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# VALIDATION REPORT

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## 9.8 MW BIOMASS BASED POWER PLANT AT LAHARI POWER & STEELS LIMITED IN CHAMPA-JANJGIR DISTRICT IN CHHATTISGARH

REPORT No. 2007-1013

REVISION No. 01

DET NORSKE VERITAS



## VALIDATION REPORT

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### Summary:

Det Norske Veritas Certification AS (DNV) has performed a validation of the “9.8 MW Biomass based power plant at Lahari Power & Steels Limited in Champa-Janjgir district in Chhattisgarh” 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. This validation report summarizes the findings of the validation.

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

In summary, it is DNV's opinion that the project, as described in the project design document of 23 May 2007, meets all relevant UNFCCC requirements for the CDM and correctly applies the small scale baseline and monitoring methodology *AMS-I.D.* Hence, DNV requests the registration of the “9.8 MW Biomass based power plant at Lahari Power & Steels Limited in Champa-Janjgir district in Chhattisgarh” project as a CDM project activity.

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Report title: 9.8 MW Biomass based power plant at Lahari Power & Steels Limited in Champa-Janjgir district in Chhattisgarh							
Work carried out by: Ma-Paa-Puratchikkanal, Astakala Vidyacharan Michael Lehmann							
Work verified by: Chandrashekara Kumaraswamy							
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### ***Abbreviations***

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH <sub>4</sub>	Methane
CL	Clarification request
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
CSEB	<u>Chhattisgarh State Electricity Board</u>
CSERC	<u>Chhattisgarh State Electricity Regulatory Commission</u>
CSREDA	<u>Chhattisgarh State Renewable Energy Development Agency</u>
CSECB	<u>Chhattisgarh State Environment Conservation Board</u>
DNV	Det Norske Veritas
DNA	Designated National Authority
EPC	Engineering, procurement , construction
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MNES	Ministry of Non-conventional Energy Sources
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
PPA	Power Purchase Agreement
TPH	Tonnes per hour
UNFCCC	United Nations Framework Convention on Climate Change



## 1 INTRODUCTION

Lahari Power and Steels Limited, Hyderabad, has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the “9.8 MW Biomass based power plant at Lahari Power & Steels Limited in Champa-Janjgir district in Chhattisgarh ” project (hereafter called “the project”). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for small scale CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consists of the following personnel:

Ma-Paa-Puratchikkanal	DNV, Bangalore	Team Leader, GHG auditor
Astakala Vidyacharan	DNV, Hyderabad	GHG auditor
C Kumaraswamy	DNV, Bangalore	Technical Reviewer
Michael Lehmann	DNV, Oslo	Sector Expert, CDM validator

### 1.1 Validation Objective

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

### 1.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved small scale methodology AMS-I.D /12/. The validation team has, based on the recommendations in the Validation and Verification Manual /11/ employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

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

### 1.3 Description of Proposed CDM Project

The project is a 9.8 MW capacity, grid connected biomass-based power project. The project is located in Madwa village, Janjgir-Champa District, Chhattisgarh, India, and the construction works of the project started in February 2005. The project utilises the surplus available renewable biomass, rice husk and other agricultural residues in the Chhattisgarh region for generation of electricity and export to the state electricity board grid. It uses a steam turbo generator with a matching boiler of travelling grate type technology, capable of firing multiple fuels. The technology used is indigenous. The project is expected to evacuate 55.88 GWh of electricity per year to the western regional grid at a plant load factor (PLF) of about 70% for the first



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year and 80% onwards. The project uses a reaction turbine generator set driven by steam at 64 kg/cm<sup>2</sup> and 480°C.

The project activity reduces the anthropogenic GHG emissions by displacing fossil fuel based electricity generation with renewable biomass based power generation. The project thereby helps in reducing power deficit in the state of Chhattisgarh and also contributes towards conservation of natural resource like coal.

The project activity start date is stated to be 10 February 2005, which is the date of the project turnkey agreement signed with M/s. Ushodaya Energy and Project Consultants Private Limited. The turnkey agreement was reviewed by DNV. The project has an expected operational lifetime of 25 years. The project is expected to result in emission reductions of 37 947 tonnes of CO<sub>2</sub> per year during the crediting period of 10 years starting from 1 September 2007.

## 2 METHODOLOGY

The validation consists 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.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /11/. The protocol shows in transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a 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 three tables. The different columns in these tables are described in Figure 1.

The completed validation protocol for the “9.8 MW Biomass based power plant at Lahari Power & Steels Limited in Champa-Janjgir district in Chhattisgarh ” is enclosed in Appendix A to this report.

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

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

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



<b>Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities</b>			
<b>Requirement</b>	<b>Reference</b>	<b>Conclusion</b>	<b>Cross reference</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> ), a <b>Corrective Action Request (CAR)</b> of risk or non-compliance with stated requirements or a request for <b>Clarification (CL)</b> where further clarifications are needed.	Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.

  

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

  

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

Figure 1: Validation protocol tables



## 2.1 Review of Documents

The PDD /1/ submitted by Lahari Power and Steels Limited (version 3 dated 23 May 2007 and the previous version) and additional background documents/2/, /3/,/4/,/5/,/6/,/7/,/8/ related to the project design and baseline such as baseline calculation data, financial analysis, local stakeholders consultation and comments and the monitoring plan were assessed during the validation.

## 2.2 Follow-up Interviews

On 3 January 2007, DNV performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of Lahari Power and Steels Limited were interviewed. The main topics of the interviews are summarised in Table 1.

**Table 1 Interview topics**

Interviewed organisation	Interview topics
1. Lahari Power and Steels Limited, India. 2. Zenith Energy Services (P) Limited	<ul style="list-style-type: none"> <li>➤ Approval from host country (India).</li> <li>➤ Further clarifications that the project activity itself is not a likely baseline scenario due to the existence of barriers</li> <li>➤ Clarifications on establishment of baseline, monitoring plan and emission reduction calculations.</li> <li>➤ Resources, training needs and procedures for operation and maintenance.</li> <li>➤ Biomass availability</li> <li>➤ Leakage consideration as per the methodology</li> <li>➤ Benefits from CDM registration.</li> <li>➤ Power purchase agreement (PPA).</li> <li>➤ No objection certificate from CSECB and environmental compliance.</li> <li>➤ Stakeholders' consultation process and comments.</li> </ul>

## 2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation was to resolve any outstanding issues which needed to be clarified for DNV's positive conclusion on the project design. The initial validation identified seven requests for CLs. The requests for clarification raised by DNV, presented to the project participants in DNV's draft validation report of 19 January 2007 (rev. 0) were resolved during communications between the Lahari Power and Steels Limited and DNV. To guarantee the transparency of the validation process, the concerns raised and responses given are documented in the validation protocol in Appendix A.

Since modifications to the project design were necessary to resolve DNV's concerns, Lahari Power and Steels Limited decided to revise the PDD and accordingly resubmitted the PDD on 23 May 2007. After reviewing the revised PDD, DNV issued this final validation report and opinion.





## 2.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent another technical review before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

## 3 VALIDATION FINDINGS

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

The final validation findings relate to the project design as documented and described in the revised and resubmitted project design documentation dated 23 May 2007./1/

### 3.1 Participation Requirements

The project activity is being proposed as a unilateral project by Lahari Power and Steels Limited Limited, which is the only project participant from the host country India. India meets all participation requirements, and the DNA of India has approved the project with a letter of approval dated 24 November 2006 and has provided confirmation that the project assists in achieving sustainable development /2/.

### 3.2 Project Design

The project has a rated capacity of 9.8 MW and exports electricity to the Chhattisgarh state electricity grid, which forms a part of western regional electricity grid of India.

The technology used is available in India and no transfer of technology is envisaged. The biomass-based power plant generates electricity by utilisation of the available renewable biomass resources in the region, which will be primarily rice husk along with other agricultural waste available in the surrounding region. As per the Ministry of non-conventional energy sources (MNES), the project can co-fire fossil fuel (coal) up to 25% of the fuel requirement. The monitoring of the coal consumption for the project activity is included in the monitoring plan. It has been verified from CREDA's biomass assessment study (in Champa-Janjgir district of Chhattisgarh state), that surplus biomass was available when the project was conceptualized and that the project activity does not lead to any leakage effects elsewhere due to the usage of fossil fuel.

The project consists of a reaction turbine type steam turbo generator coupled with matching boiler of travelling grate type technology capable of firing multiple fuels. The capacity generation of boiler is 45 tonnes of steam per hour at a pressure of 66 kg/cm<sup>2</sup> and a temperature of 480°C. The project also includes the power evacuation system and fuel handling system, the transformers to step up the generated voltage from 11 KV to the grid voltage of 33 KV and the power transmission line to the nearest Hanumandhara sub-station.

The project results in reduction of GHG emissions by capacity addition to the grid, which is dominated by fossil fuel based power generators. The added advantage of the project will be in terms of additional income generated for the farmer and also in terms of jobs generated by the



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project. The technology applied is deemed current good practice and is not expected to be replaced within the crediting period.

The project starting date is confirmed to be 10 February 2005. The expected operational lifetime of the project is 25 years. A fixed crediting period of 10 years has been chosen, with the start date of the first crediting period to be 1 September 2007.

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

### 3.3 Baseline Determination

The project applies the approved small scale methodology AMS-I.D, version 10 dated 23 December 2006 /12/ titled “Renewable electricity generation for grid”. The simplified small scale baseline methodology AMS-I.D. is applicable and justified as the project is less than 15 MW capacity, uses biomass materials for power generation and displaces fossil fuel based grid electricity.

The baseline has been established as per paragraph 9 of AMS I.D; it requires that the baseline emission factor will be calculated in a transparent and conservative manner based on either:

a) Combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002.

OR

b) The weighted average emissions (in kg CO<sub>2</sub>equ/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The project proponent has chosen to adopt a conservative baseline emission factor and hence chosen option ‘b’ for establishing the emission factor. This is demonstrated in section B.2. of the PDD.

As the project activity is feeding power to the CSEB grid which is a part of the western regional grid, the baseline for this project activity is the function of the generation mix of western regional grid. The selection of the western region grid as the grid system boundary for the project activity is in line with the recent EB guidance for large countries such as India. The baseline emission factor for the western regional grid is established *ex-post* based and as specified in AMS-I.D for the weighted average emissions of current generation mix. The weighted average emission coefficient for the current generation mix of the year 2005-06 of western regional grid of India has been estimated to be 0.887 kg CO<sub>2</sub>e / kWh. The emission factor would be calculated *ex-post* every year.

While actual fuel consumption of all power plants has been used, IPCC default values have been used for oxidation factors such as coal, natural gas and lignite. The completeness of the set of power plants as well as the correctness of the reported fuel consumption and electricity generation data has been verified. Most of the data has been sourced from data published by the Central Electricity Authority (CEA), who are the official power data publishers in India. And the information pertaining to renewable energy has been sourced from Ministry of Non-Conventional Energy Sources (MNES). The data on station heat rates have been taken from the report on “Performance review of thermal power stations” published by the CEA and for those where data were not available in this publication; data has been sourced from MNES baseline



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data<sup>\*</sup>. The emission factors for fossil fuel have been taken from India's Initial Communication to UNFCCC.<sup>†</sup> From the verification of documents used to procure the baseline data, DNV is able to confirm that the data used to establish the baseline emission factor is correct.

### 3.4 Additionality

As per the Attachment A and Appendix B of simplified modalities and procedures for small scale CDM project activities, the project demonstrates additionality through the existence of the investment barrier and prevailing practice scenario barriers.

It has been verified from the copy of Board Resolution dated 28 December 2004, that CDM revenues were considered for the project activity at the time of project conceptualization.

**Investment barrier analysis:** The increase in biomass prices from conceptual stage to operation stage is claimed as an investment barrier. Though surplus biomass in the region was available at the time of project initiation, the sudden commercial value realization for biomass after the establishment of biomass fired power plant in the region has created an uncertainty in the availability of the biomass. Apart from this is also the fact that the storage for longer periods at site could reduce the calorific value of the biomass. Due to this and as there are no price regulations present, the fluctuations in biomass prices are observed to be high, becoming a potential main deterrent for the project by increasing generation costs. The biomass price variations were confirmed against the quotations and receipts paid to the suppliers of biomass. This has been argued against the fact that in case of coal the price is regulated by Coal India Limited (CIL) and the cost of coal is regulated at Rs. 800 per tonne.

The investment analysis /6/ conducted for the project activity clearly demonstrates that the project has a project IRR of 10.23% without considering CDM revenues, as compared to a benchmark of required rate of return 14.32%. The benchmark chosen for the project activity is the required rate of return by the project proponents, which comprises of return on equity and cost on term loan. The IRR improves to 15.18% on considering the CDM revenues. A sensitivity analysis considering a 10 % variation in the electricity generation and decrease in fuel cost also demonstrate the project IRR does not cross the benchmark and hence is not financially viable without CDM revenues. A sensitivity analysis has also been carried out by the proponents for a 10% increase in generation (IRR is 13.23%) and 10% decrease in fuel price (IRR is 12.14%), and still confirms that the IRR is less than the benchmark (14.32%) for all conditions.

In DNV's opinion the assessment of the IRR's, by the project proponent is justified based on the following facts:

- DNV was able to confirm the investment analysis and the IRR's determined in this through the detailed spreadsheet calculations forwarded by the project proponent. The cash flow analysis has been presented for a period of 10 years.
- The analysis presented also considers all the applicable benefits for the biomass power projects
- DNV confirms that the all documents pertaining to the presented analysis have been verified, such as,
  - o Turnkey agreement and engineering, procurement, construction (EPC) costs

<sup>\*</sup> <http://mnes.nic.in/baselinertpt.htm>

<sup>†</sup> [http://www.basic-project.net/data/country%20information/India\\_National\\_Communication.pdf](http://www.basic-project.net/data/country%20information/India_National_Communication.pdf)



- Power purchase agreements

In DNV's opinion, it is thus sufficiently demonstrated that the proposed project activity is not economically or financially attractive.

**Prevailing practice barrier:** It has also been stated that the power generation using renewable biomass resources is not a common practice either in India or in the state of Chhattisgarh. This has been substantiated from the latest report published by the Ministry of Non-conventional Energy Resources, MNES, which states that the total installed capacity of biomass based power plants in India is only 867MW as compared to the total installed capacity of 126 089 MW, which make biomass account for less than 1%. In the state of Chhattisgarh the installed capacity was 11 MW against a potential of 531.25 MW as per information given in the annual report of MNES for 2004-05. Also, the thermal generation contribution in the state of Chhattisgarh for the recent two years 2004-2005 and 2005-2006 are 95.3% and 95.9% respectively.

In conclusion, it can be confirmed that the project is not financially attractive and faces barriers and thus is not the most likely baseline scenario. Hence, the emissions reductions are deemed additional to those that would occur in the absence of the project activity.

### 3.5 Monitoring Plan

The project applies AMS-I.D baseline and monitoring methodology/12/. The amount of biomass and fossil fuel consumption are monitored apart from electricity generated and exported to the CSEB grid.

The baseline emission is being calculated as the product of the electricity supplied to the grid and the grid emission factor of the western regional grid, which is calculated ex-post each year using the data from the CEA official website.

Direct emission due to the combustion of coal, if necessary (based on the net caloric value) as fuel, is considered for the project emissions.

Maintenance and calibration of electricity meters are carried out as per the internal procedures and in accordance with the requirements of CSEB. All data will be archived in paper/electronic form until two years after the crediting period.

While board of directors is responsible for project management, the members of CDM committee are responsible for data recording, archiving and reporting. Procedures for internal audits, performance reviews and corrective actions have also been established. The provided monitoring plan is adequate to provide the necessary information for the calculation of electricity generated, fuel consumed and analysis of the biomass used.

### 3.6 Calculation of GHG Emissions

Direct on-site emissions are restricted to the use of fossil fuel coal in the boiler, when used during shortfall in biomass supply. The emissions due to transportation of biomass have been estimated to 559 tCO<sub>2</sub>/year and constitute around 1.47% of the total annual emission reduction. It has been argued that the same types of GHG emissions occur during transportation of coal from coal mines for which transport distances are much longer. Hence, emissions due to transportation of biomass in comparison are considered negligible and therefore not considered.

In accordance with AMS-I.D the biomass power plant may co-fire fossil fuels. As per the guidelines the project can use coal up to 25% as support fuel. To arrive at a conservative ex-ante



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GHG emission reduction estimates, it was assumed that the project will co-fire about 10% of total annual fuel requirement resulting in annual project emissions of 11 001 tCO<sub>2</sub>. The emissions resulting from use of coal will be incorporated as project emissions and the use of coal during the crediting period will be monitored and project emissions calculated accordingly. There are no leakages due to biomass cultivation for the project as the required biomass is dependant on suppliers alone and the project does not have any biomass growing activity for the project. Leakage due to competing biomass is not applicable as it has been verified that there is surplus biomass available for the project (from the biomass assessment report submitted/8/).

### 3.7 Environmental Impacts

The proposed project activity contributes to generation of green power and is expected to benefit the economic development of a backward region. Thus, the project activity is expected to have only beneficial impacts and no adverse impacts are foreseen. There is no legislative mandate for carrying out an environmental impact assessment study, as biomass power projects are exempt from such requirements. However, the proponents had carried out a Rapid EIA study/9/ and no adverse impacts have been reported. The project has obtained certificate of 'No objection' from the Chhattisgarh state environment conservation board/4/. The project activity is in compliance with all current, applicable legislations.

### 3.8 Comments by Local Stakeholders

The Governmental organisations which are stakeholders in the project activity have accorded their permission for establishment and operation of the project facility. A local stakeholders meeting was conducted at gram panchayat office of Madwa village, on 15 April 2006 with the local population. The queries posed by the participants during the session had been clarified by the proponents. The project has not received any adverse comments.

## 4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD of 21 November 2006 was made publicly available on DNV's climate change website (<http://www.dnv.com/certification/climatechange/Projects/ProjectDetails.asp?ProjectId=863>) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 22 November 2006 to 21 December 2006.

No comments were received.



## 5 VALIDATION OPINION

*DNV Certification AS (DNV) has performed a validation of the “9.8 MW Biomass based power plant at Lahari Power & Steels Limited in Champa-Janjgir district in Chhattisgarh”. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, 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 the stated criteria.*

*The project participant is Lahari Power and Steels Limited of India. The host country is India and fulfils the participation criteria and has approved the project and authorized the project participants. No annex I Party is yet identified.*

*The project correctly applies the small scale methodology AMS-I.D version 10 - “Renewable electricity generation for grid”. The validation has confirmed that the project is eligible as a small scale project activity and is in line with the applicability criteria of AMS-I.D version 10 methodology. The determination of the baseline is well elaborated, transparent and sufficiently supported with facts. The selected baseline scenario is reasonable and an analysis of the barriers facing the project demonstrates that project is not a likely baseline scenario.*

*The project will contribute to sustainable development by generating renewable energy, providing benefits such as employment generation during construction and operation of the project, ensuring environmental well being and aid in bridging the gap between demand and supply of power. The DNA of India has confirmed that the project assists in achieving sustainable development and accorded approval for the project on 3 November 2006.*

*The validation did not reveal any information indicating that the project can be seen as a diversion of ODA funding towards India.*

*The project results in the reduction of GHG emissions those are real, measurable and give long-term benefits and that are additional to what would have occurred in the absence of the project. The total emission reductions from the project are estimated to be on the average 37 947tCO<sub>2</sub>e per year during the fixed ten year crediting period. The emission reduction forecast has been checked and is deemed likely that the state amount is achieved given that the underlying assumptions do not change.*

*The monitoring plan makes sufficient provision for monitoring relevant project and baseline emission indicators. Responsibilities and authorities for project management, monitoring and reporting and QA/QC procedures have also been addressed.*

*A local stakeholder consultation process has been carried out by the project participant. DNV published the PDD on the DNV climate Change web site and comments by Parties, stakeholders and UNFCCC accredited NGOs were invited through the CDM web site. No comments were received.*

*In summary, it is DNV’s opinion that the “9.8 MW Biomass based power plant at Lahari Power & Steels Limited in Champa-Janjgir district in Chhattisgarh ” as described in the PDD of 23 February 2007, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the small scale methodology AMS-I.D. DNV thus requests*





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*the registration of the “9.8 MW Biomass based power plant at Lahari Power & Steels Limited in Champa-Janjgir district in Chhattisgarh ” as a CDM project activity.*

**REFERENCES**

*Documents provided by the project proponent that relate directly to the project:*

- /1/ Lahari Power and Steels Limited Limited.: CDM PDD for the “9.8 MW Biomass based power plant at Lahari Power & Steels Limited in Champa-Janjgir district in Chhattisgarh ”. version 3 dated 23 May 2007 and the previous versions).
- /2/ Ministry of Environment and Forests (DNA of India): *Letter of host country approval* dated 24 November 2006.
- /3/ Lahari Power and Steels Limited Limited: *Power Purchase Agreement (PPA)*.
- /4/ Chhattisgarh State Environment Conservation Board: No objection certificate, dated 20 July 2004
- /5/ Ministry of Coal: Letter of allotment of coal, dated 17 December 2004.
- /6/ Lahari Power and Steels Limited Limited.: *Spreadsheets documenting the financial calculations (Lahari Power (DNV) 23 05 07.xls*
- /7/ Lahari Power and Steels Limited Limited: Spreadsheets on baseline computations (WESTERN REGION BASELINES 2005-06.xls
- /8/ Chhattisgarh Renewable Development Agency : Biomass assessment study in Janjgir-Champa district of Chhattisgarh state.
- /9/ B.S Envi-Tech (P) Limited: Rapid environmental impact assessment report
- /10/ Lahari Power and Steels Limited : Minutes of the board meeting held on 28 December 2004 considering CDM revenue.

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

- /11/ International Emission Trading Association (IETA) & the World Bank’s Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /12/ CDM Executive Board: AMS -I.D - “Renewable electricity generation for the grid” (version 10).

*Persons interviewed during the validation, or persons who contributed with other information that are not included in the documents listed above:*

- /12/ Mr. Nageshwar Rao, Lahari Power and Steels Limited Limited.
- /13/ Mr. V. Satyanarayana Murthy, Lahari Power and Steels Limited Limited
- /14/ Mr. S. Laxmi Narasimhan, Lahari Power and Steels Limited Limited
- /15/ Mr. Vijay Kumar, Zenith Energy Limited

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## **- APPENDIX A**

### **VALIDATION PROTOCOL FOR SMALL-SCALE CDM PROJECT ACTIVITIES**



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

Requirement	Reference	Conclusion	Cross Reference/ Comment
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art. 12.2	The Project has been proposed as a unilateral project	Table 2, Section E.4.1
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	OK	Table 2, Section A.3 The Project has a Host country approval dated 24 November 2006
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art. 12.2.	OK	Table 2, Section E.4.1
4. The project shall have the written approval of voluntary participation from the designated national authority of each party involved	Kyoto Protocol Art. 12.5a, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	OK	Written approval from DNA of India has been obtained on 24 November 2006.
5. The emission reductions should be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E.1 to E.4
6. Reduction in GHG emissions must be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5.c, Simplified Modalities and Procedures for Small Scale CDM Project Activities §26	OK	Table 2, Section B.2.1
7. 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	Decision 17/CP.7, CDM Modalities and Procedures Appendix B,	OK	The project is proposed as a unilateral project

Requirement	Reference	Conclusion	Cross Reference/ Comment
result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	§ 2		
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures § 29	OK	DNA of India: National Clean development Mechanism Authority, Ministry of Environment and Forests
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities and Procedures § 30, 31b	OK	India ratified Kyoto Protocol on 26 August 2002
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	Annex I Party has not been identified yet	The project is being proposed as a unilateral project
11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7	CDM Modalities and Procedures §31b	As Above	The project is being proposed as a unilateral project
12. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakesh Accords and shall not be a debundled component of a larger project activity	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	OK	Table 2, Section A.1
13. The project design document shall conform with the Small Scale CDM Project Design Document format	Simplified Modalities and Procedures for Small Scale CDM Project Activities, Appendix A	OK	OK
14. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and uses the simplified baseline and	Simplified Modalities and Procedures for Small Scale CDM Project	OK	Table 2, Section A.1.3, B and D

Requirement	Reference	Conclusion	Cross Reference/ Comment
monitoring methodology for that project category	Activities §22e		
15. Comments by local stakeholders are invited, and a summary of these provided	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22b	OK	Table 2, Section G Local Stake holders are consulted by the project proponent
16. If required by the host country, an analysis of the environmental impacts of the project activity is carried out and documented	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22c	OK	Table 2, Section F
17. Parties, stakeholders and UNFCCC accredited NGOs have been invited to comment on the validation requirements and comments have been made publicly available	Simplified Modalities and Procedures for Small Scale CDM Project Activities §23b,c,d	OK	The PDD was made publicly available on <a href="http://www.dnv.com/certification/climatechange">www.dnv.com/certification/climatechange</a> and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 day period from 22 November 2006 to 21 December 2006. No comment was received.

**Table 2 Requirements Checklist**

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
<b>A. Project Description</b> The project design is assessed.					
<b>A.1. Small scale project activity</b> It is assess whether the project qualifies as small scale CDM project activity.					
A.1.1. Does the project qualify as a small scale CDM project activity as defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM?	/1/	DR, I	The project comprises a 9.8 MW power generation unit using renewable energy as source of fuel. The project qualifies as Type I, Category D small scale CDM project and as the generation capacity is below the stipulated limit of 15 MW.		OK
A.1.2. The small scale project activity is not a debundled component of a larger project activity?	/1/	DR, I	No, the project participant does not propose another biomass plant. The project participant has not registered any small scale CDM project in the last 2 years and the project boundary is not within 1 km radius of any other proposed small scale CDM project.		OK
A.1.3. Does proposed project activity confirm to one of the project categories defined for small scale CDM project activities?	/1/	DR, I	Yes the project conforms to the category I.D for small scale CDM projects. The project is a grid connected renewable electricity generation unit (Biomass).		OK

\* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
<b>A.2. Project Design</b> Validation of project design focuses on the choice of technology and the design documentation of the project.					
A.2.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/	DR, I	<p>Yes, it is clearly defined.</p> <p>The spatial boundary of the project includes the project site (up to the evacuation point of electricity to state grid) and includes biomass collection and storage.</p> <p>The project site is located at Madwa village of Champa- Jangir district in Chhattisgarh State, India. The geographical co-ordinates are longitude 81°47'30"E and latitude 21°21'15"N.</p> <p>The power will be exported to the grid through a 33/11kV substation located at Hanumandhara Village.</p>		OK
A.2.2. Are the project's system (components and facilities used to mitigate GHG's) boundaries clearly defined?	/1/	DR, I	<p>Components including storage of biomass material and the generation unit are included in the project boundary. For the calculation of the baseline emission factor the power plants generating and exporting to the western electricity grid are included in the system boundary.</p>		OK
A.2.3. Does the project design engineering reflect current good practices?	/1/	DR, I	<p>Yes. The technology is generation of energy using a system compatible for multi-fuel. 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 an impulse turbine generator.</p>		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			The plant and machinery of the project consists of a traveling grate boiler, a steam turbine generator set, power evacuation system and fuel handling system. Other plant equipments include HP heater, DM water system, water cooling system/radiator cooling system, compressed air system, fire fighting equipment and ash handling system. The electricity voltage level generated by the turbo generator is stepped-up to the voltage that is suitable to interface with the grid electricity.		
A.2.4. Will the project result in technology transfer to the host country?	/1/	DR	The technology is already available in the country and thus no technology transfer is envisaged in the project		OK
A.2.5. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period? Does the project make provisions for meeting training and maintenance needs?	/1/	DR	Yes, the project will require trained and qualified manpower in order to work as presumed during the project period. Qualified personnel as per statutory requirements in India should carry out the boiler operations.  It needs to be elaborated how the training requirements will be fulfilled.	<del>CL-1</del>	OK
<b>A.3. Contribution to Sustainable Development</b> The project's contribution to sustainable development is assessed	/1/				
A.3.1. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	Yes. Apart from GHG reductions, the PDD states the following benefits: <ul style="list-style-type: none"> <li>• Economic utilization of surplus biomass</li> <li>• Generation of additional income to the rural farmers due to purchase of surplus crop residues from them</li> <li>• Creation of indirect employment for rural youth for collection and transportation of</li> </ul>		OK

\* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			biomass for the project.		
A.3.2. Will the project create any adverse environmental or social effects?	/1/	DR	<p>The project has a valid consent for establishment for implementation of the project. The consent for operation is expected to be issued once the project is operational, that is expected to be in May 2007.</p> <p>The project is expected to use renewable biomass as fuel along with permitted 25% of coal as per guidelines of MNES.</p> <p>However a clarification as how the issue is being dealt with and mechanism to ensure continual supply of permitted biomass material for the project needs further elaboration. Also detail biomass assessment survey report on abundant availability of biomass for the project need to be submitted.</p>	<del>CL-2</del>	OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR	Yes. Written Approval from DNA of India through a letter dated 24 November 2006 confirms this.		OK
A.3.4. Is the project in line with relevant legislation and plans in the host country?	/1/	DR	Yes.		OK
<b>B. Project Baseline</b> The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.	/1/				
<b>B.1. Baseline Methodology</b> It is assessed whether the project applies an appropriate baseline methodology.					
B.1.1. Is the selected baseline methodology in	/1/	DR	Yes. The project applies one of the simplified		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
line with the baseline methodologies provided for the relevant project category?			<p>baseline methodologies proposed for the small-scale project activity category I.D, i.e., for renewable energy that displaces electricity the simplified baseline is the electricity consumption times the relevant emission factor calculated as the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kgCO<sub>2</sub>/kWh).</p> <p>The project uses biomass and supply electricity to the grid dominated by fossil fuel based generation units.</p> <p>The baseline emission coefficient is calculated using the weighted average of current generation mix approach.</p>		
B.1.2. Is the baseline methodology applicable to the project being considered?	/1/	DR	Simplified small scale CDM project category I.D is applicable since the project is planned to be grid connected renewable biomass based power plant.		OK
<b>B.2. Baseline Determination</b>  It is assessed whether the project activity itself is not a likely baseline scenario and whether the selected baseline represents a likely baseline scenario.					
B.2.1. Is it demonstrated that the project activity itself is not a likely baseline scenario due to the existence of one or more of the following barriers: investment barriers, technology barriers, barriers due to prevailing practice or other barriers?	/1/	DR	<p>Yes. The baseline scenario is explained with the following conceptions:</p> <p><b>Investment barrier:</b> This has been explained from the fact that the cost of coal is cheaper in the region as coal is available at a cost Rs, 800/ton and the cost of biomass is fluctuating. It is claimed in the PDD that at the</p>		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			<p>planning stage of the project activity the cost of the biomass was Rs. 650/ton and has increased by 40-50%. This is set-back to the sudden realization of commercial value of the biomass without any market regulators. And on the other hand the coal prices are fixed by CIL and revised as per the market trends. And it is also mentioned in the PDD though the government has given nod for 288 MW biomass plants, only very few have come-up in the region.</p> <p>The investment barrier is laid on the IRR analysis and the IRR without CDM revenue has been worked out to be 10.23% and with the inclusion of the CDM revenue it increases to 15.18%. A sensitivity analysis has also been done which all project the IRR to below the Required rate of return of 14.32% proposed by the regulator of Chhattisgarh.</p> <p><b>Prevailing practice:</b></p> <p>This has been demonstrated by the fact that in last 15 years the state of Chhattisgarh has predominant concentration of power generation through coal plants. Even on the consideration of the last two years the thermal generation has been registered to be above 95%. Though the biomass potential identified in the region is about 531.25 MW very few plants have been commissioned in the region so far.</p> <p><b>Clarifications needed:</b></p>		

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			<ul style="list-style-type: none"> <li>It is stated that the return on investment allowed is 16% by the regulator in chhattisgarh– source and evidence needs to be provided. A copy of Detail project report need to be furnished for further references.</li> <li>The financial calculations spreadsheet needs to be provided for verification.</li> <li>It is stated that the average cost of biomass during consideration of the project was Rs. 650 / tonne and now it has increased by 40 to 50%. - Source needs to be provided for this information.</li> <li>It is stated that only few biomass plants have come in the region. Source needs to be provided for this statement and how many projects have come –up in the region need to be provided. The ASCI report on district wise biomass assessment need to be furnished for reference for estimated potential in the state for renewable energy.</li> <li>The board resolution considering CDM for the project activity needs to be provided for verification.</li> </ul>	<del>CL-3</del>	
B.2.2. Is the application of the baseline methodology and the discussion and determination of the chosen baseline transparent and conservative?	/1/	DR	<p>The proponents claim to have ex-post baseline computations.</p> <p>The baseline spreadsheet calculations need to be provided to DNV for verification.</p> <p>The CEA data utilized for 2005-06 needs to be provided to DNV with the source citation.</p>		OK

\* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			All references and sources needs to be provided to DNV for verification.		
B.2.3. Are relevant national and/or sectoral policies and circumstances taken into account?	/1/	DR	The baseline scenario considered is Western grid The proponents claim to have ex-post baseline computations starting from the year of commencement of crediting period. This is considered to be in line with methodology requirement and conservative.		OK
B.2.4. Is the baseline selection compatible with the available data?	/1/	DR	Yes, the selection of the weighted average of current generation mix approach is justifiable considering the generation pattern will not change significantly over the crediting period.		OK
B.2.5. Does the selected baseline represent the most likely scenario describing what would have occurred in absence of the project activity?	/1/	DR	Yes. The source of date would be official website of Central electricity authority.		OK
<b>C. Duration of the Project / Crediting Period</b> It is assessed whether the temporary boundaries of the project are clearly defined.					
C.1.1. Are the project's starting date and operational lifetime clearly defined?	/1/	DR	Yes. The start date of the project activity is defined as 10 February 2005. Expected operational life time is 25 years.		OK
C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no renewal)?	/1/	DR	Yes. Fixed 10 years crediting period has been chosen starting from 1 September 2007		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
<b>D. Monitoring Plan</b> The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed.					
<b>D.1. Monitoring Methodology</b> It is assessed whether the project applies an appropriate monitoring methodology.					
D.1.1. Is the selected monitoring methodology in line with the monitoring methodologies provided for the relevant project category?	/1/	DR	The project falls under category I.D of appendix B of the simplified modalities and procedures for small scale CDM project activities and the monitoring methodology used is in line with the same.		OK
D.1.2. Is the monitoring methodology applicable to the project being considered?	/1/	DR	The project is a renewable energy generation project and thus the monitoring requirement under category I.D. is used in this project. Since the project is co-fires biomass with coal, the amount and type of biomass along with fossil fuel is monitored apart from electricity generated and supplied to grid.  The possible fossil fuel consumption like diesel for the project activities like DG set operations in case of emergencies need to be included as a part of monitoring.	<b>CL-4</b>	OK
D.1.3. Is the application of the monitoring methodology transparent?	/1/	DR	Yes.		OK
D.1.4. Will the monitoring methodology give opportunity for real measurements of	/1/	DR	The Monitoring methodology is through metering. A separate GHG audit team for periodic monitoring and review of data will be formed. This is expected		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
achieved emission reductions?			to give real time results.		
<b>D.2. Monitoring of Project Emissions</b> It is established whether the monitoring plan provides for reliable and complete project emission data over time.					
D.2.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/		Since project is allowed to co-fire coal, and the project also consumes power through import from grid when the project is not operational, these emissions are considered as project emissions.  However emissions due to operation of DG set is not apparent in the monitoring plan. This needs explained.	GL4	OK
D.2.2. Are the choices of project GHG indicators reasonable?	/1/	DR	The choice of indicators is sufficient to monitor the CO <sub>2</sub> the relevant GHG.  CH <sub>4</sub> can get generated due to biomass storage, but since the storage of biomass does not exceed 6 months, it is assumed negligible.		OK
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	/1/	DR	Yes it is possible with the data being monitored.		OK
D.2.4. Will the indicators give opportunity for real measurements of project emissions?	/1/	DR	Yes.		OK
<b>D.3. Monitoring of Leakage</b> If applicable, it is assessed whether the monitoring plan provides for reliable and complete leakage data over time.	/1/				
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data	/1/		The leakage monitoring is not explained according to the procedures of the methodology. The		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
necessary for determining leakage?			leakage needs to be demonstrated through Attachment C to appendix B.	<del>CL5</del>	
D.3.2. Are the choices of leakage indicators reasonable?	/1/	DR	As on D.3.1	CL5	OK
D.3.3. Will it be possible to monitor / measure the specified leakage indicators?	/1/	DR	As on D.3.1	CL5	OK
D.3.4. Will the indicators give opportunity for real measurements of leakage effects?	/1/	DR	As on D.3.1	CL5	OK
<b>D.4. Monitoring of Baseline Emissions</b> It is established whether the monitoring plan provides for reliable and complete project emission data over time.	/1/				
D.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/		Yes, the baseline indicators have been chosen in line with the small-scale methodologies approved by the CDM EB.		OK
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/	DR	The choice of indicators is sufficient to monitor the CO <sub>2</sub> emissions, the relevant GHG.		OK
D.4.3. Will it be possible to monitor / measure the specified baseline indicators?	/1/	DR	Yes, techniques do comply with good industry practice.		OK
D.4.4. Will the indicators give opportunity for real measurements of baseline emissions?	/1/	DR	Yes.		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
<b>D.5. Project Management Planning</b> It is checked that project implementation is properly prepared for and that critical arrangements are addressed.	/1/				
D.5.1. Is the authority and responsibility of project management clearly described?	/1/	DR, I	The authority and responsibility for project management has been clearly described.		OK
D.5.2. Is the authority and responsibility for registration monitoring measurement and reporting clearly described?	/1/	DR	The PDD addresses the formation of a special group who will have assigned responsibilities for monitoring of all the parameters.		OK
D.5.3. Are procedures identified for training of monitoring personnel?	/1/	DR	A procedure for training of monitoring personnel needs to be elaborated.	<del>CL6</del>	OK
D.5.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	Emergencies like fire in storage area can cause unintended emission. The emergency preparedness in such situation needs to be elaborated.	<del>CL6</del>	OK
D.5.5. Are procedures identified for calibration of monitoring equipment?	/1/	DR	The MP does not describe procedures for calibration of instruments to be used. Procedures for calibration must be defined to ensure later verification of CERs though records of calibrations of various instruments have been provided as evidences.	<del>CL6</del>	OK
D.5.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR	The procedures for maintenance of monitoring equipment need to be established.	<del>CL6</del>	OK
D.5.7. Are procedures identified for monitoring, measurements and reporting?	/1/	DR	The procedures need to be established.	<del>CL6</del>	OK
D.5.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	The procedures need to be established.	<del>CL6</del>	OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
D.5.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/1/	DR	The procedures need to be established.	CL6	OK
D.5.10. Are procedures identified for internal audits of GHG project compliance with operational requirements as applicable?	/1/	DR	The procedures need to be established.	CL6	OK
D.5.11. Are procedures identified for project performance reviews?	/1/	DR	The procedures need to be established.	CL6	OK
D.5.12. Are procedures identified for corrective actions?	/1/	DR	The procedures need to be established.	CL6	OK
<b>E. Calculation of GHG emission</b>					
It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.					
<b>E.1. Project GHG Emissions</b>					
The validation of ex-ante estimated project GHG emissions focuses on transparency and completeness of calculations.					
E.1.1. Are all aspects related to direct and indirect project emissions captured in the project design?	/1/	DR	Direct onsite emissions are restricted to the use of fossil fuel in the boiler. Indirect emissions, such as due to energy consumed during construction and transportation have been considered as negligible.		OK
E.1.2. Have all relevant greenhouse gases and sources been evaluated?	/1/	DR	The project only identifies CO <sub>2</sub> as the relevant GHG as other GHGs like CH <sub>4</sub> are considered as negligible.		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
E.1.3. Do the methodologies for calculating project emissions comply with existing good practice?	/1/	DR	The calculations are in line with the methodology laid down as per approved methodologies for Renewable electricity generation for the grid and thus are complying with the good practices.		OK
E.1.4. Are the calculations documented in a complete and transparent manner?	/1/	DR	Yes. All the data used is sourced from official web site of CEA.		OK
E.1.5. Have conservative assumptions been used?	/1/	DR	Yes. The weighted average of current generation mix is a conservative assumption for the project.		OK
E.1.6. Are uncertainties in the project emissions estimates properly addressed?	/1/	DR	Yes.		OK
<b>E.2. Leakage</b> It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed and estimated ex-ante.	/1/				
E.2.1. Are leakage calculation required for the selected project category and if yes, are the relevant leakage effects assessed?	/1/	DR	Since the energy generating equipment is not transferred from another activity and no existing equipment is transferred to another activity, no leakage needs to be considered. Regarding the leakages due to transportation, it is argued that the same types of GHG emissions occur during transportation of coal from coal mines for which transport distances are much longer. Hence, emissions due to transportation of biomass in comparison have been considered negligible and have not been considered.  However the leakage is not explained according to	GL5	OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			the procedures of the methodology. Please refer to the Attachment C. The leakage non-consideration for computations needs to be demonstrated.		
E.2.2. Are potential leakage effects properly accounted for in the calculations (if applicable)?	/1/	DR	Pending clarification to E.2.1	CL5	OK
E.2.3. Do the methodologies for calculating leakage comply with existing good practice (if applicable)?	/1/	DR	Pending clarification to E.2.1	CL5	OK
E.2.4. Are the calculations documented in a complete and transparent manner and (if applicable)?	/1/	DR	Pending clarification to E.2.1	CL5	OK
E.2.5. Have conservative assumptions been used (if applicable)?	/1/	DR	Pending clarification to E.2.1	CL5	OK
E.2.6. Are uncertainties in the leakage estimates properly addressed (if applicable)?	/1/	DR	Pending clarification to E.2.1	CL5	OK
<b>E.3. Baseline GHG Emissions</b> The validation of ex-ante estimated baseline GHG emissions focuses on transparency and completeness of calculations.					
E.3.1. Are the baseline emission boundaries clearly defined and do they sufficiently cover sources for baseline emissions?	/1/	DR	The baseline emissions are defined in accordance with Type I.D in the CDM small-scale methodology scheme.		OK
E.3.2. Are all aspects related to direct and indirect baseline emissions captured in the project design?	/1/	DR	All the emission sources have been captured in the project design.		OK
E.3.3. Have all relevant greenhouse gases and sources been evaluated?	/1/	DR	Yes. All sources that are part of southern grid are considered for calculations.		OK

\* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
E.3.4. Do the methodologies for calculating baseline emissions comply with existing good practice?	/1/	DR	Yes.		OK
E.3.5. Are the calculations documented in a complete and transparent manner?	/1/	DR	Yes.		OK
E.3.6. Have conservative assumptions been used?	/1/	DR	Yes.		OK
E.3.7. Are uncertainties in the baseline emissions estimates properly addressed?	/1/	DR	Yes.		OK
<b>E.4. Emission Reductions</b> Validation of ex-ante estimated emission reductions.					
E.4.1. Will the project result in fewer GHG emissions than the baseline case?	/1/	DR	The project replaces fossil fuel-based electricity generation. The project is expected to result in emission reductions of 37 947 tonnes of CO2 per year during the ten year crediting period.		OK
<b>F. Environmental Impacts</b> It is assessed whether environmental impacts of the project are sufficiently addressed.					
F.1.1. Does host country legislation require an analysis of the environmental impacts of the project activity?	/1/	DR	Though as per the MoEF, an EIA is not required for projects costing less than USD 22 Millions, as is the case with the proposed project, the project proponent has conducted a rapid environment impact study for the project. According to which no abnormal effects are envisaged due to project activity.		OK
F.1.2. Does the project comply with	/1/	DR	The project has all relevant legislative and statutory		OK

\* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
environmental legislation in the host country?			clearances.		
F.1.3. Will the project create any adverse environmental effects?	/1/	DR	The environmental impacts, the project is likely to create, such as effects of suspended particulate matter, Nitrogen oxides and Sulphur dioxide apart from generation of fly ash.		OK
F.1.4. Have environmental impacts been identified and addressed in the PDD?	/1/	DR	<p>Yes. The Air, Water, Thermal and Noise pollution impacts have been addressed in the PDD.</p> <p><b>Air pollution control:</b></p> <p>The project is proposed with an Electrostatic precipitator to separate the dust from the flue gas.</p> <p>The ash is planned to be disposed off to the farmers to prepare manure or would be used for making bricks or for road building materials.</p> <p><b>Water Pollution:</b></p> <p>The proponents propose to have a water treatment and wastewater treatment plant.</p> <p>Thermal pollution is aimed to be controlled by cooling of water in the cooling tower and the boiler blow down water is taken to the effluent pond so as to cool naturally.</p> <p><b>Noise Pollution:</b></p> <p>The noise pollution is aimed to be controlled by Silencers and the design changes to rotating equipment to maintain sound level between 85 to 90 dBA.</p> <p>Apart from the above the proponents wish to develop the following:</p>		OK

\* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			1. Plant selected tree species in the area 2. Develop green belt as per their Environmental Management Plan  The Environmental Management Plan needs to be provided for verification.  The Environmental Management Plan & community development plan details need to be provided for verification.	<del>CL</del> 7	
<b>G. Comments by Local Stakeholder</b>					
Validation of the local stakeholder consultation process.					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR, I	Yes. The stakeholders identified are: <ul style="list-style-type: none"> <li>Local people</li> <li>Chhattisgarh Renewable Energy Development Agency (CREDA)</li> <li>Chhattisgarh State Electricity Board (CSEB) Chhattisgarh state Electricity Regulatory Commission (CSERC) Chhattisgarh State Environment conservation Board (CSECB)</li> </ul> Ministry of Non-conventional Energy Sources (MNES)		OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR, I	It is mentioned that the stakeholders were directly communicated for comments on the project. It is also mentioned that the local populace were assembled on April 15, 2006 for providing comments on the project.		OK

\* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	It is not required for the given size of the project.		OK
G.1.4. Is a summary of the comments received provided?	/1/	DR, I	Yes the comments received from the stakeholders are summarised.		OK
G.1.5. Has due account been taken of any comments received?	/1/	DR	No adverse comments were received from local stakeholders.		OK

\* MoV = Means of Verification, DR= Document Review, I= Interview

**Table 3 Resolution of Corrective Action and Clarification Requests**

Draft report corrective action requests and requests for clarification	Ref. to Table 2	Summary of project participants' response	Final conclusion
<p><del>CL 1</del></p> <p>The project will require trained and qualified manpower in order to work as presumed during the project period. Qualified personnel as per statutory requirements in India should carry out the boiler operations.</p> <p>It needs to be elaborated how the training requirements will be fulfilled.</p>	A.2.5	<p>The project activity is under final stage of implementation. The project will employ qualified and experienced persons for plant operation. The company will employ qualified and certified persons for boiler operations as per statutory requirements. With respect to training, the equipment suppliers (boiler and turbine) confirmed the training for plant personnel and Copy of letters from the equipment suppliers enclosed for verification.</p>	<p>Accepted.</p> <p>The project is at the initial stages. The supporting documents have been verified for the grounds that appropriate training would be provided by the equipment manufactures and suppliers.</p> <p>CL1 is closed.</p>
<p>CL 2</p> <p>However a clarification as how the issue is being dealt with and mechanism to ensure continual supply of permitted biomass material for the project needs further elaboration. Also detail biomass assessment survey report on abundant availability of biomass for the project need to be submitted.</p>	A.3.2	<p>The project activity is located in Champa district of Chattisgarh, which is rich in biomass resources. The project proponent carried out a biomass assessment study in the region to assess the quantity of available biomass. According to the study, the total quantity of biomass available in the region is 1.15 millions and the consumption of the region is 0.82 millions. The surplus biomass available after the consumption of the region is 0.25 millions. Whereas, the biomass requirement of the project activity is only 0.07 millions. Even after accounting the consumption of present activity, the availability of biomass in the region is in surplus. Hence, it can be concluded that the plant can meet its biomass requirement without any difficulty.</p> <p>The project activity will utilize crop residues and agro industrial residues (Rice husk) as</p>	<p>Accepted.</p> <p>The biomass study report have been verified and found to be satisfactory. The procedure for procurement and the monitoring plant is acceptable as sufficient measures have been elaborated for ensured procurement of biomass for the project activity.</p> <p>CL 2 is closed.</p>

Draft report corrective action requests and requests for clarification	Ref. to Table 2	Summary of project participants' response	Final conclusion
		<p>basic fuel for power generation. Being an agricultural dominated area, the availability of biomass residues in the region is in surplus.</p> <p>The biomass supply will be directly monitored by the Managing director. He looks after all the issues related to procurement and continual supply of biomass required for the project activity. He will direct the plant manager to procure the biomass based on the market condition. Rice husk will be procured from the rice millers based on time to time requirement. Since the Managing director of the company will take all appropriate steps for procurement of biomass directly, the project activity will have uninterrupted supply of biomass fuel required.</p> <p>The project proponent will prepare all the procedures and guidance for accepting the biomass fuels that will be used in the project activity. The plant manager will prepare the list of biomass fuels that will be accepted into the plant premises. The security persons at project entrance will be given proper instructions in accepting the type of biomass into the plant premises. A notice also will be kept at project entrance and at office along with the list of biomass fuel types permitted into the plant premises. So that the biomass fuel procuring persons can be aware of the type of fuels to procure for the project activity. The type of biomass i.e. not permitted or not in the list of accepted biomass fuels will be</p>	



Draft report corrective action requests and requests for clarification	Ref. to Table 2	Summary of project participants' response	Final conclusion
		<p>rejected at project entrance itself.</p> <p>The biomass assessment report carried out by the project proponent is enclosed for verification.</p>	
<p>CL 3</p> <p><b>Clarifications needed:</b></p> <ul style="list-style-type: none"> <li>It is stated that the return on investment allowed is 16% by the regulator in chhattisgarh – source and evidence needs to be provided. A copy of Detail project report need to be furnished for further references.</li> <li>The financial calculations spreadsheet needs to be provided for verification.</li> <li>It is stated that the average cost of biomass during consideration of the project was Rs. 650 / tonne and now it has increased by 40 to 50%. - Source needs to be provided for this information.</li> <li>It is stated that only few biomass plants have come in the region. Source needs to be provided for this statement and how many projects have come –up in the region need to be provided. The ASCI report on district wise biomass assessment need to be furnished for reference for estimated potential in the state for renewable energy.</li> </ul> <p>The board resolution considering CDM for the</p>	B.2.1	<p>The return on equity allowed by CERC in its order dated 11/11/2005 is enclosed for verification.</p> <p>The Detailed Project report and financial calculation sheet are furnished for verification.</p> <p>The evidence with respect to increase in biomass cost is enclosed.</p> <p>As per the statistics published by MNES only two biomass based power projects have been commissioned in the state of Chattisgarh with an installed capacity of 11 MW and only 5 projects under implementation stage as on March 2005. Hence, the scenario at the time of project implementation stage clearly shows the negligible capacity of biomass based power projects in the state and is not a common practice. The reference can be found at the following web links and hard copy of the reference is provided for verification.</p> <p><a href="http://www.nri.org/biomass/renewable_energy_policy_subpage_3.htm">http://www.nri.org/biomass/renewable_energy_policy_subpage_3.htm</a></p>	<p>Accepted.</p> <p>The minutes of board meeting as been verified. The evidence of increase of biomass price have been verified from receipts of biomass supply. The ASCI report on biomass potential has been verified.</p> <p>The financial analysis spread sheet has been verified for the project activity.</p> <p>CL 3 is closed.</p>

Draft report corrective action requests and requests for clarification	Ref. to Table 2	Summary of project participants' response	Final conclusion
project activity needs to be provided for verification.		<a href="http://www.nri.org/biomass/conference_papers/policy_annex_2.pdf">http://www.nri.org/biomass/conference_papers/policy_annex_2.pdf</a>  The ASCI report on district wise biomass potential is furnished.  The certified copy of Minutes of board of directors meeting on early consideration of CDM is enclosed for verification.	
<b>CL 4</b>  The project is a renewable energy generation project and thus the monitoring requirement under category I.D. is used in this project. Since the project is co-fires biomass with coal, the amount and type of biomass along with fossil fuel is monitored apart from electricity generated and supplied to grid.  The possible fossil fuel consumption like diesel for the project activities like DG set operations in case of emergencies need to be included as a part of monitoring.	D.1.2	The project activity is under implementation stage. The project proponent is planning to install a 100kVA DG set for the project activity. The DG set will be installed only for use during emergency situations and grid failures. The DG set consumption will be recorded in log books. The project will also consume diesel for other activities such as onsite transportation of biomass, etc. The total purchase and consumption of diesel for the entire activity will be recorded in log books. However, the total diesel consumption and corresponding emissions are negligible; the same are not considered in monitoring.	Accepted.  The project emissions due to the diesel consumption is negligible and thus needn't have to be monitored. However, the log book would be verified on the consumption pattern and consumption details.  CL 4 is closed.
<b>CL 5</b>  The leakage monitoring is not explained according to the procedures of the methodology. The leakage needs to be demonstrated through Attachment C to appendix B.	D.3.	The project region is dominated by agriculture activity and the availability of biomass in the region is surplus. The total surplus biomass in the region is 25% larger than the total consumption of the region. The PDD has been revised included the leakage demonstration according to Attachment C to Appendix B.	Accepted.  The revised PDD with inclusion of leakage has been verified and accepted.  CL 5 is closed.
<b>CL 6</b>	D.5.	Procedure for training of monitoring personnel,	Accepted.

Draft report corrective action requests and requests for clarification	Ref. to Table 2	Summary of project participants' response	Final conclusion
<p>A procedure for training of monitoring personnel needs to be elaborated.</p> <p>Emergencies like fire in storage area can cause unintended emission. The emergency preparedness in such situation needs to be elaborated.</p> <p>The MP does not describe procedures for calibration of instruments to be used. Procedures for calibration must be defined to ensure later verification of CERs though records of calibrations of various instruments have been provided as evidences.</p> <p>The procedures for maintenance of monitoring equipment, monitoring, measurements and reporting, for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation), for dealing with possible monitoring data adjustments and uncertainties, for internal audits of GHG project compliance with operational requirements, project performance reviews, for corrective actions, need to be established.</p>		<p>Emergencies like fire in storage area, emergency preparedness, maintenance of monitoring equipment, monitoring, measurements and reporting for day-to-day records handling, possible monitoring data adjustments and uncertainties, internal audits, project performance reviews and corrective actions are provided in attachment.</p> <p>The Monitoring Procedure is revised in the PDD, including procedures for calibration of instruments, various plant equipment that will be used for monitoring.</p>	<p>The revised PDD with inclusion of training, emergency situation tackling, internal auditing and monitoring measures has been verified and accepted.</p> <p>CL 6 is closed</p>
<p>CL 7</p> <p>The Environmental Management Plan &amp; community development plan details need to be provided for verification.</p>	F.1.4	<p>The Environmental Management Plan (EMP) is included in the 'Rapid Environmental Impact Assessment' report (REIA). A copy of REIA is enclosed for verification.</p> <p>The project activity will contribute to the community development of the local area. The project will directly employ around 100 local people for various purposes in the plant. The</p>	<p>Accepted.</p> <p>The REIA report has been verified and no adverse environmental impacts have been stated in the report.</p> <p>CL 7 is closed.</p>

Draft report corrective action requests and requests for clarification	Ref. to Table 2	Summary of project participants' response	Final conclusion
		project will also generate additional income to local farmers through sale of crop residues. The project indirectly generates employment for Local people in various activities such as collection, transportation and handling of biomass residues. Thus the project will ensure overall development of the local area.	

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## **APPENDIX B**

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### **CERTIFICATES OF COMPETENCE**



## CERTIFICATE OF COMPETENCE

***Michael Lehmann***

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

<b>GHG Auditor:</b>	Yes		
<b>CDM Validator:</b>	Yes	<b>JI Validator:</b>	--
<b>CDM Verifier:</b>	Yes	<b>JI Verifier:</b>	--
<b>Industry Sector Expert for Sectoral Scope(s):</b>	Sectoral scope 1, 2, 3 & 9		
<b>Technical Reviewer for (group of) methodologies:</b>			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0027	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes	AM0028, AM0034	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0030	Yes
ACM0004	Yes	AM0031	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0032	Yes
ACM0007	Yes	AM0035	Yes
ACM0008	Yes	AM0038	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0041	Yes
AM0006, AM0016, AMS-III.D, ACM0010	Yes	AM0034	Yes
AM0009, AM0037	Yes	AM0043	
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	Yes	AM0046	
AM0014	Yes	AM0047	
AM0017	Yes	AMS-II.A-F, AM0044	Yes
AM0018	Yes	AMS-III.A	Yes
AM0020	Yes	AMS-III.E, AMS-III.F	Yes
AM0021	Yes		
AM0023	Yes		
AM0024	Yes		

Høvik, 5 February 2007

**Einar Telnes**  
*Director, International Climate Change Services*

**Michael Lehmann**  
*Technical Director*



## CERTIFICATE OF COMPETENCE

### *Kumaraswamy Chandrashekara*

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

<b>GHG Auditor:</b>	Yes		
<b>CDM Validator:</b>	Yes	<b>JI Validator:</b>	--
<b>CDM Verifier:</b>	Yes	<b>JI Verifier:</b>	--
<b>Industry Sector Expert for Sectoral Scope(s):</b>	Sectoral scope 4 & 5		
<b>Technical Reviewer for (group of) methodologies:</b>			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0021	Yes
ACM002, AMS-IA-D, AM0019, AM0026, AM0029	Yes	AM0023	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0024	Yes
ACM0004	Yes	AM0027	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0028, AM0034	Yes
ACM0007	Yes	AM0030	Yes
ACM0008	Yes	AM0031	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0032	Yes
AM0006, AM0016, AMS-III.D	Yes	AM0035	Yes
AM0009, AM0037	Yes	AM0038	Yes
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	Yes	AM0041	Yes
AM0014	Yes	AM0034	Yes
AM0017	Yes	AMS-II.A-F	Yes
AM0018	Yes	AMS-III.A	Yes
AM0020	Yes	AMS-III.E, AMS-III.F	Yes

Høvik, 6 November 2006

Einar Telnes  
Director, International Climate Change Services

Michael Lehmann  
Technical Director



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## CERTIFICATE OF COMPETENCE

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### *Astakala Vidyacharan*

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-  
CDMJi-i1

<b>GHG Auditor:</b>	Yes		
<b>CDM Validator:</b>	--	<b>JI Validator:</b>	--
<b>CDM Verifier:</b>	--	<b>JI Verifier:</b>	--
<b>Industry Sector Expert for Sectoral Scope(s):</b>	--		

Høvik, 6 November 2006

Einar Telnes  
*Director, International Climate Change Services*

Michael Lehmann  
*Technical Director*

### *Ma-Paa-Puratchikkanal*

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-  
DMJI-i1

<b>GHG Auditor:</b>	Yes		
<b>CDM Validator:</b>	--	<b>JI Validator:</b>	--
<b>CDM Verifier:</b>	--	<b>JI Verifier:</b>	--
<b>Industry Sector Expert for Sectoral Scope(s):</b>	--		

Høvik, 1 March 2007

Einar Telnes  
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Michael Lehmann  
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