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# VALIDATION REPORT

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## “10 MW BIOMASS BASED POWER PLANT AT POLLACHI, COIMBATORE DISTRICT, TAMIL NADU” IN INDIA

REPORT No. 2011-0569

REVISION No. 02

DET NORSKE VERITAS



## VALIDATION REPORT

Date of first issue: 12 January 2011	ConCert Project No.: PRJC-271791-2010-CCS-IND	
Recommended for approval by: K.V.Raman	Approved by Edwin Aalders	Organisational unit: DNV Climate Change and Environmental Services
Client: Orient Green Power Company Limited		Client ref.: Mr. P.Krishna Kumar

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**Summary:**

**Project Name:** 10 MW Biomass based power Plant at Pollachi, Coimbatore district, Tamil Nadu

**Country:** India

**Methodology:** AMS-I.D

**Version:** 16

**GHG reducing Measure/Technology:** Grid-connected renewable electricity generation

**ER estimate:** 46 983 tCO<sub>2</sub>e per year (average) during first renewable crediting of 7 years

**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 Climate Change Services AS (DNV) opinion that the project activity “10 MW Biomass based power Plant at Pollachi, Coimbatore district, Tamil Nadu” in India, as described in the PDD, version 03 dated 18 January 2012, meets all relevant UNFCCC requirements for the CDM and and correctly applies the baseline and monitoring methodology AMS-I.D, version 16. Hence DNV requests the registration of the project as a CDM project activity.

Report No.: 2011-0569	Subject Group: Environment	
Report title: 10 MW Biomass based power Plant at Pollachi, Coimbatore district, Tamil Nadu		
Work carried out by: Murali Govindarajulu, Seshan Ranganathan, Astakala Vidyacharan, Kapoor Nitin		
Work verified by: Kakaraparthi Venkata Raman		
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**Indexing terms**

Key words

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Clean Development Mechanism

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### *Abbreviations*

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reduction(s)
CERC	Central Electricity Regulatory Commission
CL	Clarification request
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
DPR	Detailed Project Report
EIA	Environmental Impact Assessment
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IRR	Internal Rate of Return
LoA	Letter of approval
MNRE	Ministry of New and Renewable Energy
MoEF	Ministry of Environment and Forest
MW	Megawatt
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OGPL	Orient Green Power Company Limited
PDD	Project Design Document
PLF	Plant Load Factor
PLR	Prime Lending Rate
RBI	Reserve Bank of India
SEBI	Securities Exchange Bureau of India
SSWG	Small scale working group
tCO <sub>2</sub> e	Tonnes of CO <sub>2</sub> equivalents
TNEB	Tamilnadu Electricity Board
TEDA	Tamilnadu Energy Development Agency
TNERC	Tamilnadu Electricity Regulatory Commission
TNPCB	Tamilnadu pollution Control Board
TPH	Tonnes per hour
UNEP	United Nations environment programme
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual

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## 1 EXECUTIVE SUMMARY – VALIDATION OPINION

*DNV Climate Change Services AS (DNV) has performed a validation of the project activity “10 MW Biomass based power Plant at Pollachi, Coimbatore district, Tamil Nadu”. 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 the host Party fulfils the participation criteria and have approved the project and authorized the project participant Orient Green Power Company Limited. The DNA from India confirmed that the project assists in achieving sustainable development.*

*The project correctly applies the baseline and monitoring methodology AMS-I.D, version 16 “Grid connected renewable electricity generation”.*

*The project involves generation of renewable electricity by installing 10 MW biomass power plant, which will displace the electricity generation in the fossil fuel dominated southern regional grid of India, thereby resulting in the reduction of GHG emission that are real, measurable and give 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 46 983 tCO<sub>2e</sub> per year over the selected 7 year renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.*

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

*In summary, it is DNV’s opinion that the project activity “10 MW Biomass based power Plant at Pollachi, Coimbatore district, Tamil Nadu”, as described in the PDD, version 03 dated 18 January 2012, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology AMS-I.D, version 16. Hence, DNV requests the registration of the project as a CDM project activity.*

Bangalore and Oslo, 19 January 2012

Astakala Vidyacharan  
CDM Validator  
DNV Bangalore, India

Edwin Aalders  
Approver  
DNV Climate Change Services AS



## 2 INTRODUCTION

Orient Green Power Company Limited has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the “10 MW Biomass based power Plant at Pollachi, Coimbatore district, Tamil Nadu” (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, the simplified modalities and procedures for small-scale CDM project activities 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, the simplified modalities and procedures for small-scale CDM project activities and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology AMS-I.D (version 16). The validation was based on the recommendations in the Validation and Verification Manual /32/.

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/ OGPL: CDM-SSC-PDD for project activity "10 MW Biomass based power Plant at Pollachi, Coimbatore district, Tamil Nadu", Version 1 dated 09 October 2010, version 2 dated 12 August 2011 and version 03 dated 18 January 2012.
- /2/ OGPL: IRR Analysis.xls dated 24 June 2011 and 18 January 2012.
- /3/ OGPL: ER calc (Emission Reduction calculation).xls dated 24 June 2011.
- /4/ OGPL: No objection certificate from the Village panchayat dated 10 October 2009.
- /5/ OGPL: EPA with the TNEB dated 10 May 2010.
- /6/ OGPL: Term Loan sanction letter from the State Bank of Hyderabad dated 13 July 2009. Enhancement in term loan sanction letter dated 4 February 2011.
- /7/ OGPL: Work order for the civil works and Non EPC works placed to M/s Geometric Engineering Construction Pvt Ltd. for 10 MW Biomass based power project dated 24 April 2010.
- /8/ OGPL: Invitation for stakeholder consultation meeting advertised in The New Indian Express and in Dinamani (leading English and Tamil) news papers dated on 29 June 2010, Minutes of the Stakeholder meeting held on 10 July 2010.
- /9/ OGPL: Certificate of Incorporation issued by the Registrar of Companies, Chennai dated 6 December 2006.
- /10/ Consolidated approval from Tamil Nadu energy development agency (TEDA) for various biomass based power projects in Tamil Nadu dated 24 July 2003
- /11/ OGPL: Letter of Intent for the EPC work of 10 MW biomass plant in Pollachi dated 28 May 2009.
- /12/ OGPL: Land sale deed agreements dated 5 March 2009.
- /13/ OGPL: Consent for establishment from Tamil Nadu Pollution control board dated 29 April 2010.
- /14/ OGPL: Boiler and Turbine Name plate, specification sheet for the project activity.
- /15/ ABI Energy Consultancy: Biomass assessment report for the Coimbatore district dated March 2009.
- /16/ OGPL: Original Board Minutes dated 18 May 2009 verified at the corporate office.
- /17/ OGPL: Detailed project report for the 10 MW biomass based power project at Pollachi

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- dated 2 May 2009.
- /18/ OGPL: MoU signed between Shriram Transport finance company Limited, Shriram Powergen Limited and OGPL dated 2 January 2008 indicating the transfer of licenses from the TEDA in the name of OGPL.
- /19/ *Details of the calorific values of the different type of fuel used in the project activity*  
<http://www.indiasolar.com/cal-value.htm>
- /20/ OGPL: Prior consideration form submitted to the EB of UNFCCC dated 20 November 2009 and the acknowledgement from UNFCCC dated 6 January 2010.
- /21/ OGPL: Share certificate issued on 29 February 2008.
- /22/ OGPL: Letter to National CDM authority indicating the intention to apply for CDM dated 21 November 2009.
- /23/ SIAM: Density of diesel as 0.82 kg/L available at  
<http://www.siamindia.com/scripts/Diesel.aspx>
- /24/ World Bank: India Road transport service efficiency study by World Bank, Nov 2005
- /25/ Clearance from Forest Department for setting up 10 MW biomass plant dated 17 December 2009.
- /26/ OGPL: Minutes of the stakeholder consultation held at the project site on 10 July 2010.
- /27/ OGPL: Invitation letter sent to various government officials dated 28 June 2010.
- /28/ OGPL: Attendance and feedback sheet for the stakeholder meeting held on 10 July 2010.
- /29/ OGPL: Quotations dated 16 March 2009, 4 March 2009, 10 March 2009 and 12 March 2009 for coal and different biomass fuels submitted by various vendors assessed during the site visit of the project activity.
- /30/ Shriram EPC: Purchase order for 10 MW Boiler place on ISGEC JOHN THOMPSON dated 27 July 2009.

**3.1.2 Letters of approval**

- /31/ MoEF (DNA of India): *Letter of approval* dated 14 March 2011  
Checked \_\_\_\_\_ from \_\_\_\_\_ the \_\_\_\_\_ MoEF \_\_\_\_\_ website  
[http://www.cdmindia.in/project\\_details\\_view.php?id=384&oid=1&page=4&reporttype=1](http://www.cdmindia.in/project_details_view.php?id=384&oid=1&page=4&reporttype=1)

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

- /32/ CDM Executive Board: Validation and Verification Manual. Version 01.2
- /33/ CDM Executive Board: Grid connected renewable electricity generation, AMS-I.D, version 16.
- /34/ CDM Executive Board: Tool to calculate the emission factor for an electricity system, Version 02.
- /35/ CDM Executive Board: Appendix B of the simplified modalities and procedures for small-scale CDM project activities “Attachment A to Appendix B”.
- /36/ CDM Executive Board: Guidance on assessment of investment analysis Version 5
- /37/ CDM Executive Board: Guidelines on the demonstration and assessment of prior consideration of the CDM version 04.
- /38/ CDM Executive Board: Guidelines for the reporting and validation of plant load factors version 01.
- /39/ CDM Executive Board: General guidance on leakage in biomass project activities




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- version 03 EB 47 Annex 28.
- /40/ CDM Executive Board: Indicative Simplified baseline and monitoring methodologies for selected small scale project activity categories version 17.
  - /41/ CDM Small Scale Working Group: 22 Meeting report, paragraph 8 for transport emission calculation within 200 km round trip distance used to neglect emissions due to transportation.
  - /42/ CDM Executive Board: Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion, Version 02.
  - /43/ CDM Executive Board: Tool to determine the remaining lifetime of the equipment, version 1.

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

- /44/ CEA: Baseline Carbon Dioxide Emission Database, Version 5, November 2009 available in the weblink  
[http://www.cea.nic.in/reports/planning/cdm\\_co2/cdm\\_co2.htm](http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm)
- /45/ SEBI: Draft Red Herring Prospectus of Orient Green Power Company Limited dated 19 April 2010, submitted by OGPL.
- /46/ RBI: Details on the weighted average yield of government securities relevant at the time of decision making available at the weblink accessed on 19 March 2011  
<http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/11PDM080809.pdf>
- /47/ TNERC: Tariff order dated 27 April 2009 indicating the PLF, working days and applicable tariff for Biomass based power projects  
<http://tnerc.tn.nic.in/orders/Tariff%20Order%202009/Bio%20Mass%20Order%2027.04.2009.pdf>
- /48/ MNRE: Details on the quantify of fossil fuel permitted to be used in the biomass based power projects <http://mnre.gov.in/adm-approvals/grid-ippg.pdf>
- /49/ TNEB: Annual power plan 2007-08, Details of the Transmission and Distribution losses, (c.f 2.15.9) [http://www.tn.gov.in/spc/annualplan/ap2007-08/2.15\\_power.pdf](http://www.tn.gov.in/spc/annualplan/ap2007-08/2.15_power.pdf)
- /50/ IPCC: 2006 IPCC Guidelines for National Greenhouse Gas Inventories
- /51/ TEDA: Biomass Potential Based On Taluk Level Assessment Study In 49 Taluks In Tamil Nadu <http://www.teda.gov.in/page/Bio-Ann12.htm>
- /52/ TEDA: Details of Biomass based Power Stations Presently under operation in Tamil Nadu as on 31.03.2010 <http://www.teda.gov.in/page/biomass.pdf>
- /53/ UNEP: CDM pipeline Overview <http://uneprisoe.org/>
- /54/ CERC (Terms and Conditions of Tariff) Regulations 2009
- /55/ Income Tax act 1961 providing the details of the applicable Tax and the Minimum Alternate tax
- /56/ OGPL: Work order for the CDM validation of the project activity dated 18 August 2010.
- /57/ MoEF: India's Initial communication available in the weblink  
[http://unfccc.int/essential\\_background/library/items/3599.php?rec=j&preref=4870#beg](http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=4870#beg)
- /58/ OGPL: Mail from OGPL enquiring on the Validation received by DNV on 29 April 2009
- /59/ Bombay stock exchange: <http://www.bseindia.com/about/abindices/bse30.asp>




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- /60/ System Design of Supercritical Thermal power Plants, Indian Institute of Technology, Kharagpur indicating the calorific values ranges of different grades of coal available in India.
- /61/ RBI: Details on the Cash reserve ratio and Interest rate indicating the Prime lending rates, borrowing and lending rates for the week starting from 24 April 2009 till 29 May 2009. <http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/4Tab120609.pdf>
- /62/ TNEB: Grid interconnection certificate indicating the synchronisation date as 4 July 2011.
- /63/ References indicating the heat rate to be considered for air cooled condensers:  
[http://www.erc.gov.in/Order/JS\\_\(PO\)\\_Order\\_RE\\_Tariff\\_15.03.07.pdf](http://www.erc.gov.in/Order/JS_(PO)_Order_RE_Tariff_15.03.07.pdf)  
<http://aptel.gov.in/judgements/judgment%20129%20of%202005.pdf>  
<http://aptel.gov.in/judgements/5.4.11%20Judgment%20Appeal%20No.%20148%20of%202010.pdf>
- /64/ Details of the biomass price during the year 2009  
<http://www.financialexpress.com/news/biomass-power-generation-gets-short-shrift-in-tamil-nadu/417812/0>
- /65/ Office of the economic adviser: Wholesale price index data for Coal, for the period is from 2005 to 2010 indicating continuous increase in the prices over years.

Main changes between the version published for the 30 days stakeholder commenting period and the final version submitted for registration:

- 1) In line with the revised timelines of validation the start date of crediting period has been revised from 1 April 2011 to 20 October 2011.
- 2) Arguments under additionality under technology barriers have been removed.
- 3) Inclusion of the parameters Net Calorific value and Moisture under monitoring as per the requirement of the methodology.
- 4) Changes related to other CARs and CLs indicated as per Table 3 of this report.

### 3.2 Follow-up interviews with project stakeholders

On 28 December 2010, DNV visited the project site at Pollachi and performed assessment of the project and interviews with project stakeholders.

	Date	Name	Organization	Topic
/66/	28 December 2010	Mr. Koganti Narendra Nath	Zenith Energy Services (P) Ltd.	<ul style="list-style-type: none"> <li>➤ Project Boundary</li> <li>➤ Financials of the project activity</li> <li>➤ Environmental compliance</li> </ul>
		Mr. MohanaKrishnan	OGPL	<ul style="list-style-type: none"> <li>➤ Estimated emission reductions</li> <li>➤ Project additionality</li> </ul>
		Mr. N.Kanagasabesan		<ul style="list-style-type: none"> <li>➤ Stakeholders' consultation process</li> <li>➤ Technology applied and operational lifetime</li> </ul>



- Monitoring and reporting procedures
- Calibration, internal audit and corrective action procedures
- Surplus biomass availability

### 3.3 Resolution of outstanding issues

The objective of this phase of the validation is 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 "10 MW Biomass based power Plant at Pollachi, Coimbatore district, Tamil Nadu" is enclosed in Appendix A to this report.

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

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

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

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



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<b>Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities</b>		
<b>Requirement</b>	<b>Reference</b>	<b>Conclusion</b>
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 ( <b>OK</b> ) or a <b>corrective action request (CAR)</b> if a requirement is not met.

<b>Validation Protocol Table 2: Requirement Checklist</b>				
<b>Checklist question</b>	<b>Reference</b>	<b>Means of verification (MoV)</b>	<b>Assessment by DNV</b>	<b>Draft and/or Final Conclusion</b>
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 <b>document review (DR)</b> , <b>interview (I)</b> or any other follow-up actions (e.g., on site visit and telephone or email interviews) and <b>cross-checking (CC)</b> 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 <b>corrective action request (CAR)</b> 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 <b>clarification request (CL)</b> is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A <b>forward action request (FAR)</b> during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.

<b>Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests</b>			
<b>Corrective action and/or clarification requests</b>	<b>Ref. to checklist question in table 2</b>	<b>Response by project participants</b>	<b>Validation conclusion</b>
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.

<b>Validation Protocol Table 4: Forward Action Requests</b>		
<b>Forward action request</b>	<b>Ref. to checklist question in table 2</b>	<b>Response by project participants</b>
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




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### 3.4 Internal quality control

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

### 3.5 Validation team

<i>Role</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>	<i>Type of involvement</i>						
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 1.1 competence	Financial expertise
Technical team leader (CDM validator)	Astakala	Vidyacharan	India	✓		✓	✓			
CDM Validator	Govindarajulu	Murali	India	✓	✓	✓				
Validator	Seshan	Ranganathan	India	✓	✓	✓			✓	
Validator	Kapoor	Nitin	India	✓		✓				✓
Technical reviewer	Kakaraparthi	Venkata Raman						✓	✓	

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 03 dated 18 January 2012 /1/.

### 4.1 Participation requirements

The project participant is Orient Green Power Company Limited. The host Party (India) has ratified the Kyoto Protocol on 26 August 2002 and established National Clean development Mechanism Authority, Ministry of Environment and Forests (MoEF), as its DNA thereby meeting all relevant participation requirements. The project has been proposed as a unilateral project.

A letter of approval (LoA) /31/ was issued by DNA of India on 14 March 2011, authorizing Orient Green Power Company Limited of host Party as project participant and confirming that the project assists in achieving sustainable development.

The letter of approval was received from the project participants and it was also checked from the list of approved projects from the website of DNA of India /31/. Thus 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 /32/.

Validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards India.

### 4.2 Project design

The proposed project activity is a green field grid connected 10 MW biomass based power project. The project activity is located at Kariyanchettipalayam Village, Anaimalai Block, Pollachi Taluk, Coimbatore District in the state of Tamil Nadu, India. The geographical coordinates of the project activity are 10° 34'16.96"N and 77° 00'28.73"E.

The technology used in the project is available in India and no transfer of technology is envisaged. The project activity comprises of a travelling grate boiler of capacity 52 TPH at 66 Kg/cm<sup>2</sup> pressure and one turbo generator set of 10 MW of impulse type condensing turbine with air cooled condenser.

The project activity will use the surplus biomass residues available in the region such as coconut residues, Prosopis juliflora, saw dust, wood chips, sugarcane trash and other biomass residues, and coal for co-firing. As per the statutory approvals received for the project activity /13/, usage of coal cannot exceed 15% of the yearly average fuel mix, however the project can fire 100% biomass for power generation. Thus, the project activity can use coal during the crediting period. The project envisages to generate net electricity of 63.072 GWh annually. The gross generation is 70.080 GWh at a plant load factor of 80%. The electricity generated from the plant will be supplied to the fossil fuel dominated Southern regional grid of India thereby reducing the emission reductions that would occur in the absence of the project activity as per the energy

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purchase agreement between Orient Green Power Company Limited and TNEB /5/, verified by DNV.

The start date of the project is stated to be 28 May 2009 which was verified as the date of issuing the letter of Intent towards EPC contract by the project participant to Shriram EPC /11/. 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 4.5).

The project activity has been commissioned on 4 July 2011 /62/. The operational lifetime of the project is estimated to be approximately 25 years /14/ and a renewable crediting period of 7 years has been chosen, starting from 20 October 2011 or the date of registration, whichever is later.

DNV confirms that the project activity is not a de-bundled component of a larger project activity since the project participants have not registered another project using the same technology within 1 km radius of the project during the past two years.

DNV confirms that the description of the project activity is complete and accurate as described in the PDD version 03 dated 18 January 2012. The PDD complies with the relevant forms and guidance for completing the PDD.

### 4.3 Application of selected baseline and monitoring methodology

The project applies the baseline methodology stipulated for category I.D of the “simplified modalities and procedure for small scale CDM project activity”. The simplified baseline methodology AMS-I.D (version 16) “Grid connected renewable electricity generation” /33/ is applicable as the project generates electricity using renewable biomass and it displaces the grid electricity. The application of AMS-I.D (version 16) is justified as:

- The project activity, as stated in section 4.2, is a new grid connected biomass based power plant. The project activity involves electricity generation using renewable biomass fossil fuel upto 15% of the fuel mix and subsequent export to the primarily fossil fuel dominated regional electricity distribution system.
- The project utilizes renewable biomass and co-firing of non-renewable fuel (coal- upto 15% of the fuel mix) based power generation of 10 MW capacity which is not exceeding the limit of 15 MW for small scale project activity /5//13/.
- This project activity is not a combined heat and power (co-generation) system /13/.

The project activity being a renewable energy generation by installation of new grid connected biomass power project, remaining applicability conditions as mentioned in the methodology AMS-I.D version 16, do not apply to this project activity. The assessment of the project’s compliance with the applicability criteria of AMS-I.D (version 16) 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 Project’s system boundary includes power plant comprising the fuel preparation yard, boiler and turbo generator and utilities till the evacuation point. The system boundaries have been adequately described in the PDD, and the same has been verified based on the site visit assessments /66/. The spatial boundary of the project also includes the southern grid of India




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to which the project activity is connected. It is DNV's opinion that the selected sources and gases are justified for the project activity.

The system boundaries are presented in tabular format:

	GHGs involved	Description
Baseline emissions	CO <sub>2</sub>	The major emission source. The GHG emission reduction achieved by replacing the electricity generated by fossil fuel based power plants in the Southern regional grid of India. In case of co-firing, baseline emissions will be adjusted and electricity generated through coal will be deducted to calculate baseline emission.
Project emissions	CO <sub>2</sub>	Project activity will be equipped with diesel generator to meet the emergency requirements of power house; hence emissions due to usage of diesel will be accounted as project emissions. Project activity is expected to procure biomass from nearby region, the project proponent will monitor the distance of procurement of biomass during the verification period and if the distance is less than 200 km the emissions due to transportation will be neglected and this is in line with the clarification provided by SSCWG 22 paragraph 8.
Leakage	No Leakage	It has demonstrated that there is surplus biomass available in the project region, hence leakage emissions due to competitive use of biomass is not applicable for the project activity /15/.

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 AMS-I.D (version 16).

#### 4.5 Baseline identification

The project envisages installation of a new grid connected renewable power plant. The baseline according to the selected small scale methodology AMS-I.D (version 16) is the continuation of operation of grid connected electricity generation sources, which has been dominated by fossil fuel fired power plants. The equal amount of energy generated by the

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project activity would have been produced by other grid connected sources. The baseline emissions are the product of electrical energy baseline  $EG_{BL,y}$  expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

The Southern regional grid of India has been selected as the grid system boundary for the project activity and this is in line with the EB guidance for large countries such as India.

In line with the guidance provided in the “Tool to calculate the emission factor for an electricity system” /34/, the combined margin emission coefficient for the Southern regional grid of India has been calculated at 0.90250 tCO<sub>2</sub>e/MWh and is fixed *ex ante* for the entire renewable crediting period of 7 years. The combined margin (CM) emission factor has been sourced from data provided by the Central Electricity Authority (CEA) of the Ministry of Power, Government of India /44/. This CO<sub>2</sub> baseline database provides information about the OM and BM factors of all the regional electricity grids in India. DNV confirms that the CEA database version 5 used for calculation of combined margin emission coefficient for the Southern regional grid of India was the latest data available at the time of the commencement of validation, in line with the requirement of “Tool to calculate the emission factor for an electricity system” and is an official publication of the Government of India for the purpose of CDM baselines /44/. The operating margin (OM) in the CEA database is calculated *ex-ante* using the simple OM approach based on the generation-weighted average emissions per electricity unit over a three year period of 2006-07, 2007-08 and 2008-09. Build margin (BM) is calculated *ex ante* based on the 20% most recent capacity additions in the Southern grid based on net generation for the year 2008-09. The emission factors for coal and lignite were based on the values provided in India’s Initial National Communication under the UNFCCC (Ministry of Environment & Forests) 2004 /57/. For all other fuels, default emission factors were derived from the IPCC 2006 Guidelines /50/. The operating margin has been determined to be 0.98708 tCO<sub>2</sub>e/MWh and the build margin to be 0.81792 tCO<sub>2</sub>e/MWh, and the weights for OM and BM have been taken as 50:50.

The approved small scale baseline methodology has been correctly applied to identify the baseline scenario on what would occur in the absence of the proposed CDM project activity.

All the assumptions and data used by the project participants are listed in the PDD and all documentation relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD and 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 project additionality has been assessed as per Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities /35/.

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

The start date of the project activity is 28 May 2009, which is the date of issuing the letter of intent for the supply of 10 MW biomass based power project in Pollachi Taluk to Shriram EPC and the same has been verified by DNV /11/. It could also be verified that all other major financial commitments like contract for civil construction /7/ was signed on a later date.

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Hence, selection of 28 May 2009 as start date is appropriate and is in line with the EB guidance on start date of project activity.

**Prior consideration of CDM and Continued real actions to secure CDM status for the project.**

DNV has validated the following sequence of events:

- a) The detailed project report (DPR) dated 2 May 2009 has included the revenues from carbon credits in working the financial analysis /17/.
- b) Original Board Minutes dated 18 May 2009 was verified at the corporate office and the discussion on proposed biomass based power project in Pollachi Taluk and chances of the CDM revenues for the project activity was discussed and it was decided to appoint a CDM consultant to proceed with the further steps in the CDM cycle /16/. Thus indicating that the revenue from CDM has been a decisive factor.
- c) The start date of the project activity (28 May 2009) is after 2 August 2008 .The project participant has intimated EB of UNFCCC /20/ and DNA of India /22/ on the intention to secure CDM status for the project activity during 20 November 2009 and 21 November 2009, within six months of the start date of the project activity (29 May 2009) as per Guidelines on the demonstration and assessment of prior consideration of the CDM version 04 EB 62 Annex 13 /37/.

The PDD has been published for global stakeholder consultation on 11 November 2010, within 2 years from the initial notification to the UNFCCC and the DNA, thereby complying with the guidelines on the demonstration and assessment of prior consideration of CDM /37/.

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 Investment analysis**

To demonstrate the additionality of the project activity, the project proponent has conducted investment analysis, in line with requirement of Attachment A to Appendix B of simplified modalities and procedures for small-scale CDM project activities. DNV confirms that the project proponent has conducted investment analysis taking into account the requirement of CDM EB guidelines on assessment of Investment analysis /36/.

#### **Choice of approach**

The project proponent has chosen benchmark analysis for demonstrating the investment barrier for the project with weighted average cost of capital (WACC) of the project activity as the benchmark and project IRR as the financial indicator.

The alternative of the continuation of the current scenario does not involve any investment and the project generates revenues by way of sale of power generated to the grid apart from revenues from CDM and so choice of benchmark analysis to demonstrate additionality is considered appropriate /36/.

#### **Benchmark selection**

The project proponent has selected weighted average cost of capital (WACC) for the project activity of 13.20% applicable at the time of investment decision as the benchmark for the project activity. The selected financial indicator is Post Tax IRR of the project activity and the



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selected benchmark of WACC is appropriate as per CDM EB guidance on assessment of investment analysis version 5 /36/, indicates that “Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR”. Thus the benchmark selected for the project activity meets the requirement of CDM EB guidance on assessment of investment analysis.

The cost of equity for the project activity has been derived as per Capital Asset Pricing Model (CAPM) after taking into consideration expected market return, risk free return and beta values of power generating companies in India, that were listed at the time of the investment decision.

The market return of 17.04% is the compounded annual return of BSE index since its inception. The input values used for the computation of market return was verified to be correct from the official website of Bombay Stock Exchange /59/. Risk free return has been arrived from the weighted average yield of the government securities for the financial year 2008-2009 /46/. The risk free bond rate of 7.69 % per annum, taken for arriving at the benchmark considered has been checked to be correct from the annual report of RBI published data that was available at the time when the proposal was considered.

At the time of decision making, data on the listed companies having core business in biomass based power generation was not available /59/. Hence, the data available from listed companies involving a wider sector of power generation, including renewable and non renewable energy was considered for beta value calculation.

The equity beta (coefficient reflecting the volatility of the stock relative to the market) is calculated using BSE data since its inception. The BSE data of Tata Power Company Ltd., Reliance Energy/Infrastructure Ltd, CESC and Gujarat Industrial Power Company Ltd., GVK Power Infra, JP associates, Indowind Energy, Neyveli Lignite and NTPC for a period of one year was considered for beta calculation. The beta value thus calculated works out to 1.34. The list of companies taken for computing the beta value was verified from the web site of Bombay stock exchange /59/. The beta values are sourced from Capitaline and screenshots of the same are provided in the Excel sheet /2/.

Cost of debt for the project activity has been arrived based on the prime lending rate and tax rate applicable at the time of decision making. The prime lending rate has been sourced from the Reserve Bank of India weekly data for the period starting from 24 April 2009 till 29 May 2009. The weekly data indicates the details on the cash reserve ratio, interest rate, prime lending rates, borrowing and lending rates. The period from 24 April 2009 till 29 May 2009 has been taken for benchmark which is accepted to be appropriate at the time of decision making /61/. The minimum tax rate applicable for the project activity of 16.995% has been considered for arriving at the WACC. Since the project activity is an IPP, usage of Minimum alternate tax as applicable tax rate is considered to be appropriate.

The worksheet for benchmark calculation /2/ has been evidenced and all input parameters and calculations have been verified by DNV to be correct. The benchmark identified to compare the financial attractiveness of the project activity has been verified and found to be appropriate and conforms to paragraph 112 of the VVM 01.2.

**Input parameters**

The input parameters used for the investment analysis were based on the detailed project report /17/. Given the scenario that time gap between the start date of the project activity (28 May 2009) and preparation of DPR (2 May 2009) of around one month, it is reasonable to



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assume that the DPR was the basis of the decision to proceed with the investment in the project. DNV has validated each input parameters used for IRR calculation against respective sources. This has been cross checked with the actual contracts, signed for the project activity. The table below provides a detailed assessment of validation for the same in line with the VVM paragraph 111.

Input parameter	Values provided in DPR	Reference used for cross checking
Capacity	10 MW	The capacity of the project activity is cross checked against the actual contracts signed for supply of 10 MW biomass based power project dated 28 May 2009 /11/. This has been further cross checked against consent to establish, EPA with Tamilnadu Electricity Board /5//13/.
Days of Operation	365 Days	The number of days of operations considered in the DPR. The number of days considered for the working is found to be conservative.
Plant load Factor	80%	The plant load factor indicated in the financials is as per the DPR and DNV has cross checked the same against the Tamilnadu Electricity Regulatory Commission tariff order dated 27 April 2009 and observe that the TNERC has considered a PLF of 80% /47/. This is as per the guidelines for the reporting and validation of plant load factors and PLF is found to be appropriate.
Gross Electricity Generation	70.080 GWh	Verified based on the DPR. Cross checked with the capacity and the plant load factor. The working is based on the PLF and has been checked and found to be correct.
Auxiliary Consumption	10%	The auxiliary consumption considered in the DPR has been cross checked against the details of the equipment installed at site /66/. It was also cross checked against the Tamilnadu Electricity Regulatory Commission tariff order dated 27 April 2009 /47/, which indicate auxilliary consumption of 9% for Biomass projects. Having verified the project specific detail on the auxiliary consumption, the 10% Auxiliary consumption has been accepted which is 1% more than the TNERC order. It has also been checked by DNV that even on considering 9% auxiliary consumption the project IRR does not reach the benchmark and hence the value of 10% auxiliary consumption for the project activity is found to be appropriate.
Net Electricity Generation	63.072 GWh	Calculated after deducting auxiliary consumption from gross electricity generation
Equipment Lifetime	25 Years	DNV has considered the lifetime assumed in the DPR and has cross checked against the Tamilnadu Electricity Regulatory Commission tariff order for biomass projects /47/. The lifetime is also in line with the Tool to determine the lifetime of the equipment /43/.



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Salvage Value	10%	Salvage value of 10% has been considered for depreciable asset. Salvage value (10% of depreciable asset), land cost (100%) and margin money for working capital (100%) has been added in final year of operation. This has been cross checked against CERC (Terms and Conditions of Tariff) Regulations 2009 /54/ and found to be appropriate.
Total Investment	487 Million INR	The total investment for the project activity has been sourced from the DPR and has been cross checked by DNV with the actual contracts of the project: namely the contract for the purchase of Land, Boiler and Turbines /7//11/ /12//30/. The project cost has also been checked against the Draft red Herring Prospectus submitted to SEBI indicating the details of the individual project cost, PLF and Tariff details /45/. Thus the project cost is found to be appropriate.
Debt	70%	DNV has cross checked this from loan sanction letter issued by State Bank of Hyderabad dated 13 July 2009 /6/.
Equity	30%	DNV has cross checked this from loan sanction letter issued by State Bank of Hyderabad dated 13 July 2009 /6/.
Interest rate	12.5%	DNV has cross checked this from loan sanction letter issued by State Bank of Hyderabad dated 13 July 2009 /6/.
Company Tax Rate	33.99%	Income Tax Act 1961 including relevant amendments /55/ have been checked and the rate is found to be appropriate.
MAT rate	15% Effective tax rate after inclusion of surcharge and cess is 16.995%.	The base rate applicable is of for the year 2009-10 is 15%. Income Tax Act 1961 including relevant amendments /55/ have been checked and the rate is found to be appropriate.
Depreciation Rate	80% on Plant & Machinery 10% on Civil works	Income Tax Act 1961 including relevant amendments /55/.
Depreciation Rate	3.34 % for Civil works and 5.28% for Plant Machinery	Income Tax Act 1961 including relevant amendments /55/.
Depreciation rate as per	80%	Income Tax Act 1961 including relevant amendments /55/.



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income tax														
Fuel Cost	<p>Average Biomass price of INR 2041 per tonne. Coal price of INR 3000 per tonne.</p> <p>Thus the average fuel cost works out to 2185 INR per Tonne</p>	<p>The price of the biomass fuel considered in the financial analysis was based on the detailed project report /17/ available at the time of decision making. Individual fuel price considered in the financial analysis of the DPR have been sourced from the quotations received from independent suppliers /29/. Since the price is based on the quotations obtained from the suppliers at the time of preparation of DPR, which formed the basis for decision making (and therefore conforms to guidance 6 of Annex 5, EB 62), the biomass and fossil fuel price considered are suitable and appropriate for the project activity at the time of decision making.</p> <p>DNV has verified the quotations obtained from the suppliers at the time of preparation of DPR /17//29/, also the average biomass price at the time of decision making was cross checked against publicly available data /64/. It could be seen that the biomass price has registered a steep increase and the cost has increased to a level of INR.2400 per tonne during the year 2009, which proves that the biomass cost considered is conservative.</p> <p>The TNERC order talks on the average biomass fuel price and the average fuel price of INR 2185 per tonne considered in the financials of the project activity includes the price of the coal and biomass. It has been checked that the weighted average biomass price used in the financial analysis is INR 2041 per tonne (INR 177.917 Million. for 87 164 MT), which is only 2% higher than the average biomass price indicated in the TNERC order. The TNERC order also indicates that some of the stakeholders have demanded fuel price in the range of INR 2400 to INR 2500 per tonne of biomass with an annual escalation of 5% (page 15). However, TNERC chose to fix the price at INR 2000 per tonne. Also, there were publicly available documents /64/ indicating that the biomass cost has registered a steep increase and the cost is more than INR 2400/MT during 2009. Thus in DNV's opinion, the average biomass price considered in the financial analysis is appropriate.</p> <p>To analyse the impact of the average biomass price of INR 2000 per tonne and the relative station heat rate as indicated in the TNERC order, the project IRR under various scenarios have been checked and the results are given in the following table:</p> <table border="1"> <thead> <tr> <th>Scenario</th> <th>Project IRR</th> <th>Enclosure</th> </tr> </thead> <tbody> <tr> <td><i>Case-I (With Biomass Calorific values, prices , station heat rate as in PDD)</i></td> <td>6.61%</td> <td>Base case-IRR sheet</td> </tr> <tr> <td><i>Case-II (With Biomass Calorific values as in PDD, station heat rate &amp; Prices as per TNERC Order April 2009)</i></td> <td>9.96%</td> <td>Annex – 1.a</td> </tr> <tr> <td><i>Case-III (With Biomass calorific values,</i></td> <td>8.18%</td> <td>Annex–</td> </tr> </tbody> </table>	Scenario	Project IRR	Enclosure	<i>Case-I (With Biomass Calorific values, prices , station heat rate as in PDD)</i>	6.61%	Base case-IRR sheet	<i>Case-II (With Biomass Calorific values as in PDD, station heat rate &amp; Prices as per TNERC Order April 2009)</i>	9.96%	Annex – 1.a	<i>Case-III (With Biomass calorific values,</i>	8.18%	Annex–
Scenario	Project IRR	Enclosure												
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<i>Case-III (With Biomass calorific values,</i>	8.18%	Annex–												



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		<p><i>Prices, station heat rate as per the TNERC Tariff order April 2009)</i></p>	1.b												
		<p>It has been verified that the project activity remains additional and the financial indicator is below the benchmark (13.20%), relevant annexes enclosed.</p> <p>The coal price considered in the financial analysis is based on DPR /17/ and in-turn based on the quotations from suppliers /29/. DNV has cross checked the coal price considered in the financial analysis against the publicly available data /65/ and found to be appropriate.</p> <p>Considering that the tariff order indicates various ranges on the fuel price, the actual biomass quotations having evidenced during validation and having verified the publicly available documents on the fuel prices and their trend, it is DNV's opinion that the fuel price of INR 2185 per MT considered in the financial analysis is reasonable.</p>													
Annual escalation on fuel price	5.0%	The escalation in fuel cost considered in the DPR is cross checked against TNERC tariff order for biomass project dated 27 April 2009 /47/.													
Fuel Requirement at 100% PLF	102 546 tonnes	<p>The fuel requirement in the DPR has been worked based on the calorific value of the individual type of fuel and the station heat rate. The station heat rate has been worked out based on the calorific value of the fuel, the technical specification of the proposed boiler, turbine and plant configuration /14/ /30/.</p> <p>The calorific value of different type of fuel envisaged to be used in the project activity indicated in the DPR and ER calculation sheet has been given below</p> <table border="1" data-bbox="778 1400 1193 1697"> <thead> <tr> <th>Type of Fuel</th> <th>GCV. kcal/kg</th> </tr> </thead> <tbody> <tr> <td>Coconut residues</td> <td>3500</td> </tr> <tr> <td>Sawdust and wood chips</td> <td>3200</td> </tr> <tr> <td>Sugar cane trash</td> <td>3000</td> </tr> <tr> <td>Juliflora</td> <td>3250</td> </tr> <tr> <td>Coal</td> <td>3755</td> </tr> </tbody> </table> <p>The calorific values in the ER calculations have been referred to <a href="http://www.indiasolar.com/cal-value.htm">http://www.indiasolar.com/cal-value.htm</a> /19/ and has been cross checked based on the fuel analysis reports submitted by vendors. The calorific value of coal has been used as 3755 kcal/kg which has been verified to be within the range of common coal grades used in India /60/ and CEA CO2 database (Version 05) is 3755 kcal/kg /44/.</p>	Type of Fuel	GCV. kcal/kg	Coconut residues	3500	Sawdust and wood chips	3200	Sugar cane trash	3000	Juliflora	3250	Coal	3755	
Type of Fuel	GCV. kcal/kg														
Coconut residues	3500														
Sawdust and wood chips	3200														
Sugar cane trash	3000														
Juliflora	3250														
Coal	3755														
Operation and	3.96 %	The TNERC tariff order of 2009 does not provide breakup of O&M cost and consider all repair and maintenance cost,													



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Maintenance costs:		administrative cost, cost towards salary and wages and other manufacturing costs under O & M costs /47/. However the total O&M cost as per the Tariff order is 4.5% of the project cost. Thus the lower O&M cost, which is conservative, considered for the project activity has been accepted.
Yearly Escalation in O & M	5.0 %	The TNERC tariff order dated 27 April 2009 /47/.
Electricity tariff	4.50 INR/kWh	Verified based on the DPR and the TNERC tariff order dated 27 April 2009 /47/. Cross checked with the EPA dated 10 May 2010. The tariff used in the financials is found to be appropriate.

DNV is of the opinion that the input values used in the investment analysis are appropriate and conforms to paragraph 109 of the VVM 01.2.

### Calculation and conclusion

The IRR calculations and assumptions provided in a spreadsheet are consistent with source of the data verified and the calculations were checked and found to be in line with EB's guidance on assessment of investment analysis version 5 /36/. The assumptions used in the calculations were deemed to be correct and have been verified by DNV. The post tax project IRR of the project over 25 years is 6.61% which is less than the benchmark IRR of 13.20 %. With CDM revenues, the project IRR improves and thus makes the project feasible.

### Sensitivity analysis

A sensitivity analysis has been carried out for the major parameters like project cost, electricity generation, fuel cost, operation and maintenance costs, and electricity tariff which contribute to more than 20% of revenues or costs to check the robustness of the financial analysis. The level of variation assumed for the sensitivity analysis has been suitably justified with relevant documents pertaining to the presented analysis and has been verified by DNV, such as:

**Plant load factor (PLF):** The project proponent has considered a plant load factor (PLF) of about 80% and with a gross generation of 70.08 GWh. If the generation increases by 31.00% the project IRR reaches the benchmark. DNV has verified the PLF used for the project activity against the PLF indicated in the TNERC tariff order dated 27 April 2009 /47/, which considers a PLF of 80%. Increasing in generation by 31.00% equates to 104% PLF, hence DNV is of opinion that scenario of the generation increasing by 31.10% is highly unlikely.

**Operation and maintenance (O&M) cost:** When the O&M cost decreases by 92.38% the IRR of the project activity reaches the benchmark. Considering the O&M cost indicated for the biomass plants in Tamilnadu Region by TNERC order /47/ is 4.5%, it is in DNV's opinion that this scenario is highly unlikely.

**Electricity tariff:** The electricity tariff of 4.50 INR/kWh considered in the financial analysis of the project activity was based on the tariff considered in detailed project report /17/ which has been crosschecked with the TNERC tariff order dated 27 April 2009. The tariff taken in the DPR working and the tariff order is found to be consistent. The EPA signed with TNEB on 10 May 2010 /5/ has also been checked, indicating as tariff rate of 4.50 INR/kWh for a period of 20 years. Thus it is DNV's opinion that an increase of 141.5% is highly unlikely.

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**Project cost:** The project IRR touches the benchmark if the project cost decreases by 23.69%. However 23.69% decrease in the project cost is considered unrealistic considering the fact the project proponent had already placed the purchase order and the erection of the plant has already started. The cost incurred has been checked based on the supply contract /11//30/, civil construction contract /12/. Hence a decrease of 23.69% in project cost is highly unlikely, as the project activity has already been commissioned.

**Fuel Cost:** The project IRR without CDM crosses the benchmark on decreasing the fuel cost by 9.94% (corresponding to INR 2,185 - 9.94% = INR 1,967.8/tonne). The worksheet is enclosed as Annex-2. However a 9.94% decrease in the fuel cost is considered unrealistic considering the fact that the average cost of fuel (2185 INR/MT) considered by the Project Proponent at the time of investment decision is at par with the price of fuel in the region, cross checked with the average biomass price considered during the Tariff order hearing of the TNERC indicated in the tariff order dated 27 April 2009 /47/ and the quotations for coal supply /29/ received by the project participant. Considering that the prices of biomass and coal are in the increasing trend /64//65/ decrease of 9.94% in fuel cost is highly unlikely. The TNERC tariff order has considered 2000 INR/MT as weighted average cost of biomass in its tariff order. Even after considering 2000 INR/MT with the indicated calorific values the IRR works out to be 8.81% which is lower than the benchmark. Considering that the tariff order indicates various ranges on the fuel price, the actual biomass quotations having evidenced during validation and having verified the publicly available documents on the fuel prices and their trend, it is highly unlikely that the fuel prices will come down by 9.94% from the prices that was prevalent during 2008.

In conclusion, it is DNV's opinion that it has been correctly demonstrated that the project activity does not represent a business as usual scenario, as it encounter barrier due to low return on investment, and thus the emission reductions achieved by the project are additional to any that would happen in absence of the project.

## 4.7 Monitoring

The monitoring methodology selected complies with the requirement of applied methodology AMS-I.D (version 16) "Grid connected renewable electricity generation" /33/. The monitoring plan will give opportunity for real measurement of emission reductions achieved and the monitoring arrangements have been physically verified by DNV during the site visit assessment. It is DNV's opinion that the project participants are able to implement the monitoring plan.

Monitoring of sustainable development indicators is not required by the Indian DNA. There are no environmental impacts due to the project activity.

### 4.7.1 Parameters determined ex-ante

The following parameters have been determined by *ex-ante* for the project activity:

- **Combined Margin emission factor of Southern regional grid of India:** The combined margin emission coefficient for the Southern regional grid of India has been calculated at 0.90250 tCO<sub>2</sub>e/MWh and is fixed *ex ante* for the entire renewable crediting period of 7 years. The same has been sourced from CO<sub>2</sub> baseline data of Central Electricity Authority (CEA) of the Ministry of Power,




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Government of India /44/. The detail of the assessment of the CM has been elaborated under section 4.5 of this report.

- Specific Energy Consumption:** In line with the requirement of the methodology, as per parameter 6 under “Monitoring”, the project proponent has fixed specific energy consumption based on the different type of biomass expected to be used through the 7 year renewable crediting period. The average specific energy consumption has been fixed as 0.0165 TJ/MWh /3/. The specific energy consumption has been arrived based on the station heat rate worked out based on the fuel mix ratio of different type of biomass fuel proposed to be used by the project activity during the crediting period and the calorific values of the fuel types /19/. The calorific values have been checked based on the TNERC Tariff order dated 27 April 2009. The calorific value of coal has been used as 3755 kcal/kg which has been verified to be within the range of common coal grades used in India /60/ and CEA CO<sub>2</sub> database (Version 05) is 3 755 kcal/kg /44/:

Type of Fuel	GCV. kcal/kg
Coconut residues	3 500
Sawdust and wood chips	3 200
Sugar cane trash	3 000
Juliflora	3 250
Coal	3 755

The project activity uses air cooled condenser and the station heat rate of 3940 kcal/kWh has been calculated based on the boiler, turbogenerator specification and plant configuration /14/ and has been cross checked based on the TNERC tariff order /47/ indicating the SHR for the biomass project as 3840 kcal/kWh using water cooled condensers and other references /63/ indicating additional 240 kcal/kWh heat rate for air cooled condenser. Thus the station heat rate of 3940 kcal/kWh considered for the project activity is appropriate.

The project activity is expected to use only renewable biomass for power generation. However, since the project activity is using travelling grate boiler, it can fire both coal and biomass and as per MNRE guidelines and TNERC tariff order the use of coal (fossil fuel) up to 15% is allowed and the project activity can use coal in the future. In line with measuring methods and procedures indicated under parameter 6 of clause 22 of the applied version of methodology, whenever the project activity uses fossil fuel, the electricity generation metered should be adjusted by deducting the electricity generation from fossil fuels using the specific energy consumption and the quantity of fossil fuel consumed.

- Net calorific value of diesel:** the net calorific value of diesel has been sourced from IPCC 2006 (default value at the upper limit of the uncertainty at a 95% confidence interval) and the value applied is 43.3 TJ/Gg /50/.
- Density of diesel:** the density of diesel has been sourced from official website of SIAM (Society of Indian Automobile Manufacturers Association) and the value applied is 0.82 kg/L /23/.



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- **CO<sub>2</sub> Emission factor for diesel:** the CO<sub>2</sub> emission factor for diesel has been sourced from IPCC 2006 (default value at the upper limit of the uncertainty at a 95% confidence interval) and the value applied is 74.8 tCO<sub>2</sub>/TJ /50/.
- Average CO<sub>2</sub> emission factor for the trucks during year y (i.e. tCO<sub>2</sub>e/km) has been fixed using IPCC default values [2006 IPCC Guidelines for National Greenhouse Gas Inventories]. The value is 0.00059 tCO<sub>2</sub>e/km /50/. This value has been calculated based on the 2006 IPCC value and the fuel consumption of Diesel vehicle sourced based on the World Bank study /24/.
- As the project activity is installation of new grid connected biomass project and the equipment used in case of the project activity is not transferred from some other facility, leakage emission due to equipment transfer has not been considered.
- Leakage emission due to transportation of biomass to the project site has not been considered since as per clarification SSC WG22 paragraph 8 “emissions related to transport of biomass is only required if these are transported over a distance of more than 200 kilometers” in the case of small scale projects /41/. However average return distance and number of trips would be monitored *ex post* and if required leakage emission would be deducted from the baseline emission to arrive at the emission reduction. CO<sub>2</sub> emission factor of the most carbon intensive fuel used in the country has been fixed to be 106.2 tCO<sub>2</sub>/TJ and will be used in calculating leakage emissions, if applicable.
- As per the “General guidance on leakage in biomass project activities, version 3 EB 47” /39/ competitive use of biomass is the source of the leakage emission of the project activity. It has been evidenced from the biomass survey report prepared by ABI energy consultancy /15/, that biomass is available in surplus within 50 km radius of the project. The following table provides the surplus availability, consumption and generation of different type of biomass within the survey region:

Fuel	Total Biomass Generation (Tonnes/year)	Consumption including project activity (Tonnes/year)	Surplus availability in the region.	
			(Tonnes/year)	%
Coconut residues	642768	410272	232 496	56.67
Saw dust & wood chips	101115	77076	24 039	31.19
Sugarcane trash	58724	31694	27 030	85.29
Juliflora	257374	200671	56 703	28.26
<b>Total</b>	<b>749496</b>	<b>479444</b>	<b>340 268</b>	<b>47.28</b>



#### 4.7.2 Parameters monitored ex-post

- **Gross electricity generation:** The gross electricity generated by the project activity will be monitored continuously and recorded on hourly basis using meter of accuracy class 0.5. The meter will be calibrated as per the general industrial practice or at least once in a three year, in line with the requirement of general guidelines for small scale projects.
- **Electricity exported to the grid:** The electricity exported to the grid will be monitored through import/export (bidirectional) meter with an accuracy class of 0.2% installed at the grid interconnection point. The electricity exported & imported to grid will be jointly recorded by the project Participant and the grid company once in a month. Data collected can be cross-checked with monthly electricity sales invoices issued by the grid company.
- **Electricity imported from grid:** The quantity of electricity imported from the grid will be measured through import/export (bidirectional) meter with an accuracy class 0.2 installed at the grid interconnection point. The electricity exported & imported to grid will be jointly recorded by the Project Participant and the grid company once in a month.
- **Quantity of each kind of biomass and fossil fuel procured in the plant:** Project Proponent will separately monitor and record the procurement of each kind of biomass and fossil fuel at the weighbridge installed at the site on daily basis or estimate using annual energy/ mass balance. The project Proponent will check the parameter against the inventory data on a periodic basis.
- **Quantity of each kind of biomass and fossil fuel consumed:** Project Proponent will monitor and record the consumption of each kind of biomass and fossil fuel at the weighbridge installed at the site separately on daily basis. The amount of each type of fuel brought in by the plant will be considered as the quantity used for combustion and this will be cross checked based on the purchase receipts.
- **Calorific value of individual type of fossil fuel and biomass combusted in the project activity:** Samples collected as per the sampling procedures devised in the plant will be analysed in the external laboratory.
- **Average round trip distance for biomass transportation:** The location of biomass supply source will be recorded in the inward entry. The distance between the source and the project site will be recorded for each truck on entry to the project site.
- **Average truck load for biomass transportation:** Data from the weigh bridge measurements will be used to monitor and record the average truck load.
- **Quantity of Diesel consumed:** The quantity of diesel consumed in the project will be measured using a Dip stick. Cross checking of the data can be performed with the purchase receipts.

Details of the data collection and frequency of data recording and associated formats are described in PDD and found to be adequate. These data will be kept for two years following the end of the crediting period.

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In view of the above mentioned monitoring procedure for each of *ex-post* monitored parameters, it can be concluded that monitoring plan is feasible for the project activity design and Project Participant shall be able to implement the monitoring plan.

#### 4.7.3 Management system and quality assurance

The management structure for monitoring the emission reduction has been well defined. The meter reading will be monitored continuously and will be recorded on an hourly basis by the shift in charge and recorded in logbooks. The plant manager will check and analyze the data and report to the General Manager (O&M). Senior Manager will be responsible for overall CDM activities and the monitored data will be collected for the calculation and estimation of emission reductions. The plant data will be reported to the vice president. Internal audits will be carried out once in six months wherein the monitoring of parameters will be checked against the project design document procedures. Employees will be given periodic training after the commissioning of the power plant to ensure proper monitoring of the parameters. The provided monitoring plan is adequate to provide the necessary information for the calculation of emission reductions. It is DNV's opinion that the Project Participant is capable of implementing the monitoring plan as described in the PDD.

#### 4.8 Algorithms and/or formulae used to determine emission reductions

The emission reduction calculations and the formulae used have been assessed based on the details provided in the section B.6 of the PDD and the methodology AMS-I.D version 16.

Baseline emission ( $BE_v$ ): The baseline emissions have been estimated as a product of net electricity supplied by the project activity to the Southern regional grid of India and combined margin emission factor of the grid to which the project activity is connected.

The project activity is expected to use only renewable biomass for power generation. The project activity is using travelling grate type boiler, it can fire multiple fuel for steam generation. As per MNRE guidelines, coal (fossil fuel) can be used for power generation up to 15% /48/. Hence in case if the project activity uses coal, the following procedure will be used to calculate emission reductions from project activity:

- a) In line with parameter 6 under "Monitoring of the applied version of methodology, the electricity generation metered will be adjusted by deducting the electricity generation from coal using the specific energy consumption and the quantity of fossil fuel consumed.
- b) The amount of electricity generated by using biomass fuels calculated as per the above, will be compared with the amount of electricity generated calculated based on specific energy consumption and amount of each kind of biomass used. The lower of the two values will be used for baseline emission reduction calculation.

Project emission ( $PE_v$ ): The emissions from the fossil fuel usage for transportation of the biomass and the emissions due to usage of diesel in the diesel generator to meet the emergency requirements of the power house will be accounted as project emissions. The Project Participant will monitor the average round trip distance, the average truck load of the biomass procured and the amount of diesel consumed for transportation and the standby power throughout the crediting period whereas the NCV, emission factor and density of diesel has been fixed *ex ante*. Hence it is DNV's opinion that the project emission working has been done in a conservative manner.




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Leakage: following sources have been evaluated for emissions due to leakage:

- As the project activity is installation of new grid connected biomass project and the equipment used in case of the project activity is not transferred from some other facility, leakage emission due to equipment transfer has not been considered /14/.
- Leakage emission due to transportation of biomass to the project site has not been considered since transport emission within 200 km round trip distance is excluded for small scale projects as per clarification SSC WG22 paragraph 8 /41/. However average return distance would be monitored *ex post* and if required leakage emission would be deducted from the baseline emission to get the emission reduction.
- As per the “General guidance on leakage in biomass project activities, version 3 EB 47”/39/ competitive use of biomass is the source of the leakage emission of the project activity. It has been evidenced from the biomass survey report that biomass is available in surplus (more than 25%) within 50 km radius of the project /15/.

$$ER_y = BE_y - PE_y - LE_y$$

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 46 983 tCO<sub>2</sub>e per year for the selected crediting period.

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

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

## 4.9 Environmental impacts

The project activity contributes to generation of electricity from renewable source and the investment is expected to contribute to the economic development of the region. Thus, the project activity is expected to have only beneficial impacts and no adverse impacts are foreseen. The Project Participant has received all necessary approval for the project, like consent to establish from Tamilnadu Pollution Control Board /13/, approval from Tamilnadu Energy Development Agency /10/, no objection certificate from local village Panchayat /4/.

The project is also not likely to create any adverse environmental effects and there are no trans-boundary impacts due to the project.

## 4.10 Comments by local stakeholders

The details of the local stakeholders consultation process has been indicated under section E of the PDD. The local stakeholders were invited through newspaper advertisement in



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Dinamani and in The New Indian express on 29 June 2010 /8/. The Project Participant has conducted a local stakeholder meeting at project site on 10 July 2010 /8/. The authorities of the government agencies, local administration, local communities, and officials of village Panchayat were invited to comment on project activity. DNV verified the minutes of the local stakeholder consultation meeting and the attendance sheet and could confirm that the project did not receive any adverse comments.

DNV considers that the local stakeholder consultation process is adequate for the proposed project activity.

#### 4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 01 dated 9 October 2010 was made publicly available on the CDM website and Parties, stakeholders and NGOs were through the CDM website

(<http://cdm.unfccc.int/Projects/Validation/DB/C8J3BPVPEASOENCGIDM6AZ1KU0B5ZC/view.html>) invited to provide comments during a 30 days period from 11 November 2010 to 10 December 2010. One comment was received during period.

*Comment received:*

1. Generation based on PLF and no of operating hours of the plant should be included for the sensitivity analysis. Pls clarify.
2. Chronology of events is missing. Whether the real and continuous action taking place in getting CDM benefits is not evident from the PDD. DOE has to check.
3. During tripping of turbine due to emergency, electricity will be imported. This aspect is not discussed in the PDD. Pls clarify
4. How CDM benefits will alleviate the technical barriers as elucidated in the PDD.
5. Gross generation, auxiliary consumption, in-plant consumption of electricity should be monitored if not possible indirectly.
6. Steam generation, pressure of steam temperature of steam, feed water inlet temperature should be monitored on hourly basis. Auxiliary fuel that will be consumed should be monitored.

#### Responses Provided by PP:

1. We submit that irrespective of whether the PLF is varied or the number of operating hours is varied, the impact is on the generation, which is nothing but a product of installed capacity, PLF and number of operating hours. Since generation has already been subjected to sensitivity analysis, operating hours is redundant.
2. The project activity falls under the “new project activity” as per item 2 of Annex 13 of EB 62, the project proponent has intimated UNFCCC and DNA on 21/11/2009, for their to seek CMD status with a notification using the F-CDM-Prior Consideration form with in six months after the start date of the project activity (28/05/2009). Since this is not an “existing project activity”, paragraphs 6 and 8 of Annex 13, EB 62 do not apply. That the project developer has intimated the UNFCCC can be verified at the UNFCCC website where the project has been listed under “Prior Consideration of CDM “.The relevant documents are enclosed. Thereby complying with the guidelines on the demonstration and assessment of prior consideration of CDM




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3. As per the applied methodology in the Web hosted PDD, i.e., AMS-I.D (version 16), the quantity of net electricity supplied to the grid is determined. Vide Clause 22 point no 5 of Applied methodological version AMS-I.D version 16 *"The net electricity export/supplied to a grid is the difference between the measured quantities of the grid electricity export and the import"*. Therefore the net electricity exported/supplied to grid, which is a monitoring item takes care of import of electricity from grid in emergency conditions like tripping of turbine etc. Hence, this aspect is not discussed separately in the Web hosted PDD as it is in conformity with the methodology.
4. Additionality of the project activity is demonstrated based on investment barrier and technological issue(s) only support the investment barrier. Carbon credits will help bridge the profitability gap, as well as provide financial support for investing and smooth operation of the project activity.
5. As per the applied methodology version the quantities of grid electricity export and import are to be monitored. For the Biomass (co-firing) facility power projects the energy generation metered should be adjusted from fossil fuels. Based on the above methodology statements, the electricity generated or produced by the renewable generating unit is nothing but power exported by the project activity and the product of this parameter and grid emission coefficient will be the baseline emissions. Further, as per Clarification F-CDM-SSC wg ver 01 SSC\_371 the measurement of Gross power generation is not mandatory/essential and it can be optionally used as one of the measures to meet the QA/QC requirement to cross check the net electricity supplied to grid. Gross power generation figures will not be direct influence on baseline emission calculation. However, the daily gross power generations have been recorded at project site by plant personnel and the same is included as monitoring parameter in the PDD web hosted under Sec B.7.1 <http://cdm.unfccc.int/filestorage/0N7L59WTHK82DOUQABY3RCIZ4VGJP6/Final%20response.pdf?t=Z2V8MTI5MjIzODM2MS40Mg==|IsbGLLQk3ET40FFnew4rtSM17XM=>.
6. The Steam generation, pressure of steam temperature of steam, feed water inlet temperature are not the parameters that required to be monitored as per the applied methodology of Version 16 AMS-I.D as applicable to the project activity. Further the emission reductions due to usage of fossil fuel will be accounted under project emissions due to combustion of fossil fuel attributable to project activity as described in the PDD under sec B.6.1. However as a sign of good practice the parameters will be monitored and recorded in the plant during the operational stage.

### **DNV's assessment on the responses provided by PP:**

Project Participant's responses are considered acceptable in the light of the explanations given. The details of the responses have been assessed and their appropriateness have been indicated under various sections of the report. The sensitivity analysis has been performed for the generation from the project activity which includes PLF, number of operating hours. The excel sheet on the working has been verified as part of validation /2/. Board resolution deciding to go ahead with the project activity /16/ was verified to confirm the awareness of the CDM prior to start date. The documents on the intimation to UNFCCC EB and DNA of India related to serious consideration of CDM revenues have been verified /20/. The net electricity exported is being used for emission reduction calculation which covers the import by the project activity. The monitoring details under the PDD cover all the required



parameters, hence accepted. All the evidences addressed in the PP's response have been verified by DNV.

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## **APPENDIX A**

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### **CDM VALIDATION PROTOCOL**

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

Requirement	Reference	Conclusion
<b>About Parties</b>		
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	<del>CAR-1</del> 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	<del>CAR-1</del> 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	The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards India.
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

Requirement	Reference	Conclusion
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
<b>About additionality</b>		
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 that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	<del>CAR-3</del> <del>CL-2</del> OK
<b>About forecast emission reductions and environmental impacts</b>		
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	
<b>About small-scale project activities (if applicable)</b>		
12. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakech Accords and shall not be a debundled component of a larger project activity.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	OK
13. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and use the simplified baseline and monitoring methodology for that project category.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22e	OK
14. If required by the host country, an analysis of the environmental impacts of the project activity is carried out and documented.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22c	OK
<b>About stakeholder involvement</b>		
15. 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	
16. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project	CDM Modalities and Procedures §40	OK. The PDD has been webhosted in

Requirement	Reference	Conclusion
design document and comments have been made publicly available.		UNFCCC from 11 Nov 10 - 10 Dec 10 CL4
<b>Other</b>		
17. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
18. 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
19. 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
20. 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.
<b>A General description of project activity</b>					
<b>A.1 Title of the project activity (VVM para 55-57)</b>					
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
<b>A.2 Description of the project activity (VVM para 135 and 136 (a) &amp; (c) for small-scale project activities)</b>					
A.2.1 How was the design of the project assessed?	/1/ /66/	DR/I	<p><i>What type is the project?</i></p> <input type="checkbox"/> Project in existing facility or utilizing existing equipment(s) <ul style="list-style-type: none"> <li><input type="checkbox"/> Large scale project</li> <li><input type="checkbox"/> bundled small scale projects, each with emission reductions not exceeding 15 000 tCO<sub>2</sub>e per year</li> <li><input type="checkbox"/> individual small scale project activity with emission reductions not exceeding 15 000 tCO<sub>2</sub>e per year</li> </ul> <input checked="" type="checkbox"/> Greenfield project		OK
			<i>How was the design of the project assessed?</i>		

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<input checked="" type="checkbox"/> Physical site inspection <input checked="" type="checkbox"/> Reviewing available designs and feasibility studies The proposed CDM project activity is installation of a 10 MW Biomass based power plant. The plant will use the surplus biomass residue available in the region.		
A.2.2 If a Greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/ /66/	DR/I	The project activity is a Greenfield project. On 28 December 2010, DNV performed interviews with project proponent to confirm selected information and to resolve issues identified in the document review. At that time of site visit, the plant was under commissioning.		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 <sub>2</sub> e per year), justify the sampling through a statistical analysis:	/1/ /66/	DR/I	Not applicable since the project activity is not a bundled small scale project.		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/ /66/	DR/I	The proposed CDM project activity is installation of a 10 MW biomass based power plant. The plant will utilise the biomass residues in the available in surplus in the region.  The different types of biomass to be used in the plant need to be clearly indicated in the PDD.	<del>CAR-7</del>	OK
A.2.5 Does the project activity involve alteration of existing	/1/	DR/I	No. The proposed CDM project activity is		OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?		/66/		installation of a new 10 MW biomass based power plant supplying power to the southern grid of India.		
A.2.6	Does the project design engineering reflect current good practices?	/1/ /12/ /66/	DR/I	Yes. The technology is generation of electricity using a system compatible for firing multi-fuels. The technology employs Rankine cycle route in which direct combustion of biomass materials takes place through the multi-fuel fired boiler to generate high pressure and high-temperature steam, which drives the turbo-generator.  PP has to provide the technical manual of the equipments from the suppliers.	<del>CAR-3</del>	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/ /12/ /66/	DR/I	The technology used in the project is available in India. No transfer of technology from Annex 1 country is envisaged.		OK
A.2.8	Does the project qualify as a small scale CDM project activity as defined in paragraph 6(c) of decision 17/CP.7 on the modalities and procedures for the CDM?	/1/ /66/	DR/I	Yes, the project activity is a small scale project activity falling under Type (i) project activity – renewable energy generation project activity with a maximum output capacity equivalent of 10 MW.  The agreement for the supply of the boiler and turbine has been verified. However PP has to provide the technical manual of the equipments from the suppliers.	<del>CAR-3</del>	OK
A.2.9	Is the small scale project activity a debundled component of	/1/	DR/I	The project activity is not a de-bundled		OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.								
a larger project activity?	/66/		component of a larger project activity since the project participants have not registered another project using the same technology within 1 km radius of the project during the past two years.										
<b>A.3 Participation requirements (VVM para 51-54, 125-127)</b>													
A.3.1 Do all participating Parties fulfil the participation requirements as follows:  a) Party has ratified the Kyoto Protocol b) Party has designated a Designated National Authority c) The assigned amount has been determined	/1/	DR	Host country India and the Annex I is yet to be identified.  <table border="1" data-bbox="1301 703 1832 863"> <thead> <tr> <th data-bbox="1301 703 1525 735">India (host)</th> <th data-bbox="1525 703 1832 735">Annex I</th> </tr> </thead> <tbody> <tr> <td data-bbox="1301 735 1525 767"><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</td> <td data-bbox="1525 735 1832 767"><input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td data-bbox="1301 767 1525 799"><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</td> <td data-bbox="1525 767 1832 799"><input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td data-bbox="1301 799 1525 831"><input type="checkbox"/> Yes <input type="checkbox"/> No</td> <td data-bbox="1525 799 1832 831"><input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> </tbody> </table>	India (host)	Annex I	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		OK
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A.3.2 Do the letters of approval meet the following requirements?          a) LoA confirms that Party has ratified the Kyoto Protocol b) LoA confirms that participation is voluntary c) The LoA confirms that the project contributes to the sustainable development of the host country?	/1/	DR	The Letter of Approval (LOA) from the DNA of India (host) need to be provided for verification.          <table border="1" data-bbox="1301 1214 1832 1374"> <thead> <tr> <th data-bbox="1301 1214 1525 1246">India (host)</th> <th data-bbox="1525 1214 1832 1246">Annex I</th> </tr> </thead> <tbody> <tr> <td data-bbox="1301 1246 1525 1278"><input type="checkbox"/> Yes <input type="checkbox"/> No</td> <td data-bbox="1525 1246 1832 1278"><input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td data-bbox="1301 1278 1525 1310"><input type="checkbox"/> Yes <input type="checkbox"/> No</td> <td data-bbox="1525 1278 1832 1310"><input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td data-bbox="1301 1310 1525 1342"><input type="checkbox"/> Yes <input type="checkbox"/> No</td> <td data-bbox="1525 1310 1832 1342">NA</td> </tr> </tbody> </table>	India (host)	Annex I	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	NA	<del>CAR-1</del>	OK
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<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No												
<input type="checkbox"/> Yes <input type="checkbox"/> No	NA												
				<del>CAR-1</del>	OK								

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
d) The LoA refers to the precise project activity title in the PDD e) The LoA is unconditional with respect to (a) to (d) above f) The LoA is issued by the respective Party's DNA g) The LoA was received directly by the DOE or the 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				<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> DNA <input type="checkbox"/> PP <input type="checkbox"/> DNA <input type="checkbox"/> PP The Letter of Approval (LOA) from the DNA of India (host) s pending.		
A.3.3	Have all private/public project participants been authorized by an involved Party?	/1/	DR	The project participant is Orient Green Power Company Limited of India. Letter of Approval from DNA of India is pending.	<del>CAR+</del>	OK
<b>A.4 Technical description of the project activity (VVM para 58-64)</b>						
A.4.1	Is the project's location clearly defined?	/1/	DR	The project activity is located at Kariyanchettipalayam Village, Anaimalai Block, Pollachi Taluk, Coimbatore District in the state of Tamil Nadu, India		OK
<b>A.5 Public funding of the project activity</b>						
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/ /66/	DR/I	No public funding has been involved in the project.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<b>B Application of a baseline and monitoring methodology</b>						
<b>B.1 Methodology applied (and VVM para 136 (b) for small-scale project activities)</b>						
B.1.1	Does the project apply an approved methodology and the correct version thereof?	/1/	DR	The project correctly applies the approved baseline methodologies “Grid connected renewable electricity generation” type I. D, Version 16 as per Appendix-B of simplified modalities and procedures for small scale CDM projects, approved by the CDM-EB.		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	Yes. The small scale working group guidelines on the Biomass project activities have been considered for the project activity		OK
B.1.3	If the project applies a small-scale methodology, does the project also comply with the general guidelines to SSC CDM methodologies, which provides guidelines on equipment capacity, equipment performance/lifetime, baseline identification for type-II/III Greenfield project activities, sampling and other monitoring-related issues?	/1/	DR	Yes, The project activity comply with the general guidelines to SSC CDM methodologies		OK
<b>B.2 Applicability of methodology (and tools) (VVM para 65-76)</b>						
B.2.1	How was it validated that project complies with the following applicability criteria: This category comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.	/1/ /66/	DR/I	The project activity is installation of a 10 MW grid connected biomass based power plant supplying power to the Southern grid of India. The plant will utilise biomass residues available in the region. This has been confirmed from the TEDA letter and the PPA with the TNEB.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<p>B.2.2 How was it validated that project complies with the following applicability criteria</p> <p>Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:</p> <ul style="list-style-type: none"> <li>• The project activity is implemented in an existing reservoir with no change in the volume of reservoir;</li> <li>• The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m<sup>2</sup>;</li> <li>• The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m<sup>2</sup>.</li> </ul>	/1/ /66/	DR/I	The proposed project activity is biomass based power plant. Hence this applicability condition is not relevant for the project activity.		NA
<p>B.2.3 How was it validated that project complies with the following applicability criteria</p> <p>If the unit added has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>	/1/ /66/	DR/I	The proposed project activity is installation of 10 MW biomass based power plant. Hence this applicability condition is not relevant for the project activity.		NA
<p>B.2.4 How was it validated that project complies with the following applicability criteria:</p> <p>Combined heat and power (co-generation) systems are not eligible under this category.</p>	/1/ /66/	DR/I	The project activity is not a co-generation activity. Hence this applicability condition is not relevant for the project activity.		NA
<p>B.2.5 How was it validated that project complies with the following applicability criteria:</p> <p>In the case of project activities that involve the addition of</p>	/1/ /66/	DR/I	The project activity is installation of a new 10 MW grid connected biomass based power		NA

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.			plant supplying power to the southern grid of India. Hence this applicability condition is not relevant for the project activity.		
B.2.6 How was it validated that project complies with the following applicability criteria: insert applicability criteria: Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small-scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.	/1/  /66/	DR/I	The project activity is installation of a new 10 MW grid connected biomass based power plant supplying power to the southern grid of India. Hence this applicability condition is not relevant for the project activity.		NA
B.2.7 Is the selected baseline one of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/	DR	The baseline emissions have been estimated as a product of net electricity supplied by the project activity to the southern regional grid of India and combined margin emission factor of the grid to which the project activity is connected.		OK
<b>B.3 Project boundary (VVM para 78-80)</b>					
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/  /66/	DR/I	The project boundary includes – (i) Biomass fuel supply system including biomass residue collection, transportation and processing. (ii) The power plant connected to the boiler and auxiliary power consumption units. (iii) The spatial boundary of the project also includes transmission network for the evacuation of electricity to Southern grid to which the project activity is connected.  The project boundary has been defined clearly in the PDD.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.3.2	Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/	DR	Yes, the identified boundary covers all possible sources of GHG emissions linked to the project activity.		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/	DR/I	No such activity is envisaged.		OK
<b>B.4 Baseline scenario determination (VVM para 81-88, 105-107)</b>						
B.4.1	Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/	DR	The baseline emissions have been estimated as a product of net electricity supplied to the southern regional grid of India and combined margin emission factor of the grid to which the project activity is connected No alternative scenario analysis is done. The same is not required as per the methodologies.		OK
B.4.2	How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/	DR	No alternative scenario analysis is done. The same is not required as per the methodology.		OK
B.4.3	What is the baseline scenario?	/1/	DR	The baseline emissions have been estimated as a product of net electricity supplied to the southern regional grid of India and combined margin emission factor of the grid to which the project activity is connected		OK
B.4.4	Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/	DR	Yes, the baseline has been determined in accordance with the guidance of the methodology.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4.5	Has the baseline scenario been determined using conservative assumptions where possible?	/1/ /66/	DR/I	Yes. Since the project involves power generation through controlled combustion of the biomass residues in the region and being connected to Southern grid of India; in the absence of the project activity, equivalent amount of energy would have been generated from the existing plants or new capacity additions using the fossil fuels in the southern Grid.  As suggested by methodology, combined margin approach has been selected to estimate the baseline emission factor. The CM emission factor has been chosen from official web site of Central Electricity Authority which is publicly available data.		OK
B.4.6	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /66/	DR/I	Yes. All relevant national and sectoral policies, regulations and department rules and disciplines are considered.		OK
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/ /44/ /66/	DR/I	Yes, the baseline scenario for AMS-I.D, the CM emission factor has been chosen from official web site of Central Electricity Authority which is publicly available data and reference to the Central Electricity Authority database has been provided in the PDD.		OK
B.4.8	Is the baseline determination adequately documented in the PDD?  <ul style="list-style-type: none"> <li>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</li> </ul>	/1/ /44/ /66/	DR/I	The following parameters necessary for determining the baseline have been mentioned in the PDD;  For power generation:		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<p>referenced.</p> <ul style="list-style-type: none"> <li>All documentation is relevant as well as correctly quoted and interpreted.</li> <li>Assumptions and data can be deemed reasonable</li> <li>Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.</li> <li>The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity</li> </ul>			<p>Installed capacity of the project activity and CM Emission factor of the southern grid of India.</p> <p>All the parameters have been verified and found to be appropriate.</p>		
<b>B.5 Additionality determination (VVM para 137)</b>					
<p>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 additionality for SSC project activities”.</p>	/1/ /66/	DR/I	<p>The project participant uses the Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities for demonstrating additionally of the project. The additionality has been argued based on the investment barrier, Technological Barrier due to characteristics of biomass fuels.</p> <p>This is in line with the applied methodology AMS.I.D, Version 16.</p>		OK
<p>B.5.2 Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?</p>	/1/ /66/	DR/I	<p>The project activity is in compliance with applicable regulatory requirements.</p>		OK
<p>B.5.3 Is sufficient evidence provided to support the relevance of the arguments made?</p>	/1/ /66/	DR/I	<p>Support data/documents for the all input values/assumptions for investment analysis are to be provided.</p>	<del>CAR-3</del>	OK
<p>B.5.4 What is the project additionality mainly based on (Investment analysis or barrier analysis)?</p>	/1/ /66/	DR/I	<p>The additionality has been argued based on the Investment barrier, Technological Barrier.</p>		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<b>Prior consideration of CDM (VVM para 98-103)</b>						
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/ /17/ /66/	DR/I	The PDD under the CDM consideration indicates the list of references for the awareness of CDM, however it needs to be demonstrated that the revenues from CDM were a decisive factor in the decision to proceed with the project needs to be demonstrated adequately along with the original board minutes of OGPL.	<del>CL-4</del>	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/ /15/ /66/	DR/I	The start date of the project activity is 28 May 2009, which is the date of the letter of intent for Shriram EPC for the EPC contract of the power plant. The formal intimation to UNFCCC and the DNA of India regarding the PP's intention to seek carbon revenues need to be provided.		OK
<b>Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)</b>						
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 project activity?	/1/ /23/ /66/	DR/I	The proposals from the CDM consultants were presented as evidences for the continuous efforts.		OK
B.5.8	When did the construction of the project activity start?	/1/ /66/	DR/I	Project Participants are requested to clarify the starting date of construction of project activity and the same information need be included in PDD.	<del>CL-4</del>	OK
B.5.9	When was the project commissioned?	/1/ /66/	DR/I	The project activity was under implementation and expected to be		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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/ /66/	DR/I	commissioned during March 2011. Yes, the sequence of events confirms that continuous actions to secure CDM status in parallel with the implementation have been taken.		OK
<b>Investment analysis (VVM para 108-114)</b>					
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/ /66/	DR/I	Since the project activity is installation of a new 10 MW grid connected biomass based power plant supplying power to the southern grid of India, Project activity generates revenues apart from CDM through electricity sale to the grid. Yes the project IRR discussion provided in the PDD covers revenues generated through electricity sales.		OK
B.5.12 Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/ /66/	DR/I	No, the alternative electricity generation in the grid does not involve any investment from the PP. Yes this aspect has been covered in the PDD.		OK
B.5.13 Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/ /66/	DR/I	The project has selected benchmark analysis. Since the other revenue stream is also available for the project apart from CDM and the alternative grid based electricity generation does not involve any investment on the part of the project proponent. Therefore the selected benchmark analysis approach is justified for demonstrating the additionality of the project.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.14 Is the benchmark/discount rate the latest available at the time of decision?	/1/ /66/	DR/I	<p>The WACC calculated based on the returns from the govt securities as risk free rate, market return from BSE sensx for the power companies as expected market returns and beta from the listed power companies, has been selected as the benchmark for the project activity. The benchmark is applicable at the time of decision making and has been checked based on the sources of information indicated in the excel sheet.</p> <p>However the following needs to be clarified in the benchmark working:</p> <ol style="list-style-type: none"> <li>1. period considered for arriving at the beta value</li> <li>2. period considered for arriving at the CAGR</li> <li>3. Suitability of the selected reference for the risk free rate.</li> </ol>	<del>CAR-2</del>	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/ /66/	DR/I	<p>Post tax project IRR is the financial indicator chosen for benchmark analysis.</p> <p>Yes the Post tax project IRR (financial indicator) chosen for benchmark analysis is appropriate.</p>		OK
B.5.16 Are the underlying assumptions appropriate?	/1/ /66/	DR/I	Support data/documents for the input values/assumptions of the investment analysis are to be provided.	<del>CAR-3</del>	OK
B.5.17 Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal	/1/	DR/I	Yes. Accelerate depreciation has taken into		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	accounting practice in the host country?	/66/		account for tax working.		
B.5.18	Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?	/1/ /66/	DR/I	Yes. The salvage value used in the financial analysis is found to be conservative. It needs to be clarified on why the working capital margin has not been returned in the last year of operation.	<del>CL-2</del>	OK
B.5.19	When 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/ /66/	DR/I	The DPR submitted to banks need to be provided.	<del>CAR-3</del>	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 version 1.2 paragraph 95.	/1/ /66/	DR/I	<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.  PLF / electricity output from the plant need to be justified as per Annex 11 of EB 48.	<del>CAR-3</del>	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 version 1.2 paragraph 95.	/1/ /47/ /66/	DR/I	<input checked="" type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>related to the project and the project participants.</p> <p>The electricity tariff for the project activity considered for the project activity is based on the TNERC tariff order.</p>		
<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 version 1.2 paragraph 95.</p>	<p>/1/ /6/ /66/</p>	<p>DR/I</p>	<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 investment cost has been checked based on the DPR and also cross checked with the bank loan sanction letter.</p>		<p>OK</p>
<p>B.5.23 How were the O&amp;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 version 1.2 paragraph 95.</p>	<p>/1/ /66/</p>	<p>DR/I</p>	<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 O&amp;M cost has been checked based on the DPR and has been cross checked based on the TNERC tariff order.</p>		<p>OK</p>
<p>B.5.24 Describe the assessment of the other input parameters. Were the data available and valid at the time of decision?</p>	<p>/1/ /66/</p>	<p>DR/I</p>	<p><input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or</p>	<p>CAR-3</p>	<p>OK</p>

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM version 1.2 paragraph 95.			price indices) <input checked="" type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants. Biomass cost used in the financials need to be justified with adequate supporting evidences in light of the TNERC tariff order		
B.5.25 Was the financial calculation spreadsheet verified and found to be correct?	/1/ /66/	DR/I	Refer B.5.18		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/	DR	Sensitivity has been done for variation in Investment cost, fuel cost, generation, electricity tariff, and O&M cost.		OK
B.5.27 Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/	DR	Yes, the sensitivity analysis has been performed for 10 % variation.		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/	DR	Sensitivity analysis has been performed by varying the parameters till the IRR reaching the benchmark.		OK
<b>Barrier analysis (VVM para 115-118)</b>					
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	NA.		
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/I	NA		
B.5.31 How does CDM alleviate the investment barriers?	/1/	DR/I	NA		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	/66/				
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/ /66/	DR/I	NA		
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	Supporting documents for the arguments under Technological barriers due to characteristics of the biomass fuel need to be provided.	<del>CAR-3</del>	OK
B.5.34 How does CDM alleviate the technological barriers?	/1/	DR	The CDM revenues minimise the risk and the same has been included in the PDD.		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	The alternate does not involve any barrier of this sort.		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	NA		OK
B.5.37 How does CDM alleviate the barriers due to prevailing practise?	/1/	DR	NA		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	NA		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	NA		
B.5.40 How does CDM alleviate the other barriers?	/1/	DR	NA		
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	/1/	DR	NA		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
feasible under the same circumstances?					
<b>Common practice analysis (VVM para 119-121)</b>					
B.5.42 What is the geographical scope of the common practice analysis? Is this justified?	/1/	DR	Being small scale project common practice analysis is not considered essential.		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	Not applicable. Refer B.5.42		OK
B.5.44 What is the data source(s) used for the common practice analysis?	/1/	DR	Not applicable. Refer B.5.42		OK
B.5.45 How many similar non-CDM-projects exist in the region within the scope?	/1/	DR	Not applicable. Refer B.5.42		OK
B.5.46 How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR	Not applicable. Refer B.5.42		OK
B.5.47 What is the conclusion of the common practice analysis?	/1/	DR	Not applicable. Refer B.5.42		OK
<b>Conclusion</b>					
B.5.48 What is the conclusion with regard to the additionality of the project activity?	/1/ /66/	DR/I	The issues raised under CAR 3 of Table 3 of the protocol need to be addressed satisfactorily to draw any conclusion on the additionality of the project.	<del>CAR 3</del> <del>CL 2</del>	OK OK
<b>B.6 Calculations of GHG emission reductions</b>					
<b>Data and parameters that are available at validation and that are not monitored (VVM para 199-203)</b>					
B.6.1 How the Combined Margin emission factor of Southern grid of India available at the time of start of validation was verified?	/1/ /44/ /66/	DR/I	The CM emission factor has been sourced from CO <sub>2</sub> baseline database version 5 published by Central Electricity Authority		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>(CEA) of the Ministry of Power, Government of India, which is a publicly available data. This CO<sub>2</sub> baseline database provides information about the OM and BM factors of all the regional electricity grids in India.</p> <p>The combined margin emission coefficient for the southern grid of India has been calculated at 0.90250 tCO<sub>2</sub>e/MWh and is fixed <i>ex ante</i> for the renewable crediting period of 7 years. The simple OM approach based on the generation-weighted average emissions per electricity unit over a three year period of 2006-07, 2007-08 and 2008-09,. BM is calculated <i>ex ante</i> based on the 20% most recent capacity additions in the southern grid based on net generation for the year 2008-09. The operating margin has been determined to be 0.98708 tCO<sub>2</sub>e/MWh and the build margin to be 0.81792 tCO<sub>2</sub>e/MWh.</p>		
B.6.2 How was the specific fuel consumption of each kind of biomass residue to be used in case of project activity was verified?	/1/ /66/	DR/I	The details of the working of the SEC of the different biomass fuel need to be provided.	<del>CAR-5</del>	OK
B.6.3 How the Emission factor for transport of waste and biomass was verified?	/1/ /66/	DR/I	The NCV & EF of diesel has been fixed <i>ex ante</i> based on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and the density has been fixed based on the data from the Society of Indian automobile manufacturers.		OK
B.6.4 How the surplus availability of each kind of biomass expected to be used in case of project activity was verified?	/1/ /66/	DR/I	Project participants has conducted the biomass assessment report for the region	<del>CAR-5</del>	OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				indicating the surplus availability of each kind of biomass expected to be used in case of project activity. However copy of the report need to be furnished.		
<b>Baseline emissions (VVM para 89-93)</b>						
B.6.5	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /66/	DR/I	Yes. The calculations have been indicated in a transparent manner.		OK
B.6.6	Have conservative assumptions been used when calculating the baseline emissions?	/1/ /66/	DR/I	Yes. The calculations have been indicated in a transparent manner.		OK
B.6.7	Are uncertainties in the baseline emission estimates properly addressed?	/1/ /66/	DR/I	Yes.		OK
<b>Project emissions (VVM para 89-93)</b>						
B.6.8	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /66/	DR/I	The following sources of emission has been considered for calculating the project emissions: <ul style="list-style-type: none"> <li>• Project emissions due to combustion of fossil fuels for transportation of biomass residues to the project site.</li> <li>• Emissions due to diesel combustion in DG set</li> </ul> However the higher value of the 95% confidence interval needs to be used for the project emission calculations.	<del>CAR-6</del>	OK
B.6.9	Have conservative assumptions been used when calculating the project emissions?	/1/ /66/	DR/I	Yes		OK
B.6.10	Are uncertainties in the project emission estimates properly addressed?	/1/ /66/	DR/I	Yes		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>Leakage (VVM para 89-93)</b>						
B.6.11	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /66/	DR/I	The assessment has been carried out as per Attachment C to appendix B of the SSC modalities and procedures.		OK
B.6.12	Have conservative assumptions been used when calculating the leakage emissions?	/1/ /66/	DR/I	Refer Section B.6.12 of the report.		OK
B.6.13	Are uncertainties in the leakage emission estimates properly addressed?	/1/ /66/	DR/I	Refer Section B.6.12 of the report.		OK
<b>Emission Reductions (VVM para 89-93)</b>						
B.6.14	Algorithms and/or formulae used to determine emission reductions: <ul style="list-style-type: none"> <li>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</li> <li>All documentation is correctly quoted and interpreted.</li> <li>All values used can be deemed reasonable in the context of the project activity</li> <li>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.</li> </ul>	/1/ /66/	DR/I	Yes. All assumptions and data used by the project participants are listed in the PDD and All values used can be deemed reasonable in the context of the project activity.		OK
<b>B.7 Monitoring plan (VVM para 122-124)</b>						
<b>Data and parameters monitored</b>						
B.7.1	Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/	DR/I	The parameters Quantity of biomass procured and biomass consumed have the same method of the measurement and assessment. This needs to be clarified.	<del>CL-3</del>	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.7.2	Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR/I	Yes. All the necessary parameters are clearly described.		OK
B.7.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR/I	The method of measurement of the quantity of fossil fuel (Diesel) needs to be clarified.	<del>CC</del>	OK
B.7.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR/I	<p>The main parameters to be monitored are</p> <ul style="list-style-type: none"> <li>• Gross Electricity Generation (kWh or GWh) by the project activity</li> <li>• Net electricity exported</li> <li>• Electricity Imported from grid</li> <li>• Quantity of Biomass residue types and Fossil fuel procured / transported to the project site (Tonnes)</li> <li>• Biomass residue types and Fossil fuels combusted in the project plant (Tonnes).</li> </ul> <p>The details of the meters like make, type and accuracy needs to be clarified.</p>	<del>CC</del>	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 parameter.	/1/	DR/I	<p>The calibration frequency of the electricity meter and the weigh bridge is as per the industrial standard.</p> <p>However, the calibration frequency of the meters installed by the TNEB need to be clarified in light of the simplified modalities and procedures for the small cale project activities.</p>	<del>CC</del>	OK
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR/I	The monitoring frequency of the parameters indicated under B.7.4 is found to be adequate.		OK
B.7.7	Is the recording frequency adequate for all monitoring	/1/	DR/I	Yes.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
parameters? Describe each parameter.						
<b>Ability of project participants to implement monitoring plan</b>						
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/I	The implementation of the monitoring plan is feasible.		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)?	/1/	DR/I	Yes. The responsibility and the procedures for day-to-day records handling has been indicated 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/I	Yes. The responsibility of monitoring various parameters in the project activity indicated in the PDD. Procedures and frequency for internal audits have been indicated in the PDD.		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/I	Yes, as per the PDD all data will be kept for a minimum period of 2 years after the crediting period or CER issuance.		OK
<b>Monitoring of sustainable development indicators/ environmental impacts</b>						
B.7.12	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR/I	Host country regulation does not require monitoring of sustainable development indicators/ environmental impacts specific to the project activity.		OK
B.7.13	Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR/I	NA		OK
B.7.14	Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR/I	Host country regulation does not require monitoring of sustainable development		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			indicators for the project activity.		
<b>C Duration of the project activity / crediting period</b>					
<b>C.1.1 Start date of project activity (VVM para 99-100, 104)</b>					
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/ /15/ /66/	DR/I	The start date of the project activity is 28 May 2009	OK
C.1.3	Is the stated expected operational lifetime of the project activity reasonable?	/1/ /66/	DR/I	Yes, The expected life time of the project activity has been considered to be 25 years.	OK
C.1.4	Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/ /66/	DR/I	A renewable crediting period of 7 years has been selected. The start date of the crediting period has been stated to be 1 April 2011 or the date of registration, which ever is later.	OK
<b>D Environmental Impacts (VVM para 136 (d))</b>					
D.1.1	Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring? For small-scale project activities, is an assessment of the environmental impacts of the proposed CDM project activity is required by the host Party?	/1/ /66/	DR/I	As per environmental impact assessment notification of Government of India dated 1 December 2009, EIA is not required for the project activity.	OK
D.1.2	Does the project comply with environmental legislation in the host country?	/1/ /66/	DR	The project proponent has received all necessary clearances related to the project activity like: Consent to operate, NOC from village panchayat, Environmental clearance.	OK
D.1.3	Will the project create any adverse environmental effects?	/1/	DR/I	The project is not expected to create any adverse environmental effects.	OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/	DR/I	The project activity is not envisaged to have any negative environmental impact.		OK
<b>E Stakeholder Comments (VVM para 128-130)</b>						
E.1.1	Have relevant stakeholders been consulted?	/1/ /8/ /66/	DR/I	Yes.		OK
E.1.2	Have appropriate media been used to invite comments by local stakeholders?	/1/ /8/ /66/	DR/I	Invitation for the local villagers was sent and a local news paper advertisement inviting the stakeholders.		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 such regulations/laws?	/1/ /66/	DR/I	Minutes of the stakeholder meeting was verified during the site visit.		OK
E.1.4	Is a summary of the stakeholder comments received provided?	/1/ /66/	DR/I	Yes. The MoM of the stakeholder meeting has been verified by DNV.		OK
E.1.5	Has due account been taken of any stakeholder comments received?	/1/ /66/	DR/I	The project did not receive any negative comments. .		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
<p><b>CAR-1</b> Letter of Approval from DNA of India need to be provided for verification.</p>	<p>Table1 A.3.2 A.3.3</p>	<p>Letter of Approval received from DNA of India dated 14/03/2011 is furnished to DOE.</p>	<p>The LoA from the MoEF dated 14 March 2011 has been verified.  CAR closed.</p>
<p><b>CAR-2</b> The following needs to be clarified in the benchmark working:</p> <ol style="list-style-type: none"> <li>1. Period considered for arriving at the beta value</li> <li>2. Period considered for arriving at the CAGR</li> </ol> <p>Suitability of the selected reference for the risk free rate.</p>	<p>B.5.14</p>	<p>1. Beta value is calculated based on the stock price movement over a period of one year prior to decision making date. As Damodaran observes, “A longer estimation period provides more data, but the firms itself might have changed in its risk characteristics over the time period” (Security Analysis for Investment and Corporate Finance, Aswath Damodaran). This observation was found to be true as when the values were analyzed for a periods of 2, 3, 4 and 5 years prior to decision making, the Beta Values were comparatively yielding to higher value of benchmark. Hence beta value adopted is more conservative.</p> <p>2. For the project under consideration the period considered for arriving at the CAGR is 30 years and 1 month .(i.e from start of the BSE sensx to the end of the month prior to which the investment decision was taken).</p> <p>The risk free rate is taken based on the</p>	<p>The details of the working have been substantiated with the sources and based on the conservativeness of the values used for the benchmark calculation the values have been accepted.  CAR closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>interest rates on long term government securities at the time of investment decision and is sourced from reserve bank of India (RBI) bulletin and the value used is 7.69%, weighted average for the year 2008-09.</p> <p>PDD revised suitably to include the web references of risk free rate, appropriateness of WACC and the justification of the selected companies for beta in Sec B.5.</p> <p>The excel spreadsheet for the consideration of conservative values with regard of the period of assessment is being provided to DOE.</p>	
<p><b>CAR-3</b> The project activity argues additionality based on the investment analysis, Technology barrier. The following points need to be addressed:</p> <ol style="list-style-type: none"> <li>1. The DPR submitted for the banks need to be provided.</li> <li>2. PLF / electricity output from the plant need to be justified as per Annex 11 of EB 48.</li> <li>3. Support data/documents for the input values/assumptions for investment analysis are to be provided (Financial analysis of the DPR)</li> </ol>	<p>A.2.6 A.2.8 B.5.3 B.5.16 B.5.19 B.5.20 B.5.24</p>	<ol style="list-style-type: none"> <li>1. The copy of the same being furnished for to DOE.</li> <li>2. The project has considered plant load factor (PLF) of 80% at the time of DPR preparation as per the TNERC tariff order 2009 for Biomass power projects, as TNERC is the Authentic agency</li> </ol>	<ol style="list-style-type: none"> <li>1. The term loan sanction letter received from the bank was evidenced which indicates the details of the project activity.</li> <li>2. Accepted based on the TNERC tariff order of 2009.</li> <li>3. Documents supporting the input parameters applicable at the time of decision making have been</li> </ol>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<ol style="list-style-type: none"> <li>4. PP has to provide the technical specifications of the equipments from the suppliers.</li> <li>5. Biomass cost used in the financials need to be justified with adequate supporting evidences in light of the TNERC tariff order.</li> <li>6. Supporting documents for the arguments under Technological barriers due to characteristics of the biomass fuel need to be provided.</li> </ol>		<p>and the public domain source which can be considered as supportive document in line with Annex 11 EB 48.</p> <ol style="list-style-type: none"> <li>3. Copies of supporting documents for the considered input values/assumptions in the investment analysis are being provided to DOE for validation.</li> <li>4. A complete maintenance program will be established during the first year of the plants operation and there by technical manuals will be provided by respective , which will be made available for the First Verification if not obtained during validation.</li> <li>5. The biomass cost considered is as per the quotations from biomass suppliers prior/during investment decision. Where by the Average biomass fuel price arrives to INR. 2041 per Ton as against to that of INR 2000 per Ton considered by the TNERC in its tariff order 27 Apr 2009, the value considered by the TNERC in determination of the</li> </ol>	<p>verified.</p> <ol style="list-style-type: none"> <li>4. The equipment specifications were cross checked from the submitted purchase orders and specification sheets.</li> <li>5. The TNERC tariff order has considered 2000 INR/MT as weighted average cost of biomass in its tariff order. The tariff order indicates various ranges on the fuel price, considering the discussions in tariff order and the actual biomass quotations evidenced during validation, it has been accepted that the fuel price of 2185 INR/MT is reasonable.</li> <li>6. Revised PDD after removing the barriers has been reviewed and accepted.</li> </ol> <p>Based on the above assessment the CAR was closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>tariff would be obviously available prior to issue of order and there by the variation of 2% (INR 41 per MT) over the considered prices is not high as it appears to be. The sensitivity analysis has been carried out for the fuel price and the results reveal that the IRR remains below the benchmark and the project remains additional . Hence the considered fuel price is appropriate and valid at the time of decision making.</p> <p>6. In line with the Non-binding best practices examples to demonstrate additioanlity for SSC project activities Annex 34 EB 35, at least one barrier need to be assessed ,as of the additioanality demonstrated through investment analysis, pp wish to submit that the technology barrier is now removed from PDD.</p>	
<p><b>CAR-4</b> The PDD under the CDM consideration indicates the list of references for the awareness of CDM, however it needs to be demonstrated that the revenues from CDM were a decisive factor in the decision to proceed with the project needs to be demonstrated adequately along with the original board minutes of OGPL.</p>	<p>B.5.5</p>	<p>The original Board minutes (18/05/2009) will be made evident to DOE to demonstrate that CDM revenues were decisive in the decision to proceed with the project activity to improve the financial attractiveness. The PP has considered revenue from CDM as decisive factor when the board of directors of the proponent company have passed resolution</p>	<p>The original board minutes of OGPL dated 18 May 2009 was evidenced which refers to CDM revenues for the viability of the project and indicating that CDM was a decisive factor while decision making.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>considering the barriers likely to be faced by the project activity and therefore to seriously consider CDM revenue for implementation of the project.</p> <p>As of the Project start date was after 02 August 2008 as per the” GUIDELINES ON THE DEMONSTRATION AND ASSESSMENT OF PRIOR CONSIDERATION OF THE CDM” and The validation and verification manual (VVM Version 01.2) states that to demonstrate seriousness of consideration of CDM revenue,</p> <p><i>“For a new project activity, for which PDD has not been published for global stakeholder consultation or a new methodology proposed to the CDM Executive Board before the project activity, start date, the DOE shall ensure by means of confirmation from the UNFCCC secretariat that PPs had informed the host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status.”</i></p> <p>In line with the above clause, the proposed project activity being a new project and the project proponent has informed to UNFCCC CDM Registry about intention to seek CDM status for the proposed project activity on 21/11/2009 which is well within</p>	<p>The details on the notification to the UNFCCC EB and the national CDM authority have been provided and verified.</p> <p>CAR closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		6 months of project start date (28/05/2009) as described in CDM guidelines and the project has been listed at UNFCCC CDM Website under prior consideration of CDM. The relevant documents are being furnished to DOE as a part of Validation.	
<p><b>CAR 5:</b> The details of the working of the SEC of the different biomass fuel need to be provided. Also, copy of the biomass assessment report need to be furnished.</p>	<p>B.6.2 B.6.4</p>	<p>The details of the workings of the SEC are furnished and also being furnished a copy of the biomass assessment report carried out in the project region by the third party consultant.</p>	<p>The copy of the biomass assessment report for the region was submitted and the detail on the surplus availability of the different type of biomass in the region has been verified. Also the supporting documents for the specific energy consumption have been provided.</p> <p>CAR closed.</p>
<p><b>CAR 6:</b> The higher value of the 95% confidence interval needs to be used for the emission factor and project emission calculations.</p>	<p>B.6.8</p>	<p>The 95% confidence interval values are used for the emission reduction estimates in the revised calculations</p>	<p>The revised ER calculations have been reviewed and accepted.</p> <p>CAR Closed.</p>
<p><b>CAR 7</b> The different types of biomass to be used in the plant need to be clearly indicated in the PDD.</p>	<p>A.2.4</p>	<p>The PDD revised suitably.</p>	<p>PDD has included the details and the same has been reviewed and accepted.</p> <p>CAR Closed.</p>
<p><b>CL-1</b> Project Participants are requested to clarify the starting date of construction of project activity.</p>	<p>B.5.8</p>	<p>The start date of the construction or the mile stone activity of the construction is evident from the letter from civil work</p>	<p>The document has been reviewed and found to be appropriate.,</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		contractor dated 07/05/2010 and the date is later than the start date indicated in PDD (LOI for EPC-28/05/2009) there by the Considered start date is the earliest of the activities undergone.	CL Closed.
<p><b>CL 2</b> It needs to be clarified on why the working capital margin has not been returned in the last year of operation.</p>	B.5.18	Working capital margin has been returned (reckoned as cash inflow) in the terminal year. The formula used in the computation of salvage value, which includes land cost at 100%, margin for working capital at 100% and other assets at 10%.	Accepted based on the clarifications.  CL closed.
<p><b>CL 3</b> The following points under monitoring needs to be clarified:</p> <ol style="list-style-type: none"> <li>1. The parameters Quantity of biomass procured and biomass consumed have the same method of the measurement and assessment.</li> <li>2. The method of measurement of the quantity of fossil fuel ( Diesel)</li> <li>3. The details of the meters like make, type and accuracy needs to be clarified.</li> <li>4. the calibration frequency of the meters installed by the TNEB need to be clarified in light of the simplified modalities and procedures for the small scale project activities.</li> </ol>	B.7.1 B.7.3 B.7.4	<ol style="list-style-type: none"> <li>1. The trucks carrying fuel (biomass residues and fossil fuel) weighted by a calibrated weighbridge twice upon entry and exit to arrive at the net quantity of fuel procured. Where as the amount of fuels consumed is monitored through the weigh scales/load sensors that will be installed on the conveying system that feeds the fuel in to combustion chamber of the Boiler.</li> </ol>	<p>The revised PDD has included the detail that has been provided as part of responses and the revised PDD has been reviewed and accepted.</p> <p>CL Closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>5. Method of leakage assessment without monitoring the distance of biomass procurement during the first crediting period need to be clarified</p>		<p>2. Since the DG set is for emergency purpose, the procurement of diesel in bulk quantities will not be araised. However, the diesel are being procured from outside and the same is being issued from stores and filled fuel tank of DG set whenever the diesel level falls down. The plant personnel are being recorded the day wise fuel tank filling quantities, no. of operating hours of DG set &amp; the corresponding quantity of diesel consumed for the purpose will be recorded in the log book maintained at the DG set .</p> <p>3. The plant has not been constructed yet and project proponent acknowledged and agreed to incorporate specific procedures of high accuracy to address the issue of anomalies. The implementation of this procedure be checked during verification stage. As per the point no (6) of item 4 of executed Biomass Energy Purchase Agreement executed b/w PP and the utility TNEB included the</p>	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>information that the frequency of calibration to be as per CEA (installation and operation of meters) regulations 2006* , in the defined regulation the calibration of meters to be done once in five years and the sated calibration frequency of once in three years is reasonable as per General Guidelines to SSC CDM methodologies, Ver 17 for the small scale project activities. Hence that supports the answer that indicated frequency in the PDD is appropriate.</p> <p>*<a href="http://www.powermin.nic.in/what_s_new/pdf/Metering_Regulations.pdf">http://www.powermin.nic.in/what_s_new/pdf/Metering_Regulations.pdf</a></p> <p>4. It has been included in the PDD that the Average round trip distance (from and to) between biomass fuel supply sites and the project site will be maintained at the fuel inward entry in to the plant premises and the same is included as monitoring parameter under Sec B.7.1 of the PDD</p>	
<p><b>CL 4</b> The responses for the Comments received during the GSC period need to be furnished.</p>	Table 1, 16.	The response for the comments received during the GSC have been furnished.	The responses have been assessed along with the supporting documents provided during the process of validation and the responses provided by the PP has been

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			accepted. CL closed.

**Table 4 Forward action requests**

Forward action request	Reference to Table 2	Response by project participants
No FAR has been identified for the project activity		

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## **APPENDIX B**

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### **CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS**

## ***Murali Govindarajulu***

**Mr. Murali Govindarajulu** holds a Bachelor's Degree in Chemical Engineering and has done a Short term diploma course in Management. Having an overall experience of around eleven years. Prior to joining DNV having around seven years experience in Chemical process industry covering production, energy efficiency improvement and equipment design erection and commissioning. His experience also covers the fields of environmental management and resource conservation including identification of alternative fuels. He has also been actively involved in implementation of Management Systems such as ISO 14001 and OHSAS 18001 standards in chemical process industry for more than three years.

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 energy generation from renewable energy sources.

## ***Astakala Vidyacharan***

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

## ***Ranganathan Seshan***

**Mr. Seshan Ranganathan** holds a Bachelor's Degree in Chemical Engineering and has done diploma course in Management and completed the graduate ship course in Industrial Engineering and has an overall working experience of around twenty six years. Prior to joining DNV has around twenty four 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 and pollution control activities including waste water treatment, project management, corporate planning, sales, logistics in fertilizer & petrochemical industry . With respect to the thermal power plant the job assignment included the monitoring of flue gas exit temperatures, excess air used,effiacy of fuel additivites,conditon of boiler refractory ,insulation of steam lines etc.The experience also includes 5 years in process design & engineering for chemical process industry.

He has experience of over two years in validation and verification of CDM projects in DNV.He has completed the EMS lead auditor course.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Thermal Energy Generation from fossil fuels.

## *Nitin Kapoor*

**Mr. Nitin Kapoor:** holds a Bachelor in Chemical Engineering from BITS-Pilani and is also a qualified Chartered Financial Analyst (CFA) He has an overall experience of 15 years and 4 months as on date (October 2010). Prior to joining DNV he had experience of 10 years and 5 months in Oil & Gas as well as manufacturing sector (food) with leading MNC's like ITC, Coca Cola and Enron Oil and Gas. During his stint in industry part his responsibilities included carrying out energy audits and to identify potential areas of improvement. His experience includes analysis of specific consumptions (primarily on energy, raw materials and utilities) of processes based on historical data, carrying out material balances (heat and mass), analysis of equipment performance and identification and measurement of energy saving opportunities. He has also been responsible for the operations of the complete Crude Distillation Unit in the refinery, complete platform operations in Oil and Gas sector as well as for the utilities like steam, AHU while at ITC. He also has been responsible of the ETP operations in Coca Cola and ITC as well as Water and Sewage treatment plants while working offshore. He has been responsible for EMS and QMS at ITC and Coca Cola.

He has experience of around 3.5 years in validation and verification of numerous CDM projects within DNV. He is also a Lead Auditor for QMS, auditor for EMS and Safety. His qualification, industrial experience and project experience in CDM demonstrate his sufficient sectoral competence in Energy Generation from renewable energy sources, energy efficiency, heat distribution energy demand as well as waste handling and disposal.

His direct work experience in Oil and Gas and food sector demonstrates his sectoral competence in these industries as well.

## *Kakaraparthi Venkata Raman*

**Mr. Kakaraparthi Venkata Raman** holds a bachelor degree (B.Tech) in Chemical Engineering and a Diploma in Management. He has an overall experience of 18 years in the Chemical Process Industry - Fertilisers and Chemicals industry (FACT). His main areas of work include a) Technical Services (for Ammonia, Urea, Co-generation thermal power plants (captive), and complex fertilizers plants)- 10 years b) Erection, commissioning and hands-on operation of state of art HTAS Ammonia plant - 4 years c) Management and operation of Sulphuric acid plant as Plant Manager- 2 years and d) two years in management Information System operation and assisting of top management in planning of operations.

While in FACT he has completed the ISO14001 EMS LA course and also involved in implementation of Environmental Management Systems and in conducting internal audits.

Experience prior to joining Fertiliser industry include six months experimental work on charcoal manufacture in Karnataka Regional Engineering college.

He has experience of around 5 years in validation and verification of numerous CDM projects. His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in areas of (a) 1.1 Thermal energy generation from fossil fuels and Biomass as well as thermal electricity from solar (b) 1.2 Energy Generation from renewable energy sources (c) 5.1/4.13/11.1/12.1 Chemical Processes Industries and (d) 13.1 Waste handling and disposal.