project site are 85°19'08.02"E and 20°46'35.25"N.

This is a Greenfield project, involving the installation of a 90 TPH biomass fired boiler using a 23 MW turbine whose capacity will be governed / capped at 20 MW. The project will be connected to the grid, which forms a part of the Northern, Eastern, Western and North-Eastern regional (NEWNE) grid of India. The technology used in the project is available in India and no transfer of technology from Annex I country is envisaged. The biomass based power plant will generate electricity by utilizing the available renewable biomass in the region, which will be primarily agricultural crop residues like paddy stalks, groundnut shells, stalks of red grams, mung, til, maize etc., agro industrial waste (rice husk) and woody biomass (juliflora & casuarina twigs) from agriculture/waste lands etc. The project activity follows basic Rankine cycle and is expected to export 124.57 GWh of power to the grid annually.

The plant and machinery of the project consists of 90 TPH Bubbling Fluidised Bed Combustion (BFBC) with economizer, a steam turbine generator set with water cooled condensers, and power evacuation system. The auxiliary units consist of fuel storage and handling system, water treatment plant, compressor unit, cooling tower, electrostatic precipitators, ash handling system etc. The turbo generator has a rated capacity of 23 MW and generates electricity at 11 kV level. However, the statutory approvals /11/ granted to the



project and PPA signed with GRIDCO /26/ are for operation of 20 MW capacity only. Further, the commissioning certificate also states the capacity to be 20 MW /28/. Hence project proponent is committed to operate within the permitted capacity of the project activity. The electricity generated is stepped-up to 132 kV voltage level and exported to Orissa grid, part of the integrated NEWNE grid.

The project will result in an estimated reduction of 86 353 tCO₂e per annum over the crediting period of 10 years by exporting electricity to the NEWNE grid, which is dominated by fossil fuelled based power generators. The technology applied is deemed current good practice and is not expected to be replaced within the crediting period.

The project start date is 11 July 2008, which was evidenced to be the date of issue of Letter of Intent for purchasing the boiler from Cethar Vessels Limited /17/. This date is the earliest of all activities that involve major investment decisions and meets the requirement criteria defined for start date of the project activity (c.f. section 4.6.1).

The project was commissioned on 19 December 2011 /28/. The expected operational lifetime of the project is stated to be 20 years and a fixed crediting period has been chosen with the starting date to be the date of registration of the project activity or 1 April 2012 or the date of registration. The operating lifetime is verified from the in-principle letter issued by OREDA for setting up the project activity /4/ and the OERC Tariff order /46/. The operating life is reasonable and in line with the default lifetime as per the “Tool to determine the remaining lifetime of equipment” /38/, according to which the technical lifetime of the boilers and steam turbines is 25 years.

DNV considers the project description of the project contained in the PDD to be complete and accurate. The PDD complies with the relevant forms and guidance for completing the PDD /1/.

4.3 Application of selected baseline and monitoring methodology

The project applies the approved consolidated baseline methodology ACM0018, version 01.3.0 /31/ which is applicable to the project activity as:

The project involves installation of a new biomass residue co-fired power-only plant at a site where currently no power generation occurs. This was verified during the site visit. The project is a greenfield power project. Hence, the methodology is applicable.

Applicable conditions of Methodology ACM0018	The proposed project activity
No other biomass types than biomass residues, as defined in the methodology, are used in the project plant.	The project activity will use biomass residues such as paddy stalks, groundnut shells, stalks of red grams, mung, til, maize etc., agro industrial waste (rice husk) and woody biomass (juliflora & casuarina twigs) from agriculture/waste lands, which are biomass residues, as defined in the methodology. This was verified from the DPR /24/ and the Biomass assessment report /25/.
Fossil fuels may be co-fired in the project	The Ministry of Non-conventional Energy



VALIDATION REPORT

plant. However, the amount of fossil fuels co-fired shall not exceed 80% of the total fuel fired on an energy plant.	Sources /45/ permits the use fossil fuel only up to 15% on energy basis in biomass power plants as support fuel as and when required. Hence the use of fossil fuel will not exceed 80% of the total fuel fired on annual energy basis.
For the projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, long, etc.) or in other substantial changes.	The project activity proposes to use off-site biomass residues, which are available in the project region of 100 km around the project site. This was verified from the DPR /24/ and the Biomass assessment report /25/. There is no production process unit at project site from which biomass residues could be used. Hence the project activity will not result in an increase of the processing capacity of raw input or in other substantial changes.
The biomass residues used by the project facility should not be stored for more than one year.	It was verified during site visit that the capacity of biomass storage is limited at site. Further, the biomass residues will be consumed on first come first serve basis. Hence there is no possibility of storing the procured biomass for more than one year.
Projects that chemically process the biomass residues prior to combustion (e.g. by means of esterification, fermentation and gasification) are not eligible under this methodology. The biomass residues can however be processed physically such as by means of drying, pelletization, shredding and briquetting;	The biomass residues used by the project will not be processed chemically and/or by means of gasification. This was verified from the DPR /24/ and the Biomass assessment report /25/. However, some energy will be consumed for transportation and mechanical treatment of the biomass residues to prepare for fuel combustion.
No power and heat plant operates at the project site during the crediting period.	The proposed project is a greenfield biomass based power only project as per the DPR /24/. During the site visit, it was verified that no co-generation plant operates at the project site.
If any heat which is used for purposes other than power generation (e.g. heat which is produced in boilers or extracted from the header to feed thermal loads in the process) is generated during the crediting period or was generated prior to the implementation of the project activity, by any on-site or off-site heat generation equipment connected to the project site, the following conditions should apply: a) The implementation of the project activity does not influence directly or indirectly	The proposed project is a greenfield biomass based power only project as per the DPR /24/. During the site visit, it was verified that no co-generation plant operates at the project site.



<p>the operation of the heat generation equipment, i.e. the heat generation equipment would operate in the same manner in the absence of the project activity.</p> <p>b) The heat generation equipment does not influence directly or indirectly the operation of the project plant(e.g. no fuels are diverted from the heat generation equipment to the project plant); and</p> <p>c) The amount of fuel used in the heat generation equipment can be monitored and clearly differentiated from any fuel used in the project activity.</p>	
<p>In the case of fuel switch project activities, the use of biomass residues or the increase in the use of biomass residues as compared to the baseline scenario is technically not possible at the project site without a capital investment in:</p> <ul style="list-style-type: none"> - The retrofit or replacement of existing heat generators/boilers; or - The installation of new heat generators/boilers; or - A new dedicated biomass residues supply chain established for the purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass residues that could otherwise not be used for energy purposes); - Equipment for preparation and feeding of biomass residues. 	<p>The proposed project is a greenfield biomass based power only project as per the DPR /24/. Hence no fuel switch is involved.</p>
<p>The methodology is only applicable if the most plausible baseline scenario, identified as per the “Procedure for the selection of the baseline scenario and demonstration of additionality” section hereunder, is:</p> <ul style="list-style-type: none"> - For power generation: Scenarios P2 to P7, or a combination of any of those scenarios; - For biomass use: Scenarios B1 to B8, or a combination of any of those scenarios. However, note that for scenarios B5 to B8, leakage emissions should be accounted for as per the procedures of the methodology. 	<p>The most plausible baseline scenarios identified for the project activity are:</p> <ul style="list-style-type: none"> - For power generation: Scenario P5; - For biomass use: a combination of B1 and B3. <p>Hence, the methodology ACM0018 is applicable for the proposed project.</p>

The assessment of the project’s compliance with the applicability criteria of ACM0018



(version 01.3.0) are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

4.4 Project boundary

The spatial extent of the project boundary encompasses the power-only plant at the project site, the means for transportation of biomass residues to the project site and all power plants connected physically to the NEWNE grid, to which the project plant is connected and the sites where the biomass residues would have been left for decay or dumped. The selected sources and gases are justified for the project activity.

The system boundaries are presented in the following table:

	Source	Gas		Justification / Explanation
Baseline	Electricity generation	CO ₂	Included	Main emission source
		CH ₄	Excluded	Excluded for simplification. This is conservative
		N ₂ O	Excluded	Excluded for simplification. This is conservative
	Uncontrolled burning or decay of surplus biomass residues	CO ₂	Excluded	It is assumed that CO ₂ emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH ₄	Included	B1, and/or B3 has been identified as the most likely baseline scenario
		N ₂ O	Excluded	Excluded for simplification. This is conservative. Note also that emissions from natural decay of biomass are not included in GHG inventories as anthropogenic sources
Project Activity	On-site fossil fuel consumption	CO ₂	Included	May be an important emission source as the boiler can be co-fired with fossil fuel (coal) along with biomass residues.
		CH ₄	Excluded	Excluded for simplification. This emission source is assumed to be very small
		N ₂ O	Excluded	Excluded for simplification. This emission source is assumed to be very small
	Off-site transportation of biomass residues	CO ₂	Included	May be an important emission source
		CH ₄	Excluded	Excluded for simplification. This emission source is assumed to be very small
		N ₂ O	Excluded	Excluded for simplification. This emission source is assumed to be very small
	Combustion of biomass residues for electricity	CO ₂	Excluded	It is assumed that CO ₂ emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector
		CH ₄	Included	This emission source included as CH ₄ emissions from uncontrolled burning or decay of biomass residues in the baseline scenario are included
		N ₂ O	Excluded	Excluded for simplification. This emission source is assumed to be small



	Source	Gas		Justification / Explanation
	Storage of biomass residues	CO ₂	Excluded	It is assumed that CO ₂ emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH ₄	Excluded	Excluded for simplification. Since biomass residues are stored for not longer than one year, this emission source is assumed to be small
		N ₂ O	Excluded	Excluded for simplification. This emissions source is assumed to be very small
	Wastewater from the treatment of biomass residues	CO ₂	Excluded	It is assumed that CO ₂ emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH ₄	Excluded	This emission source is excluded as the waste water is not treated even partly under anaerobic conditions
		N ₂ O	Excluded	Excluded for simplification. This emission source is assumed to be small

The identified boundary and 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 ACM0018 (version 01.3.0).

4.5 Baseline determination

Identification of alternatives to the project activity

1) The alternative scenarios for electric power

As defined in ACM0018 version 01.3.0 /31/, in absence of the project activity, realistic and credible power generation alternatives are P1 to P7.

As per the DPR /24/ and as verified during the site visit /58/, the project activity is the establishment of a greenfield power plant, that supplies electricity to the NEWNE grid. There is no existing or new grid-connected power plant available at the project site, except the project activity. As per the methodology, *“If the project activity is the establishment of a greenfield power plant and supplies electricity only to the grid, then the alternatives considered for power generation should include only the scenarios P1 and P5. In this case, it can be considered that the electricity delivered by the project activity would have otherwise been generated by the operation of existing or new grid connected power plants, established either by the project participants or by third parties.”* Hence the scenarios P2, P3, P4, P6 and P7 are excluded. Based on above analysis, the alternatives considered for power generation are limited to the scenarios P1 and P5.

2) The alternative scenarios for biomass residues

As defined in the ACM0018 version 01.3.0 /31/, realistic and credible alternatives for biomass residues include B1 to B8 in absence of the project activity.

- In the absence of the project activity, the surplus biomass residues would have been left to



decay or burnt in an uncontrolled manner /25/. Thus B1 and B3 are possible baseline scenarios.

- B2 is excluded since landfill for dumping biomass residues and its anaerobic decaying is not practised in the region. This was verified from the Biomass assessment report /25/.
- B4 is excluded since there is no other biomass plant at the project site, existing or new, except the project activity. This was verified during the site visit.
- As per Biomass assessment report /25/, there is no other biomass based heat or power generating plants in the project region of 100 km around the plant. Hence, B5 is not a realistic baseline alternative for this project activity.
- The use of biomass residues for bio fuel and other energy purpose is not a common practice in the region. This was verified during the site visit interviews /58/-/59/ and from the biomass assessment report /25/, /58/, /59/. Hence, B6 is not a realistic baseline alternative for this project activity.
- Only a small quantity of the biomass is used for fertilizer feedstock and domestic energy requirements in the region and the remaining quantity is burnt or dumped. Surplus availability of the biomass in the area confirm that this is not an alternative /25/. Hence, B7 is not a realistic baseline alternative for this project activity.
- The primary source of the biomass residues are clearly defined in biomass assessment report /25/ as agricultural fields and rice mills which are located in the project region. The surplus biomass residues are left to decay or burnt in an uncontrolled manner /25/. Thus, B8 is not a realistic baseline alternative for this project activity.

The project participant conducted a detailed biomass assessment study in the region with a radius of 100 km around the project activity prior to the project conceptualization. According to the biomass assessment study conducted by M/s Environment and Energy management Group /25/ Bhopal, /25/, the surplus of each type of biomass residue in the region of the project activity for the year 2008 - 09 is given below:

S. No	Type of residues	Generation	Consumption		Surplus	Surplus %
			Project activity (SGEL)	Others		
1	Rice husk	838 600	86 157	385 757	366 686	77.1%
2	Paddy stalks	111 814	17 181	46 960	47 673	74.3%
3	Til stalks	28 436	3 436	7 962	17 038	149.5%
4	Mung stalks	52 445	6 872	16 750	28 823	122.0%
6	Red gram stalks	15 583	1 718	7 800	6 065	63.7%
5	Maize cobs & stalks	129 759	13 745	55 000	61014	88.8%
7	Groundnut shell	20 559	7 832	5 140	7 587	58.5%
8	Woody biomass (Juliflora & casuarina twigs)	71 955	8 590	26 450	36 915	105.3%



	Total Residues	1 269 151	145 532	551 819	571 800	82.0%
--	-----------------------	------------------	----------------	----------------	----------------	--------------

The biomass assessment study confirms that the quantity of that type of biomass residues available in the region is at least 25% larger than the quantity of biomass residues of that type which is utilized in the region, as per methodology, the scenarios B1, B2 and B3 can be regarded as plausible baseline scenarios. Of these, B2 cannot be the baseline scenario since there is no landfill of more than 5 meter depth for the anaerobic decay of biomass, which was verified from biomass assessment report /25/, according to which the surplus biomass is burnt/ mulched/ left source to decay.

Based on the analysis above, the alternative scenarios P1 & P5 and B1 & B3 are in compliance with all applicable legal and regulatory requirements, and are realistic and credible alternatives for the proposed project.

For power generation: P1- The proposed project activity not undertaken as a CDM project activity and P5- The generation of power in the grid. Since P1 is same as the project activity and project activity is not viable without CDM benefit (as discussed in the section 4.6.3), the baseline scenario for power generation is P5.

For the use of biomass residues: B1-The biomass residues are dumped or left to decay under mainly aerobic condition. B3-The biomass residues are burnt in an uncontrolled manner without utilizing if for energy purposes. Both are baseline scenarios.

Thus the alternatives are P1, B1 & B3. DNV considers the list of realistic and credible alternatives to be complete and accurate.

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 are correctly quoted and 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.

4.6 Additionality

The additionality of the project, as required by ACM0018 version 01.3.0 /31/, is demonstrated by applying the “*Combined tool to identify the baseline scenario and demonstrate additionality*” version 03.0.1 /37/.

4.6.1 Evidence for prior CDM consideration and continuous actions to secure CDM status

The starting date of the project is 11 July 2008, which was verified to be the date of the placement of Letter of Intent (LoI) by SGEL for supply of boiler on Cethar Vessels /17/ and is the date of earliest action among all activities, which involved major investments in the project implementation. This has been confirmed after verification of the following documents related to major investments.



- Agreement with Allsoft Corporation Limited for procurement of balance equipment dated 5 January 2009 /3/.
- Purchase order dated 31 March 2009 on M/s Triveni Engineering Industries Limited for supply of Turbo Generator /18/.

It is demonstrated that CDM was seriously considered in the decision to proceed with the project activity in compliance with EB 62 annex 13 /35/, which was confirmed through the assessment of the following evidences:

- The detailed project report of the project activity prepared by Shameer Financial Services Pvt Ltd in September 2007 /24/, consider the possibility of revenue from CO₂ emission reduction through CDM.
- Board of directors meeting on 21 November 2007 /2/ approved the DPR to develop the project activity with CDM, since the project is not financially viable and the additional revenue through sale of CER, as stated in the DPR /24/, will improve the viability of the project.
- Over and above the prior consideration of CDM, PP made E-mail intimation to UNFCCC on developing the project activity as CDM on 17 November 2008 and confirmation from UNFCCC on receipt of the email on the same day /5/, within 6 months of the start date of the project of 11 July 2008, which is prior to 2 August 2008.

This confirms that CDM was a decisive factor for investing in the project activity.

The assessment that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation is summarized below:

- Appointment of GIFTech Solutions, Hyderabad as advisor to SGEL for CDM related advisory services dated 1 February 2009 /12/.
- Local stake holder meeting on 4 February 2009 as verified from the copy of the initial stakeholder consultation meeting report including invitation to the meeting, minutes of meeting etc. /10/.
- Appointment of DOE on 9 December 2009 as verified from the agreement with DNV /13/.
- Presentation to the DNA of India on the project activity on 31 March 2010 /15/.
- Approval of the project activity by DNA of India on 18 August 2010 /29/.
- PDD web hosted for global stakeholders comments on 27 October 2010.

The above documented evidences have been verified by DNV. Since the gap between the major activities starting from decision making on 21 November 2007 to the date of PDD web hosting, is less than 2 years DNV concludes that continuing and real actions were taken to secure CDM status for the project activity, in line with EB 62 Annex 13 guidelines /35/ and the CDM-Validation Verification Manual Version 01.2 paragraphs 102 to 104 /30/.

It is DNV's opinion that the proposed CDM project activity complies with the requirements of the latest version of the guidance on prior consideration of CDM.



4.6.2 Identification of alternatives to the project activity

As per the methodology, the alternatives to the power generation and biomass have been discussed under section 4.5 of the methodology and concluded the following scenarios:

P5: The generation of power in the grid for power generation

B1: The biomass residues are dumped or left to decay under mainly aerobic condition and B3: The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.

4.6.3 Investment analysis

Choice of approach

In view of the fact that the proposed project activity generates financial and economic benefits through the sales of electricity and the baseline does not involve any investment, choice of benchmark analysis for proving the financial non-viability of the project is considered appropriate. The project proponent carried out an investment analysis (project IRR) based on the total project cost, energy export to grid, tariff structure, fuel cost and O & M cost in order to demonstrate that the project is economically unattractive.

Benchmark selection

The prime lending rate of 13% has been chosen as the post-tax benchmark. The Reserve Bank of India (RBI), the central bank of the country publishes the prime lending rate (PLR) in its weekly statistical supplement *Cash Reserve Ratio and Interest Rate*, representing the average prevailing lending rate of major banks and financial institutions in India /43/. At the time of the investment decision of the project activity (21 November 2007), the PLR range published by the RBI was 12.75% to 13.25% over 8 month period from March to November 2007 /43/. The project participant has selected the average of the range, 13% as the benchmark for the investment analysis.

The selected benchmark is the commercial lending rate published by RBI. This is in line with the methodology requirement of “*Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds’ required return on comparable projects*” /31/. Further, the selected benchmark is also in line with the guidance on the assessment on investment analysis /34/, according to which, in the case of projects which could be developed by other entities as well, the local commercial lending rates or the weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. The 14% interest rate on term loan charged by IDBI Bank and 17% by UCO Bank to SGEL is higher than the selected benchmark of 13%. The benchmark will come down if PLR is considered as pre-tax and corresponding tax is applied on it, but the banks will not provide loans at this lower rate of interest. Further, DNV verified that pre-tax IRR of the project activity is 10.62%; lower than the benchmark.

Further, the default value for the expected return on equity specified in Appendix to CDM EB guidance on assessment of Investment analysis version 5 /34/, for Indian bonds with Baa3 rating is 11.75% for Group 1, Energy Industries, under which the project activity falls. As per para 7 of the appendix A of CDM EB guidance on assessment of Investment analysis /34/, “*in situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central*



bank of the host country for the duration of the crediting period". The inflation rate forecasted in the report of Reserve Bank of India (RBI) – "Survey of professional forecasters: Results of the 14th round (Q2: 2008-09)" /57/, the annual average change over the next 10 years for wholesale price index (WPI) inflation is 5%. The post-tax real term benchmark (11.75+5%) works out to 16.75%, that is higher than the selected benchmark of 13%.

Thus, the selected post-tax benchmark of 13% is conservative and in conformity with paragraph 112 of VVM version 1.2 /30/.

Input parameters

In line with the Guideline on Investment Analysis /34/, which states the "*Input values used in all investment analysis should be valid and applicable at the time of the investment decision taken by the project participant*", DNV verified the input parameters to be valid at the time of decision making on 21 November 2007, based on the above mentioned documents. Since the tariff order of OERC was published only on 14 September 2010, the input parameters were crosschecked against the 2007 tariff order of the neighboring state Madhya Pradesh (MPERC tariff order) /48/, except for the fuel cost, which being state specific, is cross checked with OERC order. The corresponding values as per OERC 2010 tariff order /46/ are also indicated in bracket in italics for comparison.

Inputs values	Value used for financial analysis	Documents verified/cross-checked
Total investment cost of the project activity	INR 905.38 million for the 20 MW capacity plant	The investment cost was sourced from the detailed project report /24/ and was cross checked against MPERC order /48/ of 7 August 2007, which indicates a capital cost of INR 42.5 million/MW (INR 850 million for 20 MW) for biomass based power plants (<i>OERC order indicates INR 45 million/MW</i>). The project cost is 6.1% higher than the cost used in MPERC tariff order. However, the 6.1% increase in project cost does not have any impact on the viability of the project, since the sensitivity analysis shows that benchmark is crossed only if the project cost reduces by 12.9%. Further, the actual cost incurred in the project activity as on 25 February 2011 was INR 907.559 million and thus higher, as per the certificate issued by M/s Nisar & Kumar, Chartered Accountants /21/. Based on the above discussion DNV concludes that the investment cost is appropriate.
Electricity Tariff	INR 3.61/kWh for the 1 st year and INR 4.84/kWh during the 20 th year	The tariff and escalation was verified from the power purchase agreements signed with Tata Power Trading Company Ltd. /14/ on 13 September 2007 with a base tariff of INR 3.61/kWh (with a corresponding fuel price of INR 1384/MT) and the same was the basis for the DPR /24/. The tariff was cross checked against the



		<p>MPERC tariff order of 2007, which fixed a tariff of INR 3.33/kWh for the 1st year with annual variable component increase, resulting in INR 3.59 and 5.14/kWh during the 7th year and 20th year respectively. The yearly tariff of MPERC is provided in PDD /1/ and the rate is higher than rate considered for investment analysis only for the years 18-20. At the time of investment decision, no tariff order for biomass projects was available in the state of Orissa. The first tariff order for biomass based power plants was issued by OERC in 2010 and PP entered into PPA with the OERC tariff order of 2011. The OERC order of 2011 indicates a tariff of INR 4.87/kW, 35% higher than INR 3.61/kW applied for financial analysis with a fuel price of INR/MT 2 316, 67% higher than INR/MT 1 384 applied and a 5% annual escalation. The increase in tariff is mainly to compensate for the increase in fuel price and the increase in tariff is much lower than the increase in fuel price. Thus DNV consider the tariff used for the financial analysis is conservative.</p>
Escalation in tariff	Escalation of 5% every 3 years	<p>The tariff considered for financial analysis is based on the PPA signed with Tata Power Trading Company Ltd. /14/. The tariff is INR 3.61/kWh for the 1st year and INR 4.84/kWh during the 20th year. This works out to an average annual tariff escalation of 1.6%, based on the tariff for the 1st year and the 20th year.</p> <p>DNV verified the annual tariff increase considered in the neighboring states of Maharashtra and Chhattisgarh and Madhya Pradesh, since there was no tariff order in the state of Orissa at the time of decision making. The 2005 tariff order of Maharashtra /49/ has fixed a tariff of INR 3.04/kWh for the 1st year and INR 3.43/kWh for the 13th year, an annual increase of 1.01%. The 2008 tariff order of Chhattisgarh /55/ has fixed a tariff of INR 3.05/kWh for the 1st year and INR 3.27/kWh for the 8th year, an annual increase of 1%. The Madhya Pradesh tariff order /48/ of 2007, has fixed a tariff of INR 3.33/kWh for the 1st year and 5.14/kWh during the 20th year, which corresponds to average annual increase of 2.35%.</p> <p>The 1st year tariff considered for the investment analysis is higher than the rate fixed by the three neighboring states. The annual increase considered by the states Maharashtra and Chhattisgarh is much lower than the annual increase considered for financial analysis. In case of Madhya Pradesh, the annual</p>



		<p>increase in tariff is slightly higher, but the actual tariff is higher only for the years 18-20, than the tariff considered for investment analysis. Further, DNV verified that if the tariff fixed by the Madhya Pradesh for 20 years is applied for investment analysis, the IRR comes down to 2.32% against the 9.79% with the tariff considered for the investment analysis.</p> <p>The tariff and the annual increase fixed by different buyers depend on many factors such as biomass price in the state, initial tariff etc. In some cases, the initial tariff is higher, but annual increase is lower, whereas in some other cases, the tariff is fixed without annual escalation. In the case of the project activity, a higher tariff of INR 3.61/kWh was fixed compared to other tariff orders available at the time of decision, but the escalation was provided only once in 3 years, though increase in O&M cost and fuel cost was considered annually. As discussed earlier, the actual tariff is higher in the case of project activity for all the years, except for the years 18-20, wherein the tariff of Madhya Pradesh is higher. Thus DNV consider the initial tariff and the increase in tariff used for the financial analysis is reasonable.</p>
Plant load factor	70% for the first year and 80% for second year onwards	<p>The PLF of 70% for the first year and 80% for second year onwards was verified from the DPR /24/ prepared by Shameer Financial Services, Pvt. Ltd., the third party consultant engaged by SGEL. The PLF determined is in line with the "Guidelines for the reporting and validation of plant load factors" /42/. The PLF is crosschecked against the MPERC order of 7 August 2007 /48/, which considered 70% PLF for all the 20 years (<i>OERC order of 2010 indicates the same PLF as MPERC order</i>). Thus the PLF considered for financial analysis is reasonable.</p>
Auxiliary consumption	10%	<p>The auxiliary consumption was sourced from the detailed project report /24/ and cross checked against MPERC order (10%) of 7 August 2007 /48/ (<i>OERC order of 2010 also indicates an auxiliary consumption norms of 10%</i>). Thus the auxiliary consumption considered for financial analysis is reasonable.</p>
Operation and maintenance cost	4% of capital cost with an annual escalation of 5%	<p>The O&M cost and annual escalation was sourced from DPR and cross checked against the MPERC order of 7 August 2007 /48/, which considered 4% of capital cost with 5% annual escalation (<i>OERC order considers a 4.76% O&M with 5.72% annual escalation</i>). Thus the O&M cost considered is reasonable.</p>



Fuel price (INR/MT)	Rice husk : 1450 Paddy stalks : 1260 Groundnut shell : 1450 Other crop residues : 1260 Woody biomass : 1260 Coal: 1500 The weighted average cost: 1384 with 5% annual escalation	The weighted average fuel price was sourced from the detailed project report /24/. The biomass price varies from state to state. The OERC biomass tariff order of 23 September 2011 /46/ considered fuel cost (GCV of 3522 kcal/kg) of INR 2316/MT with 5% annual escalation. The fuel cost with a GCV of 3303 kcal/kg works out to INR 1769 in 2007 by making adjustments for the GCV and 5% annual price increase. Hence the fuel price of INR 1384/MT considered for financial analysis is reasonable.
GCV of fuel (kcal/kg)	Rice husk : 3 400 Paddy stalks : 3 100 Groundnut shells : 3400 Other crop residues : 3100 Woody biomass : 3100, coal: 3384 Weighted average GCV: 3303	The weighted average GCV of fuel was sourced from DPR /24/ and cross checked against the MPERC order of 2007 /48/, which considered a normative fuel GCV of 3325 kcal/kg. (OERC biomass tariff order of 23 September 2011 /46/ considered GCV of 3 522 kcal/kg and higher price as explained above). The GCV considered for financial analysis is reasonable.
Station heating rate	3800 kcal/kWh	The DPR /24/ considered a station heating rate of 3900 kcal/kWh, but used conservative value of 3800 kcal/kWh for financial analysis. The station heating rate was cross checked against the OERC order of 14 September 2010, which considered a station heating rate of 3800 kcal/kWh /46/. DNV consider the use of 3800 kcal/kWh as conservative.
Debt Equity ratio	70:30	The debt: equity ratio of 70:30 was sourced from the detailed project report /24/. The debt: equity ratio was cross checked against the MPERC tariff order /48/, which considered same ratio. Further, the loan sanctioned by UCO Bank and IDBI Bank for the project activity is 70% of the cost, INR 630 million. The debt: equity ratio considered for financial analysis is appropriate.
Interest rate on term loan	13.25%	The interest rate was sourced from the detailed project report /24/. The interest rate was cross checked against the PLR published by the RBI for November 2007 as 12.75% to 13.25% /43/. Further, as per the loan sanction letter of IDBI dated 27 September 2008, the interest rate was stated to be 14% and 17% for the loan from UCO Bank /7/. Thus interest rate used for financial analysis is considered reasonable.



VALIDATION REPORT

Interest rate on working capital loan	13%	The interest rate was sourced from the detailed project report /24/. The interest rate was cross checked against the PLR published by the RBI for November 2007 as 12.75% to 13.25% /43/. Further, as per the loan sanction letter of IDBI dated 27 September 2008, the interest rate was stated to be 14% and 17% for the loan from UCO Bank /7/. Thus interest rate used for financial analysis is considered reasonable.
Loan tenure	10 years	The loan repayment period of 10 years including 2 year moratorium was sourced from the detailed project report /24/. The loan tenure was cross checked against the 10 years considered MPERC order of 11 November 2007 /48/ (<i>OERC order: 10 years</i>) and the 12 years including moratorium, stated in loan sanction letter from IDBI /7/. The 10 year loan tenure considered is reasonable.
Depreciation & salvage value	Straight line depreciation was considered in line with the prevailing national regulation. The residual value of 10% of the machinery and civil works and 100% of the land value is accounted during the 20 th year.	The straight line depreciation and salvage values are sourced from the detailed project report /24/ and cross-checked against the Indian Income Tax Act 1961 /47/. The depreciation and salvage value considered for financial analysis are appropriate.
Taxes	The income tax @ 33.99% and minimum alternative tax @ 11.33% has been considered	The income tax rates applicable for the year 2007-08 were sourced from the detailed project report /24/ and cross-checked against the Indian Income Tax Act 1961 /47/.
Incentives available for renewable energy projects	10 year tax holiday, accelerated depreciation of 80% and capital subsidy of INR 13.85 million	The accelerated depreciation @ 80% and 10 year tax holiday was cross checked against the Indian Income Tax Act 1961 /47/. The capital subsidy was cross checked from MNRE guidelines /45/, which stipulates a subsidy of INR $(MW^{0.646}) \times 2$ million for biomass based power plants.

Calculation and conclusion

Based on the input parameters stated above, the post tax equity-IRR without CDM revenues has been calculated to be 9.79%, which is lower than the applied benchmark of 13% (post tax). The IRR calculations were provided in a spreadsheet /22/. The calculation was verified by DNV and are found to be correct.



Sensitivity analysis

A sensitivity analysis has been performed in order to check the robustness of the financial analysis for reasonable variations in parameters contributing more than 20% to the project costs or project revenues. The values were varied till the benchmark was reached and the likelihood for that to happen was assessed. No significant positive correlations between the parameters are anticipated.

a) **Project cost:** The project-IRR touches the benchmark with 11.48% decrease in the project cost. Since the project is in advanced stage of completion and the actual investment cost verified from the certificate issued by M/s Nisar & Kumar, Chartered Accountants /21/ as INR 907.59 million, (100.24% of the estimated cost), such reduction in investment cost is not possible.

b) **Plant load factor:** The project-IRR touches the benchmark with 12.68% increase in PLF. The plant load factor of 70% considered by the MPERC /48/ for determination of tariff is lower than the overall PLF of 70% considered for the 1st year and 80% considered from 2nd year onwards considered in the financial analysis. Even though the generator installed is of 23 MW as against the 20 MW envisaged in DPR, since the statutory licenses are for 20 MW, the plant generation capacity is restricted to 20 MW. Thus, 12.68% increase in plant load factor is deemed unlikely.

c) **Tariff:** The project-IRR crosses the benchmark if the tariff increases by 4.78%. The tariff is fixed at INR 3.61/kWh for the first year with 5% escalation every 3 years, as verified from the PPA signed with Tata Power Trading Company Ltd. /14/. The tariff applicable for 2007 as per MPERC tariff order for biomass projects of 7 August 2007 /48/ is INR 3.39/kWh with an annual escalation of 2%, is lower than the tariff considered for financial analysis. The price of biomass is increasing continuously as discussed in sensitivity of fuel cost. The tariff fixed by the state electricity regulatory authorities is always linked to price of biomass, hence the benchmark will not be crossed. Thus 4.78% increase in tariff without corresponding increase in fuel price is unlikely.

The agreement with Tata Power Trading Company Ltd. /14/ stipulates that the project activity needs to be commissioned within three years from the date of agreement; else the agreement will be terminated. Orissa Electricity Regulatory Commission (OERC) has issued its first tariff order for biomass project in September 2010 and its updated version in September 2011. Since the project implementation is delayed and based on the advice of OREDA, the SGEL entered into a PPA with GRIDCO Ltd. /26/, which is state govt. owned Transmission Company on 30 December 2010. The agreement is valid for 13 years (up to the year 2023-24) and OERC order tariff of September 2011 is applicable for the project activity /46/. The applicable tariff for the year 2011-12 is INR 4.87/kWh and INR 7.19/kWh for the 13th year. The tariff has a fixed component of INR 1.95/kWh and variable component linked to fuel price, which is INR 2.92/kWh, escalated every year by 5%. The fuel price considered in the order is INR 2316/MT with 5% annual escalation. The financial analysis to check the impact of changes in biomass price and tariff as per the applicable tariff order shows that the project IRR comes down from 9.79% to 8.92%, which is lower than the selected benchmark of 13%. The OERC tariff order does not specify the tariff after 13th year of operation. Since tariff order consider that the loans will be paid off after 13 years, tariff applicable after 13 years will not have the fixed cost component of tariff of INR 1.95/kWh. Thus financial analysis with OERC tariff is done by using tariff without fixed component after 13th year. The normal 5% annual escalation has been applied to variable cost component of the tariff for conservative



estimation. Thus DNV consider that the project continues to be unviable, even with the tariff applicable under the new PPA with GRIDCO Ltd.

- d) **Operation and maintenance cost:** The O&M costs are very small and have insignificant impact on the IRR. It has been verified that with a reduction of 47.3% in O&M cost, the bench mark is crossed. Since the 10% O&M cost considered is in line with MPERC tariff order /48/ and operation & maintenance quality is essential to achieve the objectives of the project activity, reduction in O&M costs by 47.3% is not possible.

e) **Fuel Cost:**

The project IRR touches the benchmark if the fuel cost decreases by 7.7% /22/. The weighted average cost: 1384 with 5% annual escalation. DNV verified the quotations received for supply of biomass suppliers in October 2009, quoting prices in the range of 1950 to 2750 INR/MT /27/. The OERC tariff order of 2011 /46/ has considered a fuel cost of 2316 INR/MT with 5% annual escalation. Further, the Central Electricity Regulatory Commission (CERC) order of 2010 /50/ notes that “*Since biomass prices vary from state to state and from season to season it would be appropriate to let the Appropriate Commission to decide the price of the Biomass from time to time based on the prevailing market prices in the state*”. Considering the sharp increase in biomass prices, OERC revised the price of biomass from INR 1785/tonne considered in 2010 order to INR 2 316/tonne in 2011 order, increase of 20% in one year. Thus, the decrease in biomass price by 7.7% is considered is unlikely.

The spread sheet for financial analysis including the assumptions for the sensitivity analysis /22/ has been verified by DNV and no material mistakes were found. The sensitivity analysis shows that even with likely variations of the key input parameters, the post tax equity-IRR of the proposed project is lower than the benchmark. In conclusion, the assessment of the arguments presented is deemed to sufficiently demonstrate that the project is not financially attractive.

4.6.4 Barrier analysis

PP has eventually not opted for the barrier analysis.

4.6.5 Common practice analysis

The project activity is located in the state of Orissa and exports power to the state grid. Since there is no other grid connected biomass based power project in the state (the first tariff order for biomass in the state was issued on 14 September 2010 /46/). India was selected as the region for the analysis. DNV considers the selection of the region as appropriate.

In India, biomass based power generation mainly applies the technologies of gasification direct combustion. In direct combustion, biomass is directly used as fuel, sometimes along with a small proportion of coal, to produce steam that runs a turbo generator. In India, most of the biomass based power generation plants employ regular rankine cycle route for electricity generation. This technology is quite efficient, well established for the capacities 5 MW and above.

In case of plants using gasification for power generation, the biomass is first gasified to generate producer gas consisting of Carbon monoxide (CO), Hydrogen (H₂) and Methane (CH₄). The producer gas is then used to run internal combustion engines (both compression and spark ignition) for power production. At present, the gasifiers are available in the range of



20 kW to 2 MW only, beyond which multiple units need to be used. As per the information available on the website of Energy Alternative India (EAI) /56/, the biogas power generation constitutes less than 125 MW of cumulative installed capacity in India, which is less than 15% of the total biomass based power generation, excluding biomass cogeneration. Further, most of the power production systems in India using biomass gasification technology are off-grid, mainly meant for captive consumption of the industry or the community.

Thus, for common practice analysis, direct biomass combustion with rankine cycle route is appropriate for identification of power projects with capacities of 10 to 30 MW ($\pm 50\%$ of the project activity), that are commissioned as on 11 July 2008 (Start date of the project activity) are considered. The details of the projects were compiled from the official web sites of state nodal agencies for renewable power and the data available from other public domains /53/.

There are 15 power only biomass projects of capacities of 10 to 30 MW in India, commissioned before 11 July 2008. All these projects have considered CDM while implementation. There is no project in the selected criteria that was implemented without considering CDM. The details with CDM links of all these projects are stated in the PDD, which has been verified by DNV from the web site of UNFCCC. Further, DNV verified the list of projects from the web sites of the renewable energy web sites of the Indian states /53/.

In conclusion, it is DNV's opinion that it has been correctly demonstrated that the project activity does not represent a common practice and thus the emission reductions achieved by the project are additional to any would happen in absence of the project.

From the above discussion it can be concluded that the project is not a business-as-usual scenario and thus additional.

4.7 Monitoring

The project applies the approved monitoring methodology ACM0018 version 01.3.0, /31/. The monitoring plan is in accordance with the monitoring methodology, which will give opportunity for real measurements of achieved emission reductions. The project monitoring plan is in compliance with the monitoring methodology ACM0018 (version 01.3.0).

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

4.7.1 Parameters determined ex-ante

Data available at the time of validation are as follows:

- CO₂ emission factor of the integrated NEWNE grid, combined margin value 0.84 tCO_{2e}/MWh, taken from CEA published data /51/.
- CO₂ emission factor of coal used 99.7 tCO₂/TJ as per IPCC default value at the IPCC 95% confidence interval upper value of other bituminous coal. The value is higher than the value of 95.81 tCO₂/TJ published in India's Initial National Commission – Chapter 2 – Greenhouse Gas Inventories /54/, thus conservative for project emission calculations.
- Emission factor of diesel is considered as 74.8 tCO₂/GJ as per IPCC 2006 default value. The value considered is of upper limit of the 95% confidence level interval. Any future revision of the IPCC Guidelines will be taken into account and review the appropriateness of the data annually.



- Net calorific value of diesel 43.3 GJ/Tonne, sourced from web site of IPCC
- Density of diesel used in DG set at project site (ρ_{Diesel}) value 0.845 kg/litre sourced from public data from Society of Indian Automobile Manufacturers /52/.
- Global warming potential of methane as 21. The value would be updated according to any future COP/MOP decisions.
- Biomass residues categories and quantities used for the selection of the baseline scenario selection and assessment of additionality: rice husk, paddy stalks, til stalks, mung stalks, red gram stalks, maize cobs & stalks, groundnut shell and woody biomass (Juliflora & casuarina twigs).

4.7.2 Parameters monitored ex-post

The following data and parameters will be monitored in accordance with ACM0018:

- Biomass residues categories and quantities used in the project activity
- Amount of biomass residues category n used in the project plant(s) included in the project boundary in year y for which B1 or B3 has been identified as the most plausible baseline scenario.
- Quantity of biomass residues that has been transported to the project site during the year y: The quantity of biomass types procured shall be monitored with the weighbridge every time during the entry and exit of fuel loaded truck to the project site, to calculate the net fuel procured for the project activity. Actual fuel consumptions would also be cross checked with the with an annual energy balance that is based on purchased quantities (e.g. with sales/receipts) and stock changes.
- Quantity of fossil fuel consumed in the project plant ($FC_{i,y}$). The quantity of coal procured shall be monitored with the weighbridge meter every time during the entry of fuel loaded truck to the project site. The weight of truck during the entry and exit shall be monitored to calculate the net fossil fuel procured for the project activity. Actual coal consumed will be used to estimate of project emissions and for annual energy balance and efficiency of energy generation.
- Diesel consumption due to usage of DG set for emergency purposes ($FC_{\text{Diesel},y}$). The quantity of diesel consumption, will be monitored using dipstick/level gauge and shall be recorded and aggregated annually. This shall be cross-checked against purchase receipts.
- Net quantity of electricity generated in year y ($EG_{PJ,y}$): This shall be monitored by export readings through Joint meter readings (JMR) of Main meter & Check meter of 0.2s accuracy class, installed at grid interface of OSEB. These meters are sealed by state utility and monthly readings are taken jointly for billing. The monitored value of $EG_{PJ,y}$ includes transmission losses between the project activity and the grid interface, thus considered to be conservative in comparison with the value calculated as a difference of the gross electricity generated and auxiliary consumption.
- Electricity imported from the grid: The parameter is monitored by the meters located at the grid interface, which also measure electricity exported to the grid.
- Gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year y: This shall be measured hourly and recorded daily using the calibrated onsite electricity meters of accuracy class 0.2s.



- Total auxiliary electricity consumption required for the operation of the power plant at the project site: This shall be measured hourly and recorded daily using the calibrated onsite electricity meter of accuracy class 0.2s.
- Net calorific value of biomass residues of category n in year y : Measured in laboratories according to relevant international standards by fuel analysis tests carried out every six months, taking at least three samples for each measurement.
- CH_4 emission factor for uncontrolled burning of the biomass residues category n during the year y
- Moisture content of the biomass residues
- Number of truck trips for the transportation of biomass
- Average round trip distance (from and to) between biomass fuel supply sites and the project site: The data shall be monitored on continuous basis and aggregated monthly as and when the loaded trucks of biomass enter or exit the project activity site.
- Average CO_2 emission factor for the trucks during the year y : Will be computed using latest IPCC default values for CO_2 emission factor and NCV of diesel and truck mileage from public sources.
- Average truck load of the trucks used for transportation of biomass: This shall be monitored continuously using the onsite weighbridge and shall be aggregated monthly.
- Net calorific value of the fossil fuel (coal) in year y : Measured in laboratories according to relevant international standards by fuel analysis tests carried out every six months, taking at least three samples for each measurement.
- CH_4 emission factor for the combustion of biomass residues in the project plant

4.7.3 Management system and quality assurance

The overall responsibility for project management & monitoring rests with Board of Directors of SGEL. Chief Engineer of the project power plant is responsible for operation, maintenance and management of plant and will review the monitored parameters daily and present a daily summary report to the Board of Directors of SGEL. Electrical head is responsible for proper operation of electrical equipment and taking generation, export and import meter readings and reporting to the Chief Engineer on a daily basis. Measurement, registration, and reporting of the data will be done by Electrical head.

The net electricity supplied to the grid and quantity of fuel consumed will be cross checked against the monthly invoices or receipts of payments from Grid officials and fuel purchase receipts, respectively. Necessary formats, tables and log sheets will be used for data registering and these will be preserved until two years after the end of crediting period or the last issuance of CER.

The energy meters of accuracy class 0.2% shall be used for monitoring energy export and import and for gross energy generated. Maintenance and calibration of electricity meters will be carried out to comply with the national standards. Export/import meter and gross generation meter will be calibrated annually. The weighbridge having an error margin of ± 10 kg shall be used and will be calibrated every year as per the statutory requirements in Orissa state. The procedures for management review and internal audits have also been formulated and stated in PDD.

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



4.8 Algorithms and/or formulae used to determine emission reductions

The GHG emission reduction calculations are in accordance with the formulae given in the baseline and monitoring methodology ACM0018 version 01.3.0 /31/.

Since the proposed project is a biomass power-only generation project, the emission reductions (ER_y) by the project activity during the crediting period are the emission reductions due to baseline emission reductions (BE_y) minus project emissions (PE_y) and emissions due to leakage (LE_y), as follows:

$$ER_y = BE_y - PE_y - LE_y$$

4.8.1 Baseline emissions

There is no other biomass or fossil fuel based power plant at the site in the baseline. Hence, the baseline is the electricity that would have been generated by the predominantly fossil fuel based power plants connected to the grid. In accordance with ACM0018 version 01.3.0, the baseline emissions are calculated as the product of the net electricity generated from biomass at the project site and the grid emission factor of the integrated NEWNE grids of India.

The combined margin emission coefficient for the integrated NEWNE grid of India is 0.84 tCO_{2e}/MWh, has been sourced from Central Electricity Authority data version 5, dated November 2009 /51/, which was the latest public data available at the time of initial web hosting of PDD for global stake holder comments on 27 October 2010. The Central Electricity Authority, Ministry of Power, Government of India has published the database of carbon dioxide emission factors from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This CO₂ baseline database provides information about the OM and BM factors of all the regional electricity grids in India. DNV confirms that the database is an official publication of the Government of India for the purpose of CDM baselines and the OM in the CEA database is calculated ex-ante using the simple OM approach based on the generation weighted average emissions per electricity unit of all fossil-fuelled generating sources serving the system over a three year period of 2006-2007, 2007-2008 and 2008-2009. The BM is calculated ex-ante based on 20% most recent capacity additions in the grid based on net generation as described in "Tool to calculate the emission factor for an electricity system". Actual calorific values of coal and lignite have been used. DNV was able to verify the value of combined margin from the Central Electricity Authority published data, dated November 2009 /51/. The emission factor for coal is based on the values provided in India's Initial National Communication under the UNFCCC (Ministry of Environment & Forests, 2004). For all other fuels, default emission factors were derived from the IPCC 2006 Guidelines. The 3 year weighted average OM is calculated to be 1.00494, the BM is 0.6752 tCO_{2e}/MWh and the CM is 0.84 tCO_{2e}/MWh.

In accordance with ACM0018 version 01.3.0, the biomass power plant may co-fire fossil fuels /31/. As per the MNRE guidelines, the project can use coal up to 15% as support fuel /45/. To arrive at a conservative *ex-ante* GHG emission reduction estimates, it was assumed that the project will co-fire about 15% of total annual fuel requirement. The import of electricity from the grid system during emergency situation is accounted while calculating the net export to grid. Auxiliary power consumption is taken as 10% of gross power generation in the ex-ante estimation as considered in the OERC and MPERC orders /46/ /48/.



The quantity of biomass types procured shall be monitored with the weighbridge meter and actual fuel consumptions would also be cross checked with the annual energy balance that is based on purchased quantities (e.g. with sales/receipts) and stock changes. As the project activity involves the combustion of fossil fuel and biomass, in line with the methodology, the net electricity generation from biomass will be cross checked with annual energy balance using quantity of biomass and fossil fuel consumption and efficiency of energy generation

Emission reductions ($BE_{BR,y}$) from uncontrolled burning or decay of surplus biomass residues

The methodology ACM0018 (version 01.3.0) /31/ provides the option of calculating $BE_{BR,y}$ by undertaking accurate measurements of methane emission by using default values. The , project participant opted to calculate $BE_{BR,y}$ using 0.0027 tCH₄/tonne of biomass as default value and the lowest value of 0.73 as the conservativeness factor at 150% uncertainty band for ex-ante emission calculations. The resulting methane emission value of 0.001971 tCH₄/tonne of biomass is conservative as the calculated methane baseline emissions will be low.

4.8.2 Project emissions

According to the methodology ACM0018 /31/, project emissions include i) project emissions from transportation of biomass residues ii) project emissions from on-site consumption of fossil fuel (coal and diesel) by the project and iii) emissions from the combustion of biomass residues:

$$PE_y = PE_{TR,y} + PE_{FF,y} + PE_{BR,y} + PE_{EC,y}$$

Project emissions from transportation of biomass residues ($PE_{TR,y}$)

Option 1 was selected to determine the emission from combustion of fossil fuels arising from the transportation of biomass residues to the project plant on the basis of distance and the number of trips:

$$PE_{TR,y} = \frac{BR_{TR,y}}{TL_y} * AVD_y * EF_{km,y}$$

The quantity of biomass residues transported to the project site ($BR_{TR,y}$, tonnes on wet basis), average round trip distance (AVD_y , from and to, km) between biomass residue supply sites and the project site, and average truck load (TL_y , tonnes) for the transportation of biomass residues will be monitored ex post. The IPCC default value will be applied for CO₂ emission factor ($EF_{km,y}$) of the diesel trucks or it will be calculated from the density and NCV of diesel and average mileage of trucks.

Project emissions from on-site consumption of coal by the project ($PE_{FF,y}$)

The project will use coal as support fuel to the extent of 10% of the energy requirement. The emission due to combustion of coal is calculated by multiplying the amount of coal consumed with its NCV and CO₂ emission factor of 99.7 tCO₂/GJ of coal, the default IPCC emission factor. The coal consumption will be monitored and its NCV analysed in third party laboratory.

Project emissions from on-site consumption of diesel by the project ($PE_{FF,y}$)

Also, the emission due to combustion of fossil fuel in DG set to meet emergency requirement in the power plant is considered as zero as these are minimal and unpredictable and to



simplify the calculation. However, the relevant parameters, for calculating project emission due to the above will be ex-post monitored and recorded, for calculating actual emission due to these.

Project emissions from combustion of biomass residues during the year y ($PE_{BR,y}$)

As per methodology, the project emission from burning of biomass residues needs to be considered if the emission reductions from uncontrolled burning or decay of surplus biomass residues is considered in baseline emission reduction calculations. This is calculated by multiplying the amount of biomass category consumed with its average NCV of 13.1 GJ/tonne and CH₄ emission factor of 41.1 kg/TJ and global warming potential of CH₄. The CH₄ emission factor of 41.1 kg/TJ is determined as per the methodology /31/ using the default IPCC CH₄ emission factor of 30 kg/TJ and conservativeness factor of 1.37 with assumed uncertainty of 300%. The default values selected for the calculation of $PE_{BR,y}$ is conservative.

Project emissions from electricity consumed from grid import during the year y ($PE_{EC,y}$)

The project may import electricity from the grid during emergency situations and start up. The corresponding project emissions from the use of grid electricity consumption will be calculated every year during the crediting period.

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y})$$

Where $EC_{PJ,j,y}$ is the quantity of electricity consumed by the project from the grid in year y (MWh/yr), $EF_{EL,j,y}$ is the emission factor of the NEWNE grid, and $TDL_{j,y}$ is the average technical transmission and distribution losses for providing electricity to source j in year y. The default value of $TDL_{j,y}$ is considered as 20% for the project electricity consumption sources as defined in “Tool to calculate baseline , project and/or leakage emissions from electricity consumption” (Version 01) /41/.

4.8.3 Leakage

According to the methodology ACM0018 /31/, the leakage is applicable only for the baseline scenarios for biomass of B5 to B8. Since the baseline scenario identified for the project activity are B1 and B3, leakage is not applicable for the project activity.

Further, leakage due to competing use of biomass has been considered in the calculation of emission reduction in line with the General guidance on leakage in biomass project activities /39/. For ex-ante estimation of leakage, the surplus availability of biomass types used has been assessed for the radius of 100 km around the plant, in the biomass assessment report prepared by Environment & Energy Management Group /25/. In total, the surplus biomass availability is 82% larger than the local consumption including the project activity has been supported by the biomass assessment report /25/. Thus, as per the General guidance on leakage in biomass project activities /39/, no leakage is considered for the project activity.

4.8.4 Emission reductions

The calculations are in accordance to the methodology ACM0018, and a spreadsheet for the CERs calculation has been reviewed. The expected net electricity generation is 124 567 MWh/year and the estimated emission reductions are 86 353 tCO₂/year over the selected ten years crediting period /23/.

The baseline emission estimate can be replicated using the data and parameter values provided in the PDD /1/ and supporting documents provided. The data sources mentioned



have been verified by DNV. In summary, the GHG calculations /23/ are complete and transparent, and their accuracy has been verified. No other project emission or leakage sources contributing more than 1% and not mentioned by the methodology have been found.

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 /1/.

4.9 Environmental impacts

The proposed project activity contributes to generation of green power and is expected to benefit the social economic development of a backward region. Thus, the project activity is expected to have only beneficial impacts and no adverse impacts are foreseen. As required by Indian legislation, the project participants have conducted Environmental Impact Assessment (EIA) /20/ with the objective to review the environmental status of the plant site and its surrounding areas; the impact of the project on the environment and to plan for environmental management plan meeting the requirements of local pollution control board. The EIA was prepared as per the approval of terms of reference for preparation of EIA/EMP from Ministry of Environment & Forests dtd. 1 July 2008 /8/. A public hearing was also conducted on 30 October 2009 as part of the environmental clearance for the project activity /9/. However, the environmental impact assessment for the project activity revealed no negative impacts on the environment.

Further, SGEL obtained Consent to operate the plant from Orissa State Pollution Control Board /11/ and all the statutory permits such as permission to draw water from Brahamani river /16/.

4.10 Comments by local stakeholders

The local stakeholder meeting was held at office of SGEL Plant at Nimdha village, Dhenkanal district of Orissa on 4 February 2009. The stakeholders were invited personally for the meeting. Invitation, questionnaire and photos of stake holder consultation conducted on 4 February 2009 at the factory premises of SGEL Plant at Nimdha village, Dhenkanal district of Orissa have been evidenced /10/. The project has not received any adverse comments during the meeting as was also verified by interview with local stakeholder representatives during site visit.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 01 dated 2 June 2010, was made publicly available on the CDM website <http://cdm.unfccc.int/Projects/Validation/DB/BCW2SFT73EBY6KSXEP90CYBXEMZBBW/view.html> and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 27 October 2010 to 25 November 2010.

Three comment were received and is given (in unedited form) in the below text box together with how the project participants responded to these comments.

S.No.	Comments from Global Stakeholder Process (GSP)	PP's Response
A	Stakeholder : Vijay Khangar	



1	<p>WWF Denmark finds the PPD insufficient for validation of the project due to lack of documentation in a number of areas. First and foremost, the demonstration of additionally by use of barriers is undocumented and not comprehensive. Secondly, the assessment of the contribution to sustainable development including the approval of the host country is unclear. Moreover, WWF Denmark finds that the specific location of the project in a vulnerable natural resource area calls for special attention to environmental impacts. In addition to this, the stakeholder consultation has not included people directly impacted by the project or local NGO's that could have identified negative local impacts. The project therefore has not met a key validation requirement – consultation with affected stakeholders.</p> <p>Sustainable development criteria</p> <p>According to the PDD, the project satisfies national sustainable development criteria for small CDM projects in India. There is, however, no documentation for this statement. The letter from the DNA does not refer to any compliance with sustainable development criteria and is thus not sufficient documentation.</p> <p>The PDD should include a short description of the screening and the applied criteria should be included as an annex to the PDD. In addition, it should be documented that the resources used for electricity production are in fact waste that is presently left over and that the use in the project is not competing with other waste uses in the local community .</p> <p>Environmental Impact Assessment</p> <p>The Sabah region is a vulnerable natural resource area where biodiversity is already under environmental pressure. WWF finds that an EIA should have been carried out in order to ensure that that project does not introduce additional negative impacts. At the very least, a screening according to international EIA methodologies should have been carried out in order to justify the lack of a full EIA. This is even more appropriate since the public consultation process has not involved people directly</p>	<p>The PP wishes to inform that the project is located in Central region of Orissa state, India and not in Sabah region, which is not belongs to host country (India).</p> <p>The proposed biomass based power project is to utilize surplus biomass crop residues in the project region for which the PP obtained approval from state nodal agency (OREDA) for implementation of the project in the districts of Dhenkanal & Cuttack. The PP has conducted biomass assessment study by engaging third party services in the project region. The report shows that the ratio of biomass generation and demand is around 1.8. Hence, there is no environment impact in the vicinity of the project and the project would not cause displacement of any local populace.</p> <p>As part of stakeholders meeting at project site, the PP has invited local people through Public Notice and letters to Government agencies & NGOs. During stakeholders meeting, the representatives of SGEL informed about the project activity and explained the type of fuels proposed for power generation, waste generations & its disposal and invited questions from members. The company representatives have replied to their queries appropriately and suggestions came up in this meeting have been given due consideration and future actions were planned accordingly. Summary of stakeholders views & their comments are incorporated in the revised PDD and copies of minutes of meeting of stakeholders meeting, feedback forms, attendance sheet are being provided to DOE for validation.</p> <p>Sustainable development criteria</p> <p>The project satisfies national sustainable development criteria and its contribution to sustainable development is furnished in the furnished in the PDD. Further the PP is aware about the Indian DNA guideline on commitment of 2% of the CDM revenues towards sustainable development and a formal undertaking for contribution of 2% of the CDM revenue realized from candidate CDM project is being submitted separately. Tentative action plan has been provided in the PDD.</p>
---	---	---



	<p>affected by the project or local NGO's that could have identified possible environmental impacts.</p> <p>Public consultation</p> <p>The public consultation process has only involved authorities and government agencies. Ensuring appropriate and adequate stakeholder consultation is key to ensuring that the projects bring real sustainability benefits. Local policy makers, local people directly impacted by the project and local NGO's should be involved. In addition, local public participation is important in the screening of possible negative environmental impacts from projects.</p>	<p>As per methodology, the project participants have demonstrated that the quantity of that type of biomass residue s available in the region should be 25% larger than the quantity of biomass residues of that type which is utilized in the region including the project activity.</p> <p>Environmental Impact Assessment</p> <p>The project is located in Central region of Orissa state and not in Sabah region.</p> <p>The PP has conducted Environmental Impact Assessment (EIA) study in the region by hiring third party services and Obtained Environmental Clearance from MoEF, Govt. of India. Copies of these documents are being provided to DOE for validation</p>
2.	<p>financials submitted to bankers are on 20 MW or 23 MW?</p>	<p>The PP has obtained In-principle clearance for setting up 20 MW Biomass power project in Dhenkanal Dist. from state nodal agency (OREDA) in July 2007. Subsequently the PP has obtained all statutory approvals for sanctioned capacity i.e. 20 MW. As marginal difference in the cost of TG set for 20 MW and 23 MW, the PP has finalized the TG set specification with 23 MW at generator terminal and placed P.O. in March 2009. Based on statutory approvals, the PP has approached Bankers for Term loan and provided financial statements for 20 MW only. The Bankers (IDBI Ltd & UCO Bank) have appraised the project activity for 20 MW capacity generations & considered the project cost is INR 905 millions. Copies of statutory approvals for confirmed capacity i.e. 20 MW and Term loan sanction letters are being provided to DOE.</p>

S.No.	Comments from Global Stakeholder Process (GSP)	PP's Response
A	Stakeholder : Justin on behalf of Justin	
1	<p>as per MNRE standards we are supposed to use 62 ata boiler pressure as minimum. Th project meets the standards of MNRE, and all the projects in India above 15 MW are using the same technology, the project is not technically additional</p> <p>Submitted by: Vijay Khangar</p>	<p>The proposed high pressure (89 ata) boiler is not common practice in the host country (India) and the same can be verified from the registered CDM projects. However, the PP wishes withdraw technology barrier as other barriers are convincingly demonstrated.</p>

S. No.	Comments from Global Stakeholder Process (GSP)	PP's Response
--------	--	---------------



A	Stakeholder : Justin on behalf of Justin	
1	<p>How biomass residue is defined? How Paddy husk, straw and stalks, ground nut shell and stalks, cotton stalks, stalks of grams such as mung, til, biri etc. and agro industrial residues/wastes such as saw dust, bagasse etc, and woody biomass from forest and wastelands belong to biomass residue.</p> <p>1. What is the status of the project implementation? If construction is started, how PP will justify that CDM benefit is the deciding factor for the project implementation. What will happen to the project if the project fails to get registered?</p> <p>2. Whether the project is green field project, or power expansion capacity expansion, or energy efficiency projects, or fuel switch projects .This aspect is not discussed in the section A of PDD.</p> <p>3. How GHG emission is reduced by the project activity is not discussed in the PDD. This is required as per CDM guidelines.</p> <p>4. Project boundary is not clearly depicted in the PDD. It should be as per methodology ACM18. Transportation of biomass, site where biomass will be dumped should be documented in the PDD. But PDD is silent on this aspect.</p> <p>5. The specific situation of the project activity as per Meth ACM 18 is not mentioned in the PDD</p> <p>6. It is mentioned in the B.2 that biomass residues used for this project will be obtained off-site from the nearby area. But where is the justification or proof. Just mentioning is not sufficient</p> <p>7. What is the proof that coal will not be used more than 50% in energy units. How much coal is proposed to use in the system. Why it is not mentioned in the section B.2. How PP will justify the argument.</p> <p>8. Applicability conditions as per ACM18 are not justified completely in the PDD.</p> <p>9. In section B.4, it is argued that P1 (i. e project activity without CDM revenue) is not credible alternative. If that is the case, how the construction has been started without CDM revenue?</p> <p>10. Why P2, P3, P4, P6, P7 are not discussed at all. How PP leaving out the option without any argument.</p> <p>11.</p> <p>12. In section B.4, the justification for P6. Is not correct. "The installation of new power-only</p>	<p>The proposed biomass residues are non-fossilized and biodegradable organic material originating from waste streams from agricultural and related industry. The said materials are in line with the Biomass (All types) defined in "Glossary of CDM terms ". Further the said biomass residues are allowed to use in Biomass power projects as per MNRE guidelines vide web link http://www.mnre.gov.in/faq-biomass.htm</p> <p>1. The PP was aware of CDM benefits and the Directors of SGEL have developed the four biomass based power projects as CDM activity in the states of Andhra Pradesh, Karnataka & Maharashtra. With the experience of these projects, the PP has considered additional revenues through sale of CERs to make the project for better impact on financially attractive. Accordingly the PP has taken initiative steps for implementation of project activity. The CDM revenues will help to procure the fuels which would be slightly higher than the affordable fuel price per type especially in off-season to minimize the plant shut downs & maintain envisaged PLF. In this background, the project is not viable without CDM benefits.</p> <p>2. The project is a green field biomass based power generation project connected to the grid. The same is added in the section A.4.3 of revised PDD.</p> <p>3. The project activity utilizes renewable biomass residues for power generation and exports the generated electricity to the carbon intensive Eastern grid which is part of NEWNE region grid that is highly dominated by thermal energy sources; thereby it reduces the equivalent amount of green house gas (GHG) emissions such as CO₂, CH₄ gases in to the atmosphere and the is incorporated in the revised PDD</p> <p>4. Transportation of biomass i.e.</p>



<p>plants fired with biomass residues, or fossil fuels, or a combination of both, at the project site, using the same amount or less biomass residues than under scenario P1". But is argued wrongly that "It is technologically impossible for new biomass residue fired power-only plant to provide the same amount of power using less biomass residues than under scenario P1." Therefore, Alternative P6 needs to be justified properly</p> <p>13. The argument for P7 is not properly justified. It should be substantiated so as to satisfy the criteria.</p> <p>14. When defining plausible and credible alternative scenarios for power generation, the guidance below should be strictly followed as per meth:</p> <ul style="list-style-type: none"> • For any of the alternative scenarios described above, all assumptions with respect to installed capacities, load factors, energy efficiencies, fuel mixes, and equipment configuration, should be clearly described and justified in the CDM-PDD. The justification for existing plants should be based on the existing conditions of the plants and the justification for new plants, or changes to existing plants, should be based on design parameters selected considering realistic and credible alternative design options; • The whole electricity generation under the project scenario, at the project site, must be considered. Therefore, whenever the project activity involves an increase in installed power generation capacity, an increase in electricity generation, and/or a change in electricity demand as compared to the historical situation, the baseline scenario should be determined for the overall power generated under the project activity, possibly including a combination of the different scenarios described above. This is particularly relevant for cases in which existing power plants have operated at the project site prior to the implementation of the project activity; <p>In cases where alternative scenarios include the installation of new power generation facilities at the project site other than the proposed project activity, the economically most attractive technology and fuel mix should be identified among those which provide the same service (i.e. the same power quantity), that are technologically available and that are in compliance with relevant regulations. The efficiency of the technology and the fuel type should be selected in a conservative</p>	<p>from source to project and other power generation units connected to grid are incorporated in the revised Project boundary diagram. Emissions on account of Transportation of biomass are considered in Project emissions.</p> <p>5. The project activity is under construction stage and it is likely to be commissioned in the month of November 2011.</p> <p>6. The proposed project is newly constructed green field biomass based power generation and there is no any other process unit in the project plant. Thereby the PP will use off-site biomass residues, which are available in the project region. The same is reflected in the revised PDD. Copies of statutory approvals are being provided to DOE.</p> <p>7. As per the MNRE (Ministry of New and Renewable Energy), Govt. of India regulation a biomass power plant cannot use fossil fuel more than 15% of total energy usage. Hence there is no possibility of usage of fossil fuel (coal) more than 15% of total energy.</p> <p>8. Applicability conditions in case of power and biomass are clearly mentioned in the revised PDD. The applicable scenarios are for power generation P1 and P5, and for biomass it is B1 and/or B3.</p> <p>9. It is with the previous experience of the group in establishing biomass power projects the project is certain to get CDM registration and hence the PP has gone ahead for implementation.</p> <p>10. The methodology clearly states that for a green filed power project and supplies electricity only to the grid, then the alternatives considered for power generation should include only the scenarios P1 and P5. However, all the power scenarios are justified in the revised PDD.</p> <p>11.</p> <p>12. As per the methodology ACM0018 Version 01.3.0, the power scenarios P1 & P5 are the credible &</p>
--	---



<p>manner, i.e. where several technologies and/or fuel types could be used and are similarly economically attractive, the least carbon intensive fuel type/the most efficient technology should be considered. Ensure that the selected technology represents at least common practice for new power plants in the respective industry sector, in the country or region, excluding CDM registered projects.</p> <p>If a power plant was already operated at the project site prior to the implementation of the project activity, it could be retired at the start of the project activity because it is replaced by the project plant, or it may initially be operated in parallel to the project plant and be retired at a future point in time (at the end of its lifetime). In such cases, the remaining technical lifetime of the existing equipment has to be determined and a baseline based on historical performance only applies until the existing power plant would have been replaced or retrofitted in the absence of the project activity. From that point of time, a different baseline shall apply.</p> <p>Project participants should determine the age and the average technical lifetime of any existing power plant, taking into account common practices in the sector and country. The average technical lifetime may be determined based on industry surveys, statistics, technical literature or the practices of the responsible company regarding replacement schedules, e.g. based on historical replacement records for similar equipment. The average technical lifetime should be chosen in conservative manner, i.e. the earliest point in time should be chosen in cases where only a time frame can be estimated, and should be documented and justified in the CDM-PDD;</p> <ul style="list-style-type: none"> • If the project activity supplies electricity partially or fully to (a) captive consumer(s), then alternatives considered for power generation should only include alternatives that can be implemented at the project site (e.g. P1, P2, P3, P4, P6 or P7) or the purchase of electricity from the grid (P5) but not the generation of power in plants established by the project participants at other locations; <p>But PP does not follow this in the PDD'</p> <p>15. When defining plausible and credible alternative scenarios for the use of biomass residues, the guidance below should be strictly followed:</p>	<p>realistic alternatives to the proposed greenfield power project. However, all the power scenarios are justified in the revised PDD.</p> <p>13. As per the methodology ACM0018 Version 01.3.0, the power scenarios P1 & P5 are the credible & realistic alternatives to the proposed greenfield power project. However, all the power scenarios are justified in the revised PDD</p> <p>14. As per the methodology ACM0018 Version 01.3.0, the power scenarios P1 & P5 are the credible & realistic alternatives to the proposed greenfield power project. However, all the power scenarios are justified in the revised PDD</p> <p>15. In the project region, the common practice of surplus biomass residues to be dumped or left to decay and burned in an uncontrolled manner on fields. The envisaged agricultural crop residues are categorized by its type, source and fate are furnished in Table-5 of PDD and demonstrated that there is surplus of the type of biomass residue in the region is more than 25% larger than the quantity of biomass residues of that type which is utilized in the project region including the project plant. The same is presented in Table-6 of PDD. Hence, the alternative B1 & B3 are the realistic baseline scenarios for the project activity. Further, the PP included monitoring of surplus availability of each type of biomass residues in case any new biomass type fuel used during the crediting period.</p> <p>16. As per the third party biomass assessment survey report and common practice in the region, the surplus biomass residues are either burnt or dumped in aerobic conditions to decay.</p> <p>17. As per the third party biomass assessment survey report and common practice in the region, the surplus biomass residues are either burnt or dumped in aerobic conditions to decay.</p> <p>18. The PP wishes to withdraw</p>
---	---



<ul style="list-style-type: none"> • The baseline scenario for the use of biomass residues should be separately identified for different categories of biomass residues, covering the whole amount of biomass residues supposed to be used in the project activity along the crediting period, and consistent with the alternative scenarios selected for power generation (Scenarios P above); • A category of biomass residues is defined by three attributes: (1) its type (i.e. bagasse, rice husks, empty fruit bunches, etc.); (2) its source (e.g. produced on-site, obtained from an identified biomass residues producer, obtained from a biomass residues market, etc.); and (3) its fate in the absence of the project activity (Scenarios B above); • For example, consider a project activity which includes the installation of a new biomass-only power plant, and the retrofit of an existing co-fired biomass-fossil-fuel power plant, which has historically used rice husks, produced on-site. Suppose that the project activity will use two types of biomass residues, rice husks (historical use plus an additional amount) and diverse agricultural residues (as additional biomass residues compared to the historical situation). Further consider that the rice husks used in the project would come from two different sources, on-site production and off-site supply from an identified rice mill. Presumably, the rice husks produced on-site would have been partly used on-site for electricity generation and partly be dumped in the baseline. The rice husks procured off-site would have been dumped in the baseline. The diverse agricultural residues are purchased from a biomass retailer. For this example, four categories of biomass residues should be considered in the subsequent analysis, as illustrated in Table 2; • Explain and document transparently in the CDM-PDD, using a table similar to Table 2, which quantities of which biomass residues categories are used in which installation(s) under the project activity and what is their baseline scenario. The last column of Table 2 corresponds to the quantity of each category of biomass residues (tonnes). For the selection of the baseline scenario and demonstration of additionality, at the validation stage, an ex-ante estimation of these quantities should be provided. These quantities should be updated every year of the crediting 	<p>Technical barrier as other barriers are convincingly demonstrated and the same is reflected in the revised PDD.</p> <p>19. It is observed during the survey that the farmers dispose off the surplus crop residue by way of burning to clear off the fields for next crop. The company has proposed to utilize the surplus biomass residues for which the PP has to develop a collection mechanism to obtain fuels continuous basis to avoid plant interruptions. In view this, the fuel delivered cost based on estimates of various components such as remuneration to the farmers; labour charges for collection, loading & unloading; cost related to storage, transportation; agents commission; etc. Also it will vary from season to season. The cost towards above activities are must to utilize the biomass residues.</p> <p>20. All aspects of the investment barriers are demonstrated in the revised PDD. The total capital investment made is in the form of debt and hence the PLR decided by RBI (Reserve Bank of India), Govt. of India has been considered as benchmark which falls in the option (d).</p> <p>21. Justification for PLF is provided in Section B.5 after sensitivity analysis in the PDD.</p> <p>22. There was a delay in statutory clearance from the nodal agency OREDA because of which the PP held the decision to engage a consultant till 2009.</p> <p>23. Reviewed & corrected the coal emission factor in the revised PDD.</p>
--	---



<p>period as part of the monitoring plan so as to reflect the actual use of biomass residues in the project scenario. These updated values should be used for emissions reductions calculations. Along the crediting period, new categories of biomass residues (i.e. new types, new sources, with different fate) can be used in the project activity. In this case, a new line should be added to the table as per Meth ACM18.</p> <p>16. What is the proof that in the absence of project activity, biomass will be dumped or left to decay under aerobic conditions (B1)? What is the proof? Is there any practice in around the region? I don't think it will be left to decay or dumped. It has energy value that will waste these precious materials. The argument is not as per meth ACM18.</p> <p>17. The argument is not strong for Biomass alternatives B2 and B3. What is the proof? It should be argued based on some practice followed in the region. The argument is not correct. So B1, B3 cannot be considered as alternative.</p> <p>18. How the CDM revenue will alleviate the technical barriers. If CDM revenue does not alleviate the barriers then the project activity is not additional.</p> <p>19. It is argued that in the absence of project activity, biomass will be dumped or left to decay which implies that the biomass is free. But in the investment barrier argument, the cost of biomass is mentioned as Rs.1240/T which is wrong. DOE has the responsibility to validate this.</p> <p>20. Investment barrier argument should be based on meth. Not all aspects of investment barrier are demonstrated in the PDD</p> <p>Benchmark chosen based on PLR is not acceptable. Why internal benchmark is not taken as benchmark for argument. Why WACC is not taken as benchmark. The basis of calculating IRR is not mentioned. The benchmark should be based on</p> <p>(a) Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data;</p> <p>(b) Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private</p>	
---	--



<p>equity investors/funds required return on comparable projects;</p> <p>(c) A company internal financial benchmark (weighted average cost of capital of the company), only in the particular case that the project activity can only be implemented by the project participant. The project developers shall demonstrate that this financial benchmark has been consistently used in the past i.e. that project activities under similar conditions developed by the same company used the same financial benchmark;</p> <p>(d) A government/officially approved financial benchmark where, it can be demonstrated that such financial benchmarks are used for investment decisions;</p> <p>(e) Any other indicators, if the project participants can demonstrate that the above options are not applicable and their indicator is appropriately justified;</p> <p>21. The justification for PLF is not provided in the PDD.</p> <p>22. After board meeting in 2006, Why PP has waited for three years to engage CDM consultancy. It shows PP is not serious enough in getting CDM benefits</p> <p>23. The calculation of Fuel emission factor for coal is wrong</p>	
---	--

How DNV has considered the comment received in its validation:

The barrier analysis for additionality has been deleted in final PDD and financial analysis is done. There are no large biomass based power plants in Orissa at the time of start date and the first tariff order for biomass based plants was issued in September 2010 /46/. Thus most of the biomass in the state is being dumped or burned. This was verified during site visit interviews /59/ and from biomass assessment report /25/. The project is located in the state of Orissa and not in Sabah region mentioned in the first comment. The local stakeholder consultation was carried out by SGEL on 4 February 2009 as per the requirements of CDM, which is detailed in section 4.10 of the report. Further, as part of the requirement of environmental impact assessment (EIA) carried out for the project activity, a public hearing on the project was conducted by district authorities on 30 October 2009 /9/, as per the guidelines of Ministry of Environment and Forests (MoEF). The EIA study has been carried out and approved as per the norms of MoEF. DNV verified that the capacity of the project is mentioned as 20 MW in the application to the bank and the statutory authorities.

The project activity uses latest technology to generate high pressure steam at 89 kg/cm² (a) and 520°C for power generation, against the 40 to 60 kg/cm² (a) steam pressure boilers normally used in similar plants. Thus the technology used is not a common practice in India.

The MNRE guideline does not allow the use of more than 15% of the energy used in biomass based power plants, though the methodology permits use of coal upto 80% of the total energy



requirement. Thus the coal consumption will be limited to 15% of the energy requirement of the boiler. The emission factor of coal has been corrected in final PDD. It is our opinion that the other issues raised by the stakeholder Justin have been adequately addressed by DNV as described in the sections above and the validation protocol.

It is DNV's opinion that these general comments have been sufficiently covered in the validation process and reflected in the validation protocol.

- o0o -

APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory requirements for Clean Development Mechanism (CDM) project activities

Requirement	Reference	Conclusion
About Parties		
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
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	OK
4. 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, CDM Modalities and Procedures §40a	OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	OK
9. 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
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the 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	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	CL3 CL4

Requirement	Reference	Conclusion
that would have occurred in the absence of the registered CDM project activity.		OK
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
For large-scale projects only		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

Table 2 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 (VVM para 55-57)						
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	<input checked="" type="checkbox"/> Clearly identifiable title of the project activity <input checked="" type="checkbox"/> Version number of the PDD is included <input checked="" type="checkbox"/> 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	<input checked="" type="checkbox"/> Yes		OK
A.2 Description of the project activity (VVM para 58-64 and VVM para 135 and 136 (a) & (c) for small-scale project activities, as applicable)						
A.2.1	How was the design of the project assessed?	/1/	DR/I	<i>What type is the project?</i> <input type="checkbox"/> Project in existing facility or utilizing existing equipment(s) <input type="checkbox"/> Project is either a large scale project or a small scale project with emission reductions exceeding 15 000 tCO ₂ e per year. In this case, a site visit must be performed. <input type="checkbox"/> Project is a bundled small scale project, with each project in the bundle with emission reductions not exceeding 15,000 tCO ₂ e per year. In such case the number of physical site visits may be based on sampling, if the sampling size is appropriately justified through statistical analysis.		OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<input type="checkbox"/> The project is an individual small scale project activity with emission reductions not exceeding 15 000 tCO ₂ e per year. In this case, DOE may not conduct a physical site visit as appropriate. <input checked="" type="checkbox"/> Greenfield project <i>How was the design of the project assessed?</i> <input checked="" type="checkbox"/> Physical site inspection <input checked="" type="checkbox"/> Reviewing available designs and feasibility studies		
A.2.2 If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR/I	At the time of site visit, the erection activities of boiler, turbo-generator and electrical systems were nearing completion and commissioning activities were set to start from end of January 2011.		OK
A.2.3 If physical site visits were performed based on sampling (only applicable for bundled small scale projects, each with emission reductions not exceeding 15 000 tCO ₂ e per year), justify the sampling through a statistical analysis:	/1/	DR/I	As this is a large scale project activity at a single location, no sampling was necessary.		OK
A.2.4 Is the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?	/1/	DR/I	<p>Yes. The project activity is generation of power based on the biomass residues available in the region like paddy husk, straw and stalks, ground nut shell and stalks, cotton stalks, stalks of grams such as mung, til, biri etc. and agro industrial residues/wastes such as saw dust, bagasse etc, and woody biomass from forest and wastelands. The electricity generated will be exported to the NEWNE grid of India.</p> <p>The review of the purchase order and the site inspection of the equipment show that the</p>	CAR-1	OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				capacity of the generator is 23 MW instead of the 20 MW plant proposed. The PP is requested to substantiate the difference in the capacity of the equipments proposed and the ordered. Further, it needs to be clarified whether the PP has taken necessary approvals for installing higher capacity equipment.		
A.2.5	Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/	DR/I	The project is a green field project activity and so this is not applicable.		OK
A.2.6	Does the project design engineering reflect current good practices?	/1/	DR/I	Yes. The equipment supply and erection are by suppliers and contractors who are experienced in the field.		OK
A.2.7	Would the technology result in a significantly better performance than any commonly used technologies in the host country? Is any transfer of technology from any Annex-I Party involved?	/1/	DR/I	Yes. The project generates power from biomass residues locally available and is the first such project in the state of Orissa.		OK
A.3 Participation requirements (VVM para 51-54, 125-127)						
A.3.1	Do all participating Parties fulfil the participation requirements as follows:	/1/	DR/I			OK
	India (host)					
	a) Party has ratified the Kyoto Protocol			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
	b) Party has designated a Designated National Authority			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
	c) The assigned amount has been determined			<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
A.3.2	Do the letters of approval meet the following requirements?	/1/ /29/	DR	The title of the project stated in the PDD and LoA does not match precisely.	CAR-2	OK
	India (host)					OK
	a) LoA confirms that Party has ratified the Kyoto Protocol			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
	b) LoA confirms that participation is voluntary			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
c) The LoA confirms that the project contributes to the sustainable development of the host country?		<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/> No		
d) The LoA refers to the precise project activity title in the PDD		<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/> No		
e) The LoA is unconditional with respect to (a) to (d) above		<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/> No		
f) The LoA is issued by the respective Party's DNA		<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/> No		
g) The LoA was received directly by the DNA or the PP		<input type="checkbox"/> DNA	<input checked="" type="checkbox"/> PP			
h) In case of doubt regarding the authenticity of the letter of approval, describe how it was verified that the letter of approval is authentic		DNV does not doubt the authenticity of the letters of approval.				
A.3.3	Have all private/public project participants been authorized by an involved Party?	/1/ /29/	DR	Shalivahana Green Energy Limited is the only PP at this stage and SGEL has been authorised by DNA of India.		OK
A.4 Technical description of the project activity (VVM para 58-64)						
A.4.1	Is the project's location clearly defined?	/1/	DR/I	The project activity site is located at at Nimdha village on Sambalpur –Cuttak road, Dhenkanal district, Orissa state, India. The geographical coordinates of the project activity (latitude) stated in the PDD are apparently wrong and needs to be corrected.	CAR-3	OK
A.5 Public funding of the project activity						
A.5.1	In case public funding from Parties included in Annex I is used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties?	/1/	DR/I	The project does not involve any public funding and hence no diversion of funds from official development assistance is expected.		OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B Application of a baseline and monitoring methodology					
B.1 Methodology applied (VVM para 65-76 and VVM para 136 (b) for small-scale project activities, as applicable)					
B.1.1 Does the project apply an approved methodology and the correct and valid version thereof?	/1/	DR	The project activity applies the approved and valid version of the methodology ACM 0018 version 1.1, "Consolidated methodology electricity generation from biomass residues in power –only plants".		OK
B.1.2 If applicable, has any specific guidance provided by the CDM EB in respect to the applied methodology been considered?	/1/	DR/I	The guidance provided by CDM EB on biomass projects has been considered.		OK
B.2 Applicability of methodology (and tools) (VVM para 65-76) <i>Insert a row for each applicability criteria of the applied methodology (and tools)</i>					
B.2.1 How was it validated that project complies with the following applicability criteria: This methodology is applicable to project activities that generate electricity in biomass residue (co-)fired power-only plants.	/1/ /31/	DR	The applicability criteria for the type/ combinations of activities referred in the methodology have not been justified for the project activity. Further, the applicability criteria for the type biomass proposed to be used needs to be justified.	CAR-4	OK
B.2.2 How was it validated that project complies with the following applicability criteria: No other biomass types than biomass residues, as defined in the baseline methodology, are used in the project plant	/1/ /31/	DR/I	The project propose to use paddy straw and stalks, wheat husk, cotton stalks, stalks of grams such as mung, til, biri etc. and agro industrial residues/wastes such as rice husk, groundnut shells etc, and woody biomass from forest and wastelands are either by-		OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				product or residue or waste stream from agriculture, forestry and related industries.		
B.2.3	How was it validated that project complies with the following applicability criteria: Fossil fuels may be co fired in the project plant. However, the amount of fossil fuels co-fired shall not exceed to 50% of the total fuel fired on an energy basis.	/1/ /31/	DR/I	As per the Ministry of Non-conventional Energy (MNRE) guidelines, use of fossil fuels in biomass based power plants is restricted to 25% maximum. Hence the applicability criteria of limiting the co-firing of fossil fuels to 50% are met.		OK
B.2.4	How was it validated that project complies with the following applicability criteria: For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process	/1/ /31/	DR/I	Project does not envisage the use of biomass residues from a production process (e.g. production of sugar or wood panel boards). During the site visit, it was verified that there is no other production units in the locality.		OK
B.2.5	How was it validated that project complies with the following applicability criteria: The biomass residues used by the project facility should not be stored for more than one year	/1/ /31/	DR	The PP stated that biomass residues used by the project facility will not be stored for more than one year.		OK
B.2.6	How was it validated that project complies with the following applicability criteria: No significant energy quantities, except from transportation or mechanical treatment of the biomass residues, are required to prepare the biomass residues for fuel combustion, i.e. projects that process the biomass residues prior to combustion (e.g. esterification of waste oils, gasification, etc.) are not eligible under this methodology	/1/ /31/	DR/I	PP clarified that biomass residues used by the project will not be processed chemically and/or by means of gasification. Only small amount of energy would be consumed for transportation or mechanical treatment of the biomass residues to prepare for fuel combustion.		OK
B.2.7	How was it validated that project complies with the following applicability criteria: No power and heat plant operates at the project site during the crediting period	/1/ /31/	DR/I	The project activity is a green field power project supplying the power generated to grid exclusively. During the site visit, it has been verified that		OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				there was no other power and heat plant in operation at the project site.		
B.2.8	How was it validated that project complies with the following applicability criteria: If any heat which is used for purposes other than power generation (e.g. heat which is produced in boilers or extracted from the header to feed thermal loads in the process) is generated during the crediting period or was generated prior to the implementation of the project activity, by any on-site or off-site heat generation equipment connected to the project site, the following conditions should apply	/1/ /31/	DR/I	The steam generated by the project activity is only for the power generation. During the site visit, it has been verified that possibility of interconnections with other industries in the locality does not exist.		OK
B.2.9	How was it validated that project complies with the following applicability criteria: In the case of fuel switch project activities, the use of biomass residues or the increase in the use of biomass residues as compared to the baseline scenario is technically not possible at the project site without a capital investment?	/1/ /31/	DR/I	Since the project is green field power plant, possibility fuel switch does not exist.		OK
B.2.10	How was it validated that project complies with the following applicability criteria: the methodology is only applicable if the most plausible baseline scenarios identified are P2 to P7 for power generation and B1 to B8 for biomass use.	/1/ /31/	DR/I	The baselines identified for the project activity are P1 & P5 for power generation and B1 & B3 for biomass use. The project participant is requested to clarify the selection of P1 as one of the baseline scenarios, considering that the applicability of methodology limited to the baseline scenarios P2 to P5 only.	CAR-5	OK
B.2.11	Is the selected baseline on of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/ /31/	DR	Yes. The selected baseline scenario is in accordance with the methodology and confirms the applicability of the methodology.		OK
B.3 Project boundary (VVM para 78-80)						
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/ /31/	DR	The spatial boundaries of the project encompass the biomass based power plant, the means of transportation of biomass residues to the project		OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				site and the power plants connected to the NEWNE grid.		
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/ /31/	DR	The GHG sources included are the CH ₄ and CO ₂ emissions from electricity and heat generation by use of biomass residue, fossil fuel in the project activity and CO ₂ emission from off site transportation of biomass residues. The GHG sources identified are as per the methodology.		OK
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/ /31/	DR	No. The project activity does not involve emissions that are not foreseen by the methodologies applied to the project activity.		OK
B.4 Baseline scenario determination (VVM para 81-88, 105-107) <i>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.</i>						
B.4.1	Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/ /31/	DR/I	The baseline scenario identified for the power generation as per the methodology are P1 to P7 for generation of power and B1 to B8 for biomass use. The list of baseline scenarios identified is complete.		OK
B.4.2	How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/ /31/	DR/I	Yes. The other baseline scenarios have been eliminated after discussion of the alternative and	CAR-5	OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>then concluding with reasons its non applicability for the project activity.</p> <p>There are 7 baseline scenarios for power generation in the methodology, of which only 2 are discussed in the PDD. All the scenarios stated in the methodology needs to be discussed in the PDD and applicable ones selected.</p> <p>The project participant is requested to clarify the selection of P1 as one of the baseline scenarios, considering that the applicability of methodology limited to the baseline scenarios P2 to P5 only.</p> <p>Further, it needs to be demonstrated that the biomass residues proposed to be used are available in the region by at least 25% more than the quantity of biomass residues of that type which is utilized in the region or they have been dumped and left to decay, land-filled or burnt without energy generation.</p> <p>Copy of the biomass assessment report to be provided for review.</p>		
B.4.3 What is the baseline scenario?	/1/ /31/	DR/I	The alternative scenario P5 “the generation of power in the grid” has been identified as the baseline scenario. For biomass use, the baseline scenarios are B1 “the biomass residues are dumped or left to decay mainly under aerobic conditions” and B3 “the biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes” are the baseline scenarios identified.		OK
B.4.4 Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/ /31/	DR	Yes. The baseline scenario is in accordance with the guidance in the methodology		OK
B.4.5 Has the baseline scenario been determined using	/1/	DR	Yes. The baseline scenario has been determined		OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	conservative assumptions where possible?	/31/		using conservative assumptions.		
B.4.6	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /31/	DR	Yes. The baseline scenario is in keeping with the policy of generating power from alternative energy sources.		OK
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/ /31/	DR	Yes, the baseline scenario determination is compatible with the available data and all literature and sources are referenced.		OK
B.4.8	Is the baseline determination adequately documented in the PDD? <ul style="list-style-type: none"> All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. 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/ /31/	DR	The baseline determination has been adequately documented in the PDD, except for the resolution of CAR 5.	CAR-5	OK
B.5 Additionality determination (VVM para 94-121 and VVM para 137 for small-scale project activities, as applicable)						
B.5.1	What approach/tool does the project use to assess additionality? Is this in line with the methodology? In case of small-scale CDM project activities, is Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities applied considering also the “Non-binding best practice examples to demonstrate	/1/ /32/	DR/I	The additionality of the project activity has been demonstrated using version 05.2 of the “ <i>Tool for the demonstration and assessment of additionality</i> ”,		OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
additionality for SSC project activities”.						
B.5.2	Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/	DR/I	Yes, the regulatory requirements have been taken into account to evaluate the alternatives to the project activity.		OK
B.5.3	Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR/I	Yes, sufficient evidence has been provided to support the relevance of the arguments made.		OK
B.5.4	What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/ /32/	DR/I	Investment analysis and barrier analysis has been used to demonstrate the additionality of the project.		
Prior consideration of CDM (VVM para 98-103)						
B.5.5	What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/1/ /2/	DR/I	The resolution passed by the Board of Directors of the company on 30 June 2007 on the investment decision considers the necessity of CDM revenue for the project activity. Some of the dates stated in the chronology such as the date of board meeting are not in agreement with the supporting documents provided. The dates to be checked and corrected.	CL-1	OK
B.5.6	If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status?	/1/ /14/ /36/	DR	The start date of the project activity is stated to be 13 September 2007, the date on which PPA was signed with Tata Power Trading Company Limited. Since the start date is before 2 August 2008, intimation to DNA and UNFCCC is not applicable. The selection of start date needs to be justified in accordance with the definition in CDM Glossary.	CL-2	OK
Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)						
B.5.7	What initiatives were taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the	/1/ /17/ /7/	DR	The continuing and real actions taken to secure CDM status for the project in parallel with its	CL-1	OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
project activity?	/12/ /13/ /10/		<p>implementation are:</p> <ul style="list-style-type: none"> Letter of intent placed for boiler on Cethar Vessels on 11 July 2008. Loan approval from IDBI Bank on 1 September 2008 Loan approval from Uco Bank on 16 September 2008 Signed agreement with GIFTech Solutions for CDM consultancy services on 1 February 2009 Signed agreement with DNV for validation of the project on 1 February 2009 Local stakeholder consultation meeting was held on 4 February 2009. Purchase order placed for boiler on Cethar Vessels on 31 January 2009. Purchase order placed for turbine and generator on Triveni Engineering Industries Ltd. on 31 March 2009. 		
B.5.8 When did the construction of the project activity start?	/1/	DR	The PP is requested to provide start date of the construction of the project activity.	CL 4	OK
B.5.9 When was the project commissioned?	/1/	DR	During site visit, the project was under construction and commissioning activities were yet to be started.		OK
B.5.10 Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?	/1/	DR	Yes. The time gap between activities is less than two years and as per the guidelines of EB 49 Annex 22.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Investment analysis (VVM para 108-114) <i>The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation.</i>					
B.5.11 Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?	/1/	DR/I	Yes. The project activity generates revenue from sale of power to the grid and the same is mentioned in the PDD.		OK
B.5.12 Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR/I	Yes. The alternative to the project activity does require investment.		OK
B.5.13 Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR	Yes. The benchmark analysis has been chosen by PP to demonstrate the additionality of the project.		OK
B.5.14 Is the benchmark/discount rate the latest available at the time of decision?	/1/	DR/I	The lending rate is stated to be used as benchmark for the project. The PLR considered is that at the time of decision making.		OK
B.5.15 What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?	/1/	DR/I	The financial indicator selected by the PP for the investment analysis is the post tax project-IRR.		OK
B.5.16 Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?	/1/	DR/I	Not applicable, as any waste of value is not considered in the project.		OK
B.5.17 Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/	DR	Yes. Income tax calculation considers depreciation as permissible under the income tax act. The depreciation considered is as per the accounting practice allowable for such type of projects as per the Income tax act. The financial analysis spreadsheet shows that the income tax rates of 2007-08 were used and MAT rate is taken as 11.33%. PP is requested to clarify the use of these assumptions.	CL-3	OK
B.5.18 Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken	/1/	DR	Investment analysis has been done for 20 years, which is realistic lifetime for similar power	CL-3	OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
into account? Is working capital returned in the last year of operation?			plants. Salvage value has been added back during the 20 th year. The working capital has not been considered in the financial analysis. However, PP is requested to provide the basis for the selection for 20 years for investment analysis and the lifetime of the power plant.		
B.5.19 When a feasibility study report or similar approved by the government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between finalization of the FSR and the investment decision adequate?	/1/	DR	Detailed project report of the project is the basis for the investment analysis. The values used in the PDD are consistent with the DPR and the period of time between finalization of the DPR and the investment decision adequate.		OK
B.5.20 How was the amount of output (e.g. sales of electricity) assessed? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/	DR	<input type="checkbox"/> The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval <input type="checkbox"/> The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company) <input type="checkbox"/> Other approach. PP is requested to provide the basis for arriving at the PLF of 70% in first year and 80% for the subsequent years.	CL-3	OK
B.5.21 How was the output price (e.g. electricity price) assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/	DR	<input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input checked="" type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants The tariff used for investment analysis is based on the PPA signed with TATA Power trading company Limited, according to which the tariff is	CL-3	OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>INR 3.61/kWh for 3 years.</p> <p>PP is requested to provide the basis for the escalation of 5% in tariff used, since the same is not stated in the PPA.</p>		
B.5.22 How were the investment costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/	DR/I	<p><input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices)</p> <p><input checked="" type="checkbox"/> Review of feasibility reports, public announcements, contracts and annual financial reports related to the project and the project participants</p> <p>The investment costs were assessed from the DPR and cross checked against the major purchase orders.</p> <p>However, PP is requested to provide the basis of project cost considered in the DPR and the actual cost incurred.</p>	CL3	OK
B.5.23 How were the O&M costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/	DR	<p><input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices)</p> <p><input checked="" type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants</p> <p>The basis for the O&M cost considered needs to be clearly referenced in the PDD and IRR spreadsheet.</p>	CL3	OK
B.5.24 Describe the assessment of the other input parameters. Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/	DR	<p><input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices)</p> <p><input checked="" type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants</p> <p>The supporting documents for all the inputs such</p>	CL3	OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			as PLF, specific consumption, price and GCV of biomass and coal, station heating rate used in financial analysis needs to be provided. The biomass price stated in the PDD and IRR spreadsheet does not match.		
B.5.25 Was the financial calculation spreadsheet verified and found to be correct?	/1/ /22/	DR	The supporting documents for all the inputs such as PLF, specific consumption, price and GCV of biomass and coal, station heating rate used in financial analysis needs to be provided.	CL-3	OK
B.5.26 Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?	/1/ /22/	DR	PP has carried a sensitivity analysis to analyse the effect of $\pm 10\%$ variation in project cost, PLF and tariff. The $\pm 10\%$ variation in the parameters was found to have no impact on the outcome of the financial analysis.		OK
B.5.27 Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/ /22/	DR	The range of variations in the parameters used for sensitivity analysis is reasonable.		OK
B.5.28 Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?	/1/ /22/	DR	The key parameters project cost, PLF, fuel cost, O&M cost and tariff have been varied to reach the benchmark and to check the likelihood of this to happen.		OK
Barrier analysis (VVM para 115-118)					
B.5.29 Are the barriers identified complimentary to a potential investment analysis? Does the barrier have a clear impact on the financial returns so that it can be assessed in an investment analysis? Each barrier is discussed separately.	/1/	DR	In addition to investment analysis, PP also identified technical barriers and technological barriers. However, PP is requested to demonstrate the technical barriers and technological barriers in accordance with EB 50 Annex 13.	CAR-6	OK
B.5.30 How were the <u>investment barriers</u> assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?	/1/	DR	The project activity does not face any investment barrier and so this is not applicable.		OK
B.5.31 How does CDM alleviate the investment barriers?	/1/	DR	The project activity does not face any investment		OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			barrier and so this is not applicable.		
B.5.32 Is the project activity prevented by the investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR/I	The project activity does not face any investment barrier and so this is not applicable.		OK
B.5.33 How were the <u>technological barriers</u> assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1/	DR/I	PP is requested to demonstrate the technical barriers and technological barriers in accordance with EB 50 Annex 13.	CAR-6	OK
B.5.34 How does CDM alleviate the technological barriers?	/1/	DR/I	PP is requested to demonstrate the technical barriers and technological barriers in accordance with EB 50 Annex 13.	CAR-6	OK
B.5.35 Is the project activity prevented by the technological barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR/I	PP is requested to demonstrate the technical barriers and technological barriers in accordance with EB 50 Annex 13.	CAR-6	OK
B.5.36 How were the <u>barriers due to prevailing practise</u> assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project participants?	/1/	DR/I	The project activity does not face barriers due to prevailing practise and so this is not applicable.		OK
B.5.37 How does CDM alleviate the barriers due to prevailing practise?	/1/	DR/I	The project activity does not face barriers due to prevailing practise and so this is not applicable.		OK
B.5.38 Is the project activity prevented by the barriers due to prevailing practise and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR/I	The project activity does not face barriers due to prevailing practise and so this is not applicable.		OK
B.5.39 How were the <u>other barriers</u> assessed to be real? Are the other barriers substantiated by a source independent of the project participants?	/1/	DR/I	The project activity does not face other barriers and so this is not applicable.		OK
B.5.40 How does CDM alleviate the other barriers?	/1/	DR/I	The project activity does not face other barriers and so this is not applicable.		OK
B.5.41 Is the project activity prevented by the other barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR/I	The project activity does not face other barriers and so this is not applicable.		OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Common practice analysis (VVM para 119-121)						
B.5.42	What is the geographical scope of the common practice analysis? Is this justified?	/1/	DR/I	The selection of geographical scope, technology and capacity of power plants for the common practice need to be justified.	CL-4	OK
B.5.43	What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has this been justified?	/1/	DR/I	The selection of geographical scope, technology and capacity of power plants for the common practice need to be justified.	CL-4	OK
B.5.44	What is the data source(s) used for the common practice analysis?	/1/	DR/I	The data source used for the common practice analysis is the data published by Orissa Renewable Energy Development Agency (OERC)		OK
B.5.45	How many similar non-CDM-projects exist in the region within the scope?	/1/	DR/I	The state of Orissa does not have any biomass based power plant at present.		OK
B.5.46	How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR/I	The state of Orissa does not have any biomass based power plant at present.		OK
B.5.47	What is the conclusion of the common practice analysis?	/1/	DR/I	The analysis concluded that the project activity is not a common practice in the region.		OK
Conclusion						
B.5.48	What is the conclusion with regard to the additionality of the project activity?	/1/	DR	The additionality can be concluded upon resolution of CL 3, CL 4 and CAR 6.	CL-3 CL-4 CAR-6	OK
B.6 Calculations of GHG emission reductions						
Data and parameters that are available at validation and that are not monitored (VVM para 199-203)						
B.6.1	How was "parameter" available at validation verified?	/1/	DR	Section B.6.2 of the PDD lists all the parameters listed in the methodology not monitored, though many of them are not applicable to the project activity. Section B.6.2 of the PDD to be revised to show only those parameters applicable to the project activity.	CAR-7	OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Baseline emissions (VVM para 89-93)						
B.6.2	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	PP is requested to present a transparent <i>ex ante</i> calculation of project emissions, baseline emissions and leakage emissions expected during the crediting period, applying all relevant equations provided in the approved methodology.	CL-5	OK
B.6.3	Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	Please refer to section B.6.2	CL-5	OK
B.6.4	Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	The computation of grid emission factor needs to be presented in the PDD. Whether, the grid emission factor will be monitored or fixed ex-ante needs to be stated.	CL-6	OK
Project emissions (VVM para 89-93)						
B.6.5	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Refer to B. 6.2	CL-5	OK
B.6.6	Have conservative assumptions been used when calculating the project emissions?	/1/	DR	Refer to B. 6.2	CL-5	OK
B.6.7	Are uncertainties in the project emission estimates properly addressed?	/1/	DR	Refer to B. 6.2	CL-5	OK
Leakage (VVM para 89-93)						OK
B.6.8	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Refer to B. 6.2	CL-5	OK
B.6.9	Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	Refer to B. 6.2	CL-5	OK
B.6.10	Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	Refer to B. 6.2	CL-5	OK
Emission Reductions (VVM para 89-93)						OK
B.6.11	Algorithms and/or formulae used to determine emission reductions:	/1/	DR	Refer to B. 6.2	CL-5	OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<ul style="list-style-type: none"> All assumptions and data used by the project participants are listed in the PDD and related document submitted for 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. 					
B.7 Monitoring plan (VVM para 122-124)					
Data and parameters monitored					
B.7.1 Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/	DR	Yes. The monitoring described meets the requirement of the methodology.		OK
B.7.2 Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR	All the necessary parameters are described in the monitoring plan. However, the type of measuring equipment, accuracy, requirements for maintenance and calibration of measurement equipment etc. have not been presented in the PDD. Further, the tables used in section B.7.2 of the PDD are inconsistent with the PDD template.	CAR-8	OK
B.7.3 In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	Please refer to B.7.2	CAR-8	OK
B.7.4 In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR	Please refer to B.7.2	CAR-8	OK
B.7.5 In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant	/1/	DR	Please refer to B.7.2	CAR-8	OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	parameter.					
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	Please refer to B.7.2	CAR-8	OK
B.7.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	Please refer to B.7.2	CAR-8	OK
Ability of project participants to implement monitoring plan						
B.7.8	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/	DR	The monitoring arrangements detailed in the PDD are executable.		OK
B.7.9	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?			Yes. The records to be maintained and the persons who will maintain the records are detailed in the PDD.		OK
B.7.10	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/	DR	Yes. The systems and procedures detailed are adequate to ensure the verification of emissions reductions from the project activity.		OK
B.7.11	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/	DR	Yes, it is stated that all 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.		OK
Monitoring of sustainable development indicators/ environmental impacts						
B.7.12	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR	The present legislation in vogue does not warrant monitoring of sustainable development for such kind of project activity. However, DNA of India mandates the 2% CER revenues generated by large scale projects for sustainable development activities. The proposal for the same is presented under section A.2 of the PDD. PP is requested to provide the evidence on the	CL-7	OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			decision to spend 2% CER revenues generated by the project for sustainable development activities.		
B.7.13 Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	The monitoring plan does not provide for the collection and archiving of relevant data concerning environmental, social and economic impacts and this is not warranted by the current legislation.		OK
B.7.14 Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR	Yes, the sustainable development indicators are in line with stated national priorities in the host country, which is verified from LoA.		OK
C Duration of the project activity / crediting period					
C.1.1 Start date of project activity (VVM para 99-100, 104)					
C.1.2 How has the starting date of the project activity been determined? What are the dates of the first contracts for the project activity? When was the first construction activity?	/1/	DR	The start date of the project activity is mentioned as 13 September 2007, which is the date of signing power purchase agreement. The selection of start date needs to be justified in accordance with the definition in CDM Glossary.	CL-2	OK
C.1.3 Is the stated expected operational lifetime of the project activity reasonable?	/1/	DR	PP is requested to provide the lifetime of the power plant with supporting document.	CL-3	OK
C.1.4 Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/	DR	The start date of the crediting period is has been stated under section C.2.2.1 of PDD. PP has opted for a fixed crediting period of 10 years, which is reasonable.		OK
D Environmental Impacts (VVM para 131-133 and VVM para 136 (d) for small-scale project activities, as applicable))					
D.1.1 Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an	/1/ /3/	DR	As per the Environment Impact Assessment Notification dated 1 November, 2009 of MoEF		OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
EIA approved? Does the approval contain any conditions that need monitoring?		/9/ /20/		an EIA is required for the project activity. The EIA report was prepared by Pioneer Enviro Laboratories & Consultants Pvt. Ltd., Hyderabad as per the terms of reference approved by MoEF. As part of the EIA, a public hearing was conducted by the district authorities on 30 October 2008. The OSPCB provided consent to the project after considering the EIA.		
D.1.2	Does the project comply with environmental legislation in the host country?	/1/	DR	Yes. The project complies with environmental legislation in India.		OK
D.1.3	Will the project create any adverse environmental effects?	/1/	DR	The project activity does not create any adverse environmental effects.		OK
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/	DR	Yes. The project design addresses the identified environmental impacts		OK
D.1.5	Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR	Yes. The EIA has analysed the impact of the project activity on air, water, noise, soil and ecology.		OK
D.1.6	Are transboundary environmental impacts considered in the analysis?			Yes. Trans-boundary environmental impacts are not applicable to the project activity.		OK
E Stakeholder Comments (VVM para 128-130)						
E.1.1	Have relevant stakeholders been consulted?	/1/ /10/	DR/I	Yes. Stake holders meeting was held at the project site on 4 February 2009.		
E.1.2	Have appropriate media been used to invite comments by local stakeholders?	/1/ /10/	DR/I	Yes. The stakeholders were invited for the meeting by sending invitation letters and the questionnaires in English and local language Oriya were used to get the comments.		OK
E.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	/1/ /10/	DR/I	The stakeholder consultation process is not required for the project as per regulations/laws in the host country India.		OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
such regulations/laws?						
E.1.4	Is a summary of the stakeholder comments received provided?	/1/ /10/	DR	A summary of the comments received needs to be provided in the PDD.	CL-8	OK
E.1.5	Has due account been taken of any stakeholder comments received?	/1/ /10/	DR	No adverse comments have been received.		OK

Table 3 Resolution of corrective action requests and clarification requests

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CAR 1 The review of the purchase order and the site inspection of the equipment show that the capacity of the generator is 23 MW instead of the 20 MW plant proposed. The PP is requested to substantiate the difference in the capacity of the equipments proposed and the ordered since DNV is unable to validate the project capacity. Further, it needs to be clarified whether the PP has taken necessary approvals for installing higher capacity equipment.	A.2.4	The PP has obtained In-principle clearance for setting up 20 MW Biomass power project in Dhenkanal Dist. from state nodal agency (OREDA) in July 2007. Subsequently the PP has obtained all statutory approvals for sanctioned capacity i.e. 20 MW. As marginal difference in the cost of TG set for 20 MW and 23 MW, the PP has finalized the TG set specification with 23 MW at generator terminal and placed P.O. in March 2009. Further PP confirmed that the plant would be operated in line with statutory approvals as obtained for 20 MW. Copies of Final agreement with OREDA for project implementation, Consent for establish of unit from State Pollution Control Board (OPCB) and other approvals of sanctioned capacity (20 MW) have been provided to DOE for validation.	OK. The verification of purchase order for the boiler /17/ and generator /18/ shows that the 23 MW capacity turbine was procured, but the boiler capacity of proposed in DPR was not changed. Thus the boiler capacity is insufficient to generate 23 MW generator. Further, the agreement with OREDA /4/ is for establishment of 20 MW power plant and the OPEB consent /11/ is also to operate 20 MW plant. The commissioning certificate from GRIDCO /28/ dated 23 Dec 2011 also show the capacity of the plant as 20 MW. DNV is able to verify from the above documents that capacity of the project activity is 20 MW. CAR 1 is closed.
CAR 2 The title of the project stated in the PDD and LoA does not match precisely.	A.3.2	The title of the project activity has been corrected in line with the project name mentioned in the Host country approval issued by MoEF, Govt. of India.	OK. The project title has been corrected in the revised PDD /1/ in line with the LoA /29/. CAR 2 is closed.
CAR 3 The geographical coordinates of the project activity (latitude) stated in the PDD are wrongly stated.	A.4.1	The geographical coordinates are corrected in revised PDD.	OK. The geographical coordinates (latitude) of the project activity has been corrected in the updated PDD /1/. CAR 3 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CAR 4 The applicability criteria for the type/ combinations of activities referred in the methodology have not been justified for the project activity. Further, the applicability criteria for the type biomass proposed to be used are also not justified.	B.2.1	. The applicability criteria for the type of biomass proposed to utilize for power generation has been incorporated in the revised PDD.	OK. The PDD /1/ has been corrected to include the justification of applicability criteria for the type/ combinations proposed to be used in the project activity. CAR 4 is closed.
CAR 5 There are 7 baseline scenarios for power generation in the methodology, of which only 2 are discussed in the PDD. PDD does not discuss all the scenarios stated in the methodology to select the applicable ones. Further, it is not clear how the PP concluded that the biomass residues proposed to be used are available in the region by at least 25% more than the quantity of biomass residues of that type which is utilized in the region or they have been dumped and left to decay, land-filled or burnt without energy generation. Copy of the biomass assessment report is not provided for review.	B.2.10 B.4.2 B.4.8	As per the methodology ACM0018 Version 01.2.0, the power scenarios P1 & P5 are the credible & realistic alternatives to the proposed greenfield power project. However, all the power scenarios are justified in the revised PDD. Based on Biomass assessment study report, the PP has considered the biomass residues which are available in the project region i.e. 100 km radius from project site and the envisaged quantities are 25% more than the quantity of biomass residues of that type, which is utilized in the project region including project activity. The details of biomass generation, local consumption, project consumption and percentage of surplus on local consumption incl. Project activity are presented in Table. 6 of revised PDD. The project proponents conducted a Biomass Assessment Survey in the project region by engaging the third party agency to ensure that the biomass available in the region is surplus, which is not utilized so far. A copy of Biomass assessment report is being provided to DOE for validation.	OK. Applicability of all the baseline scenarios for power generation has been discussed in the revised PDD /1/ and all the scenarios except P1&P5 were eliminated. PP carried out Biomass assessment study /25/ through a third party. The report concluded that biomass categories proposed to be used are available at a distance of 100 km from the plant. Further, as per the report /25/, the surplus availability in the region is more than 25%, including the requirement of the project activity. CAR 5 is closed.
CAR 6 The technical barriers and technological	B.5.29	In the absence of relevant data available in public domain, Technological barrier has been removed.	OK. The demonstration of barriers has been

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
barriers are not demonstrated in accordance with EB 50 Annex 13.		However, the barrier analysis has been demonstrated stepwise conform to methodology and discussed the investment analysis in line with latest tool Annex 5 of EB 62.	removed from the updated PDD /1/. CAR 6 is closed.
CAR 7 Section B.6.2 of the PDD lists all the parameters listed in the methodology not monitored, though many of them are not applicable to the project activity. Section B.6.2 of the PDD to be revised to show only those parameters applicable to the project activity.	B.6.1	As per methodology, all applicable parameters are included in section B.6.2 of revised PDD.	OK Section B.6.2 of the PDD /1/ has been revised to show only those parameters applicable to the project activity. CAR 7 is closed.
CAR 8 The type of measuring equipment, accuracy, requirements for maintenance and calibration of measurement equipment etc. have not been presented in the PDD. Further, the tables used in section B.7.2 of the PDD are inconsistent with the PDD template.	B.7.2 B.7.3 B.7.4 B.7.5 B.7.6 B.7.7	The type of measuring equipment, accuracy, calibration frequency and calibration of measurement equipment etc. are incorporated in respective monitoring parameter tables in section B.7.1 of revised PDD.	OK Section B.7.2 of the PDD /1/ has been revised to indicate the type of measuring equipment, accuracy, calibration frequency and calibration of measurement equipment etc. Further, tables in section B.7.2 are updated as per the PDD template. CAR 8 is closed.
CL 1 Some of the dates stated in the chronology such as the date of board meeting are not in agreement with the supporting documents provided. The start date of the construction of the project activity is not indicated in PDD.	B.5.5 B.5.7 B.5.8	The dates mentioned in the chronology of events have been checked and corrected/incorporated in the revised PDD. Copies of the relevant documents have been provided to DOE for validation. The PP has commenced the civil works at project site in May 2009. Copies of photographs are being provided to DOE for verification.	OK. The date of board meeting and the dates of other activities have been corrected in section B.5 of PDD /1/ and the same is verified from the supporting documents provided /2/. The start date of construction of May 2009 was been verified from the photographs. CL 1 is closed.
CL 2	B.5.6	In the web-hosted PDD, the start date of the	OK.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
The selection of start date needs to be justified in accordance with the definition in CDM Glossary.	C.1.2	project activity was mentioned as 13/09/2007, the day the PP has entered Power purchase agreement with TATA Power and it doesn't involve any investment. Hence the same is removed and considered 11/07/2008 on which the company issued a Letter of Intent for supply of Boiler & Auxiliaries and it involves about INR 143.22 millions and considered this as major investment decision. Copies of these documents are being provided to DOE for validation. The start date of the project activity has been corrected in the revised PDD	The start date has been corrected to 11 July 2008, which is the date on which the first major financial commitment was made. The start date was verified from the Letter of Intent (LoI) placed by SGEL for supply of boiler on Cethar Vessels /17/. CL 2 is closed.
CL 3 The financial analysis spreadsheet shows that the income tax rates of 2005-06 were used and MAT rate is taken as 19.33%. PP is requested to clarify the use of these assumptions. PP is requested to provide supporting documents available at the time of investment decision, for the following input parameters: 1) selection for 20 years as the lifetime of the power plant. 2) PLF of 70% in first year and 80% for the subsequent years. 3) tariff and escalation of 5% in tariff every 3 years, 4) O&M cost and escalation. 5) The specific consumption of fuel, price and GCV of biomass and coal. The biomass price stated in the PDD and IRR spreadsheet does not match.	B.5.18 B.5.19 B.5.20 B.5.21 B.5.22 B.5.23 B.5.24 B.5.25 C.1.3	As the investment decision was taken in the month of November 2007, the Income tax rates of FY 2007-08 are considered and corrected the PDD by taking 11.33% as MAT for the relevant period and computed the IRR analysis accordingly. 1) The lifetime of the proposed power plant is 20 years as per CERC RE Tariff Order FY 2010-11. 2) The PLF depends on availability of biomass residues at affordable price and plant availability. Based on biomass assessment study report and experience of project consultant, the PLFs are envisaged as 70% for 1 st year and 80% from 2 nd year onwards and the same is reflected in the DPR. Further, the considered PLF is line with the value considered by OERC for computing tariff in their tariff order dated 14 Sep 2010. 3) As per PPA with TATA Power, the base tariff INR 3.61 per kWh is fixed for the first three years and the tariff would be revised as per mutual	OK. The tax rates applicable for the financial year 2007-08 has been applied in revised PDD /1/. The operating lifetime of 20 years is verified from in-principle letter issued by OREDA for set up the project activity /4/ and the OERC Tariff order /46/. The PLF and O&M cost and escalation considered for the financial analysis was cross-checked against the MPERC /48/ and OERC tariff orders /46/. The tariff and 5% escalation every 3 years was verified from the PPA signed by SGEL with Tata Power Trading Company Ltd. /14/. The supporting documents for specific consumption of fuel, price, station heating rate and GCV of biomass and coal considered for financial analysis has

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>6) station heating rate</p> <p>7) project cost and actual cost incurred</p>		<p>consent for the later period. In accordance with Electricity Regulatory Commission (ERC) of Maharashtra, Chattisgarh, Madhya Pradesh and Andhra Pradesh, the tariff structure was two components i.e. variable and fixed cost. The variable cost component would be escalated with 3% for every year and fixed cost component would be reduced by 2% annual escalation. Hence conservatively the tariff has given an escalation of 5% for every three years which keeps the tariff slightly higher of the tariff fixed by ERCs. Hence, the considered annual tariffs are reasonable and stands conservative.</p> <p>Due to delay in project implementation and advice of state nodal agency (OREDA), the PP has entered into new PPA with GRIDCO Ltd. which is state govt. owned transmission company. In view of this, the earlier PPA with TATA Power is no more valid. The PP has considered OERC tariff rates and computed project IRR analysis and it works out to 7.50%, which is far less than the selected benchmark IRR i.e. 13%.</p> <p>(4) O&M cost (4% of capital cost) taken from DPR, which is lower than Chattisgarh state ERC prevailing norms (7% of capital cost) and hence the considered cost is reasonable. 5% of annual escalation on O&M is same in DPR as well as in CSERC norms.</p> <p>5) The specific fuel consumptions, GCVs and Fuel prices are corrected in the revised PDD in line with excel spread sheet.</p> <p>6) Station heat rate value (3800 kcal/kWh)</p>	<p>been provided and the same is detailed in section 4.6.3 of the report.</p> <p>The actual cost incurred in the project activity (INR 907.559 million) as on 25 February 2011 was verified from the certificate issued by M/s Nisar & Kumar, Chartered Accountants /21/.</p> <p>CL 3 is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>considered from CSERC order dated 11/11/2005, which is lower than the SHR value (3900 kcal/kWh) mentioned in the DPR and hence, the considered SHR is stands conservative for IRR analysis.</p> <p>7) Total investment cost (INR 905.38 million) considered from DPR, which is the basis for taking investment decision to go ahead project implementation with CDM benefits. The considered project cost is matching with CSERC norms and it is also in line with the cost (INR 45.00 millions per MW) considered in OERC tariff order.</p> <p>A copy of CA certificate for the amount incurred INR 907.55 million as on 25/02/2011.</p> <p>The sources for these values are provided in revised PDD & excel spread sheets and copies of relevant documents are being provided to DOE for validation. .</p>	
<p>CL 4</p> <p>The selection of geographical scope, technology and capacity of power plants for the common practice is not justified.</p>	<p>B.5.42</p> <p>B.5.43</p>	<p>The selection of geographical scope, technology and capacity of power plants for identification of similar facilities to demonstrate the common practice has been incorporated in the revised PDD.</p>	<p>OK</p> <p>The selection of geographical scope, technology and capacity of power plants for the common practice has been discussed in the updated PDD /1/. CL 4 is closed.</p>
<p>CL 5</p> <p>DNV is not able to verify the emission reduction calculations, since the <i>ex ante</i> calculation of project emissions, baseline emissions and leakage emissions expected during the crediting period are not presented transparently, applying all relevant equations</p>	<p>B.6.2</p> <p>B.6.3</p> <p>B.6.5</p> <p>B.6.6</p> <p>B.6.7</p> <p>B.6.8</p>	<p>Sample calculations for project emissions, baseline emissions and leakage emissions are presented in the revised PDD.</p>	<p>OK.</p> <p>The sample calculations for project emissions, baseline emissions and leakage emissions are presented in the revised PDD /1/. Further, the calculations are provided in Excel sheet /23/, which</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
provided in the approved methodology.	B.6.9 B.6.10 B.6.11		can be transparently replicated. CL 5 is closed.
CL 6 The computation of grid emission factor is not presented in the PDD. Further, whether, the grid emission factor will be monitored or fixed ex-ante is not clear.	B.6.4	Based on published CEA CO ₂ Baseline database Ver. 5 dated Nov 2009, the grid emission factor was computed using the latest approved version of the “Tool to calculate the emission factor for an electricity system” (Version 02.2.0) in the revised PDD. The grid emission factor is fixed as ex-ante and this value is applied for estimation of baseline emissions during crediting period.	OK. The calculation for grid emission factor, with the values of OM and BM sourced from version 5 of CEA CO ₂ Baseline database /51/ has been provided in revised PDD /1/. CL 6 is closed.
CL 7 In line with the requirement of DNA of India, PP is required to spend 2% CER revenues generated by the project for sustainable development activities. The action plan for the same is not presented in PDD.	B.7.12	PP is aware about the Indian DNA guideline on commitment of 2% of the CDM revenues towards sustainable development and a formal undertaking for contribution of 2% of the CDM revenue realized from candidate CDM project is being submitted separately. Tentative action plan has been provided in the PDD.	OK The draft action plan for utilisation of 2% of CER revenues for sustainable development is presented in revised PDD /1/. CL 7 is closed
CL 8 A summary of the comments received during local stakeholder meeting is not described in the PDD.	E.1.4	Summary of the comments received are incorporated in the revised PDD.	OK A summary of the comments received during local stakeholder meeting are presented in updated PDD /1/. CL 8 is closed.
CL 9 PP's response to the comments received during global stakeholder consultation need to be provided.		Response to the comments received during the global stakeholder consultation has been provided.	OK. PP's response to the comments received from global stakeholders is included in the validation report. CL 9 is closed.

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
No FAR was issued.		

- o0o -

APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

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."

Mr. Ravi Kumar Prabhu holds Bachelor's Degree in Chemical Engineering and has done Post Graduate Diploma course in Management and has an overall working experience of around twenty five years. Prior to joining DNV has around twenty three years experience in Chemical process industry (fertilizer & petrochemical manufacturing) covering production, technical services including energy audits and efficiency studies, waste heat recovery, efficiency studies of boilers, power plants, safety audits, pollution control activities and waste water treatment. With respect to the Thermal Power Plant, the job assignment included the monitoring of flue gas stack temperatures and excess air, efficiency of fuel additives, condition of boiler refractory and insulation of steam lines, residual life assessment of boilers etc. His experience also includes 7 years in the Process design of fertilizer & petrochemical plants, wherein he was involved in the development of process flow diagrams, development of P&IDs, equipment design, HAZOP studies, procurement and commissioning activities.

He has over three years of experience in validation and verification of CDM projects in DNV and is also an EMS lead auditor.

His qualification, industrial experience and experience in CDM projects demonstrate sufficient sectoral competence in Chemical Process Industries, Thermal Energy Generation from fossil fuels, Heat distribution and Waste handling and disposal.

Mr. A.Parasuraman is a fellow member of the Institute of Chartered Accountants of India (FCA) and Partner of, Sundar Sridhar & Sridhar, Chartered Accountants. He has 28 years of experience consisting of associating as Partner in M/s Shri Kamakoti Associates, Chartered Accountants, Chennai and Senior Manager (Finance) FACT, Udyogamandal covering costing, taxation, project appraisal etc. He is presently involved in statutory audits, bank audits – internal and concurrent, internal audits, direct and indirect taxation, company formation and related activities, preparation of cash flow/ fund flow statements on behalf of customers for availing loan from banks etc.

Mr. Indrajit Rana holds double Bachelor Degree, in Chemical engineering and in Chemistry and is a certified energy auditor from Bureau of Energy Efficiency (BEE) of Government of India. Having an overall experience of around nine years. Prior to joining DNV having around six years experience in Chemical process industry namely Petrochemical industry covering production, day to day production

planning, energy efficiency improvement, safety, and capacity expansion of existing unit. His experience also covers the fields of environmental management and resource conservation including optimisation of steam consumption. Being shift in charge of HDPE unit he has acquired the knowledge of utility services like, nitrogen, hydrogen, plant air and water, steam, power and flare system. He is adequately experienced in handling many types of energy intensive rotating equipment like brine refrigerator (screw compressor), centrifugal and reciprocating compressor, blower, vertical mounted centrifugal pump, extruder, etc. and also experienced in handling DCS and advanced process control systems. He has knowledge in material balance and energy balance of HDPE plant. He has also experience in integrated offsite plant (IOP) mainly waste water treatment plant, cooling tower operation and flare operation.

He has experience of around 4 years in validation and verification of numerous CDM projects in DNV, both in India & abroad.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in TA 1.1, TA 1.2, TA 3.1, and TA5.1, TA 11.1, TA12.1