



VERIFICATION / CERTIFICATION REPORT

“4.5 MW BIOMASS (LOW DENSITY
CROP RESIDUES) BASED POWER
GENERATION UNIT OF MALAVALLI
POWER PLANT PVT LTD.”
IN INDIA

(UNFCCC Registration Ref. No. 0298)

Monitoring Period:
01 October 2007 to 31 July 2008

REPORT NO. 2009-0210

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VERIFICATION / CERTIFICATION REPORT

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Approved by: Edwin Aalders	Organisational unit: DNV Climate Change and Environmental Services
Client: Malavalli Power Plant Pvt. Ltd.	Client ref.: K.Krishan - Managing Director

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Summary:

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” (UNFCCC Registration Ref. No. 0298) project by Malavalli Power Plant Pvt. Ltd. located at Kirugavalu village, Malavalli taluka, Mandya district, Karnataka state, India for the period 01 October 2007 to 31 July 2008.

In our opinion, the GHG emission reductions reported for the project in the revised monitoring report (Version 02) of 07 January 2012 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology AMS-I.D (version 07) and the monitoring plan contained in the Project Design Document of 13 February 2006.

DNV Climate Change Services AS is able to certify that the emission reductions from the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” during the period 01 October 2007 to 31 July 2008 amount to 8 181 tonnes of CO₂ equivalent.

Report No.: 2009-0210		Subject Group: Environment	
Report title: “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” In India			
Work carried out by: Gaurav Srivastava, Astakala Vidyacharan, Anjana Sharma			
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Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	DNV Climate Change Services AS
DNA	Designated National Authority
EB	Executive Board
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
JMR	Joint Meter Reading
KPTCL	Karnataka Power Transmission Corporation Limited
KSPCB	Karnataka State Pollution Control Board
MESCL	Mangalore Electricity Supply Company Limited
MP	Monitoring Plan
MR	Monitoring Report
MPPPL	Malavalli Power Plant Pvt. Ltd.
NCV	Net Calorific Value
PDD	Project Design Document
PP	Project Proponent
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual



1 INTRODUCTION

Malavalli Power Plant Pvt. Ltd. has commissioned DNV Climate Change Services AS (DNV) to carry out the verification and certification of emission reductions reported for the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” project in the period 01 October 2007 to 31 July 2008. This report contains the findings from the verification and a certification statement for the certified emission reductions.

The CDM-Executive Board at its 55 meeting decided not to approve DNV’s earlier request for issuance of CERs for the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” (0298) for the period 01 October 2007 to 31 July 2008 /26/. The issuance request was not approved on the grounds that “(i) the DOE did not confirm that the annual monitoring of NCV is the most conservative assumption theoretically possible as stated in the VVM version 1.1 paragraph 207 and (ii) The DOE failed to request for deviation, regarding the monitoring of NCV, since the actual monitoring practice is not in accordance with the monitoring plan, as required by the VVM version 1.1 paragraph 210”. Subsequently, in accordance with paragraph 96 of the report of the Board’s 28 meeting report /25/, DNV on 21 September 2010 requested permission to submit a revised request for issuance for the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” for the same monitoring period from 01 October 2007 to 31 July 2008 /28/. The request letter submitted to CDM EB stated that the reasons for rejection are intended to be addressed as follows in a revised monitoring report and verification report in a two-step process:

- In order to address the issue of the project proponent/DNV failing to seek a request for deviation to address the monitoring the NCV of the biomass residues on an annual basis instead of the monthly basis (deviation from the monitoring plan of the registered PDD). DNV will submit a request for deviation for approval by the CDM EB, on acceptance of this request for re-submission.
- Based on the guidance provided by CDM EB to the request for deviation, the project proponent will revise the monitoring report and DNV will finalize the revised verification report.

The CDM EB in its 60 meeting considered the request from DNV and approved the resubmission of the request for issuance for project activity for the monitoring period from 01 October 2007 to 31 July 2008 (refer paragraph 100 (b) of EB 60 meeting report) /27/.

This re-submission for the verification activity addresses the issues highlighted in the reasons for rejection of earlier issuance request (refer CDM EB 55 meeting report) /26/ in addition to the requirement of the monitoring plan of the registered PDD and applied version of the methodology (AMS-I.D Version 07) /23/.

1.1 Objective

Verification is the periodic independent review and *ex post* determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined monitoring period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.



The objective of this verification was to verify and certify emission reductions reported for the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” for the period 01 October 2007 to 31 July 2008.

1.2 Scope

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified.

1.3 Description of the project activity

Project Parties:	India and Switzerland
Title of project activity:	4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.
UNFCCC registration No:	0298.
UNFCCC registration date:	21 July 2006
Baseline and monitoring methodology	AMS-I.D (version 07)
Project Participants:	Malavalli Power Plant Pvt. Ltd. from India, Myclimate-The Climate Protection Partnership and South Pole Carbon Asset Management Ltd. from Switzerland
Location of the project activity:	Kirugaval village, Malavalli Taluka, Mandya District, Karnataka State, India
Project's crediting period:	01 August 2001 to 31 July 2008 (first renewable crediting period)
Period verified in this verification:	01 October 2007 to 31 July 2008

The project activity is a 4.5 MW (gross) capacity grid connected biomass residues based renewable energy power plant with high pressure steam turbine configuration that comprises a condensing steam turbo generator unit with a matching boiler of travelling grate type capable of firing multi fuel of low density crop residues and produces steam at 22 tonnes per hour /3/. Biomass for the activity is sourced from the surrounding regions of Kirugaval village, Malavalli Taluka in Karnataka state. The generated electricity is exported to the state owned power utility company Karnataka Power Transmission Corporation Ltd. (KPTCL) /7/. Auxiliary plant facilities such as biomass storage and handling systems, ash handling system, air pollution control devices and cooling water systems have all been established /3/.



The project activity results in the reduction of GHG emissions through displacement of fossil fuel based state grid power by the 4.5 MW biomass residues based renewable power plant.

1.4 Methodology for determining emission reductions

According to the applied methodology ASM-I.D, version 07 /23/, the emission reductions for the project are determined as the difference between the baseline emissions, project emissions and leakage:

$$ER_y = BE_y - PE_y - L_y$$

Baseline emissions: The project's baseline emissions are determined as the product of the net electricity supplied to the southern regional grid of India by the project activity /6/ and the weighted average grid emission factor of southern grid for current generation mix (for year 2006-07) and the value applied is 0.72193 tCO₂/MWh /21/. The weighted average grid emission factor of current generation mix of southern regional grid of India has been sourced from data by the Central Electricity Authority (CEA) of the Ministry of Power, Government of India. CEA has published a database of carbon dioxide emission factors from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country /21/.

Project Emission: As the project activity is designed specifically to fire low density crop residues and there is no provision of supplementary firing or co-firing in the project activity boiler. There are no project emissions associated with the project activity as also stated in registered PDD /3/ and validation report /4/.

Leakage: Leakage due to transportation of biomass residues has been identified as source of emissions.

Therefore, the emission reductions are accounted as:

Emission Reduction (ER) = Baseline emission – Leakage emissions.

$$ER_y = BE_y - L_y$$

2 METHODOLOGY

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

- The actual installed capacity 4.5 MW (gross) capacity grid connected biomass residues based renewable energy power plant to ensure the conformance with the descriptions in the registered PDD/3/;
- Gross electricity generated by the project activity- monitored continuously and recorded on daily basis /6/.
- Electricity exported: - net electricity exported to grid (calculated as the difference of electricity exported to the southern grid of India by the project activity and electricity imported from the southern grid of India by the project activity) on daily basis/6/ and also recorded in the form of joint meter reading record on monthly basis /5/.
- Biomass quantity utilised by the project activity (each kind of biomass residues) - measured and recorded on daily basis /16/ & /17/.
- Leakage emissions due to transportation of biomass residues on daily basis /2/, /16/ & /17/.



- Average calorific value of biomass used - measured and recorded on daily basis /6/ and independent third party testing on annual basis /15/ (this is not in line with the requirement of monitoring plan of the registered PDD /3/, hence a deviation request to permit use of yearly testing by independent third party for average calorific value of biomass used was submitted on 10 May 2011 and same got approved on 14 July 2011 /29/).
- Grid emission factor as weighted average of current generation mix (refer section 3.3 of the report) /21/.

Verification team

Role	Last Name	First Name	Country	Type of involvement					
				Desk review	Site visit	Reporting	Supervision of work	Technical review	TA 1.1 competence
Team leader (Verifier)	Astakala	Vidyacharan	India	✓	✓	✓	✓		✓
Verifier	Srivastava	Gaurav	India	✓	✓	✓			
GHG Auditor	Sharma	Anjana	India	✓	✓	✓			
Technical reviewer	Kakaraparthi	Venkata Raman	India					✓	✓

Duration of verification

Preparations: 28 May 2009

On-site verification: 29 May 2009

Reporting, calculation checks and QA/QC: 29 May 2009 to 30 January 2012

2.1 Review of documentation

The basis for the verification has been the initial monitoring reports for the period 01 October 2007 to 31 July 2008 (webhosted version 00, and final version 01 submitted for issuance dated 21 August 2009 prior to rejection by UNFCCC) and revised monitoring report submitted by Malavalli Power Plant Pvt. Ltd. for re-verification, version 02 dated 07 January 2012 /1/.

In addition to the monitoring reports, the emission reduction calculation provided in the form of spreadsheet submitted by Malavalli Power Plant Pvt. Ltd. /2/, were assessed as a part of the verification. In addition, the project's registered Project Design Document /3/, the deviation request approved by UNFCCC on 14 July 2011 /29/, the project's validation report /4/ and verification/certification reports for previous monitored period's /20/ were also assessed.

The data presented in the monitoring report /1/ were assessed in detail by a thorough review of the detailed project documentation and production records /5/, /6/ & /8/, interviews with personnel at Malavalli Power Plant Pvt. Ltd., collection of measurements, observation of established monitoring and reporting practices and assessment of the reliability of monitoring



equipment /10/, /11/ & /13/. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results and verify the correct application of the approved monitoring methodology AMS-I.D version 07 /23/. Data from other sources include the weighted average grid emission factor of current generation mix (for year 2006-07) and the value is 0.72193 tCO₂/MWh /21/ (refer CAR 3 as stated in Appendix A of the report).

2.2 Site visit

On 28 May 2009, DNV carried out a site visit at Malavalli Power Plant Pvt. Ltd. During the on-site assessment, DNV has verified the actual implementation and operation of the project as described in the PDD /3/. The instruments used for monitoring electricity parameters /5/, /6/ & /8/, calorific value /6/ & /15/, biomass weight /16/ & /17/, diesel consumed were checked /16/, including the calibration records for these instruments /10/, /11/ & /13/. These were found to be in order.

Interviewed organisation	Interview topics
Malavalli Power Plant Pvt. Ltd.	➤ Whether the project has been implemented as planned. ➤ Application of baseline emission factor. ➤ Adherence to monitoring plan established in registered Project Design Document. ➤ Management procedures like internal audits and reviews to minimise uncertainties in data monitoring and data management. ➤ Project performance. ➤ Resources, training needs and procedures for operation and maintenance.

Following people were interviewed or assisted the verification team during site visit.

Name	Position	Interview topics
1. Mr. K. Krishan,	Managing Director	• Detailed checking of the daily monitoring records & spreadsheets, as per monitoring plan and report. • Assessment of calibration records • Environmental permits
2. Mr. Nara Singh,	Project coordinator	
3. Mr. M. A. Sharief,	Plant Manager	

In addition, all parameters required by the monitoring methodology AMS-I.D, version 07/23/, and the management system were also assessed during the site visit.

2.3 Reporting of findings

A corrective action request (CAR) is issued, where:

- i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;



- ii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- iii. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CL) shall be 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 issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

After the verification visit in 2009, 3 CARs have been raised. These CARs have been subsequently closed upon satisfactory response from the project participant (refer to Appendix A of this report).

After approval of re-submission request for issuance for project activity for the monitoring period from 01 October 2007 to 31 July 2008 (refer paragraph 100 (b) of EB 60 meeting report), DNV raised 3 additional CARs (refer to Appendix A of this report). All CARs/CL have been subsequently closed upon satisfactory response from the project participant. No forward action requests were identified.



3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” for the period 01 October 2007 to 31 July 2008.

3.1 Remaining issues, FARs from previous validation / verification

According to the validation report /4/, no CAR or CL’s were required to be closed out during verification. Similarly, no CAR’s / FAR’s were required to be closed following the previous verifications /20/.

The CDM-Executive Board at its 55 meeting decided not to approve DNV’s earlier request for issuance of CERs for the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” (0298) for the period 01 October 2007 to 31 July 2008 /26/. The issuance request was not approved on the grounds that “(i) the DOE did not confirm that the annual monitoring of NCV is the most conservative assumption theoretically possible as stated in the VVM version 1.1 paragraph 207 and (ii) The DOE failed to request for deviation, regarding the monitoring of NCV, since the actual monitoring practice is not in accordance with the monitoring plan, as required by the VVM version 1.1 paragraph 210”. Subsequently, in accordance with paragraph 96 of the report of the Board’s 28 meeting report /25/, DNV on 21 September 2010 requested permission to submit a revised request for issuance for the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” for the same monitoring period from 01 October 2007 to 31 July 2008 /28/. The request letter submitted to CDM EB stated that the reasons for rejection are intended to be addressed as follows in a revised monitoring report and verification report in a two-step process:

- In order to address the issue of the project proponent/DNV failing to seek a request for deviation to address the monitoring the NCV of the biomass residues on an annual basis instead of the monthly basis (deviation from the monitoring plan of the registered PDD). DNV will submit a request for deviation for approval by the CDM EB, on acceptance of this request for re-submission.
- Based on the guidance provided by CDM EB to the request for deviation, the project proponent will revise the monitoring report and DNV will finalize the revised verification report.

The CDM EB in its 60 meeting considered the requests from DNV and approved the resubmission of the request for issuance for project activity for the monitoring period from 01 October 2007 to 31 July 2008 (refer paragraph 100 (b) of EB 60 meeting report) /27/.

Hence in line with the procedure prescribed in request letter submitted to CDM EB for permission to submit a revised request for issuance, DNV followed the following approach:

- On 10 May 2011 a deviation request was submitted to UNFCCC, which was approved by EB on 14 July 2011 /29/.
- Project proponent revised the monitoring report /1/.
- DNV revised the verification/certification report.



3.2 Project implementation

As part of the site visit DNV was able to confirm that the project implementation is in accordance with the project description contained in registered PDD of 13 February 2006 /3/. The verification team confirmed through visual inspection and document review that all physical features of the proposed CDM project activity including data collection systems and storage systems have been implemented in accordance with the registered PDD /3/. DNV confirmed during the on-site visit that the CDM project is completely operational. DNV confirmed that neither a notification nor request for approval of changes has been requested to CDM Executive Board.

The project boundary covers the fuel storage, boiler, steam turbine generator, other accessory equipments and KPTCL grid. The following equipment has been installed as mentioned in the registered PPD /3/.

- 4.5 MW gross capacity steam turbine
- Travelling grate technology type boiler (capacity 22 tons/hour steam at 42 ata and 440°C temperature)
- Ash handling system for effective disposal of fly ash
- Demineralised water plant for boiler feed water supply
- Electro static precipitator
- Energy meters for monitoring electricity

After trial operations, commercial power generation from CPP started from 1 August 2001 after obtaining all statutory clearances. After implementation and commissioning of the project technology, no changes have been carried out. These facts have been verified by DNV during the site visit /19/.

Valid air and water consents covering the chosen verification period have also been obtained from the Karnataka State Pollution Control Board /14/. In addition the verification of air and effluent reports confirm that relevant pollution parameters as specified in the consents are within the specified limits.

The plant uses agriculture wastes, comprising of crop residues like cane trash, coconut fronds, toppings of casuarinas & eucalyptus, mill residues like saw mill waste, rice husk etc. as residue fuel. This has been confirmed through the verification of invoices / receipts from suppliers of biomass and the records maintained at the weigh bridge centre and daily log sheets /6/, /16/ & /17/.

The total plant outages of 2744 hours & 42 min have been recorded (during the monitoring period of 01 October 2007 to 31 July 2008) and have been verified from plant performance sheet /6/ & /19/.

3.3 Information (data and variables) provided in the monitoring report that is different from that stated in the registered PDD

The registered PDD is not clear whether the actual emission reduction during the crediting period will be claimed based on the validated weighted average grid emission factor or ex-post updated weighted average grid emission factor of current generation mix of southern regional grid of India /3/. However DNV has accepted the use of 0.72193 tCO₂/MWh /21/, updated weighted average grid emission factor (ex post) of current generation mix of southern regional grid for year 2006-07 (latest data available at the time of verification) as this is conservative than the validated grid emission factor of 0.7659 tCO₂/MWh provided in the



registered PDD /3/ (refer CAR 3 as stated in Appendix A of the report) and is the latest available data for the period considered for verification.

During the current verification period (01 October 2007 to 31 July 2008) the project activity has supplied 11 678 690 kWh of net electricity to the southern grid of India (after applying correction factor due to delay in calibration) /6/ in comparison to 25 280 833 kWh of net electricity estimated in the registered PDD (for 305 days) /3/, the variation is deemed to be within a reasonable range considering outages of 2744 hours & 42 minutes/6/ & /19/. It has been confirmed by DNV that the maximum output capacity has not been exceeded on any given month during the monitoring period /6/.

In the registered PDD the leakage emissions due to transportation is estimated to be 323.425 tCO₂ (calculated for 305 days based on the estimation provided in registered PDD) /3/. However during the current verification period the actual leakage emissions due to transportation are verified to be only 249.476 tCO₂ /2/. The variation is deemed to be within a reasonable range considering the outages of 2744 hours & 42 minutes /6/ & /19/, which resulted in less leakage emissions due to transportation due to reduced biomass residues requirement for operation of plant.

The variation in electricity generation, leakage emissions due to transportation of biomass residues, application of correction factor in electricity export and import figures due to delay in calibration and application of weighted average grid emission factor (ex post) of current generation mix of southern regional grid for year 2006-07 has resulted in corresponding reduction of emission reduction achieved by the project activity in comparison to the estimates provided in the registered PDD of 13 February 2006 /3/. The emissions reductions reported in this monitoring period are tonnes of 8 181 tCO₂ equivalents in the period from 01 October 2007 to 31 July 2008 (i.e. 305 days) /2/. The expected emission reductions in the registered PDD are tonnes of 19 039 tCO₂e equivalent, calculated from PDD /3/ based on figures provided for year 2007-08 (i.e. 305 days) and hence the reported emission reductions 8 181 tCO₂e are 57% lower than the expected.

During the site visit it was noticed that the project proponent has monitored the calorific value of each kind of biomass residues in in-house laboratory on daily basis /6/. Based on the calorific value of each kind of biomass residues and the quantity of each kind of biomass used /16/, the weighted average calorific value of biomass is calculated on daily basis and same has been recorded in daily plant performance sheet /6/. However it was witnessed during the site visit that the testing of calorific value of each kind of biomass residues by independent third party was conducted only on yearly basis /15/, which is not in line with the requirement of the monitoring plan of the registered PDD /3/, which states a monthly monitoring. Hence a deviation request to permit use of yearly testing by independent third party for average calorific value of biomass used was submitted on 10 May 2011 and same was approved by the EB on 14 July 2011 /29/.

There is no other variation observed during the current verification except the one mentioned above that is different from what has been stated in the registered PDD /3/.

3.4 Compliance of monitoring plan with monitoring methodology

DNV is able to confirm that the monitoring plan contained in the registered PDD of 13 February 2006 /3/ is in accordance with the approved methodology applied by the project activity, i.e. AMS-I.D (version 07) /23/.



3.5 Compliance of monitoring with the monitoring plan

For the current verification period except for monthly testing by independent third party of calorific value of each kind of biomass residues, the project proponent has monitored all the parameters in accordance with the monitoring plan contained in the registered PDD of 13 February 2006 /3/. During the site visit it was noticed that the project proponent has monitored the calorific value of each kind of biomass residues is monitored in in-house laboratory on daily basis /6/, based on the calorific value of each kind of biomass residues and amount of each kind of biomass used /16/, the weighted average calorific value of biomass is calculated on daily basis and same has been recorded in daily plant performance sheet /6/. However it was witnessed during the site visit that the testing of calorific value of each kind of biomass residues by independent third party was conducted only on yearly basis /15/, which is not in line with the requirement of the monitoring plan of the registered PDD /3/. Hence a deviation request to permit use of yearly testing by independent third party for average calorific value of biomass used was submitted on 10 May 2011 and same got approved on 14 July 2011 /29/.

DNV confirms that all other parameters stated in the validated monitoring plan are monitored and reported appropriately. The revised monitoring report /1/ lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, to recording, calculation and reporting) for these parameters is provided in the revised monitoring report /1/. The information flow for the each parameter is further verified in the following sections. DNV confirms that no revision of monitoring plan has been requested to CDM Executive Board.

3.5.1 Monitoring parameters

As required by the monitoring methodology AMS-I.D. (version 07) /23/ and monitoring plan of the registered PDD /3/, monitoring of parameters essentially comprises:

Baseline emissions: Based on weighted average grid emission factor (ex post) of current generation mix of southern regional grid (0.72193 tCO₂/MWh) /21/ and net electricity exported (11 678 690 kWh) /6/, the baseline emissions have been verified to be 8 431.197 tCO₂ equivalent for the period 1 October 2007 to 31 July 2008 /2/.

- **Weighted average grid emission factor (ex post) of current generation mix of southern regional grid:** The registered PDD is not clear whether the actual emission reduction during the crediting period will be claimed based on the validated weighted average grid emission factor or ex-post updated weighted average grid emission factor of current generation mix of southern regional grid of India /3/. However DNV has accepted the use of 0.72193 tCO₂/MWh /21/, updated weighted average grid emission factor (ex post) of current generation mix of southern regional grid for year 2006-07 (latest data applicable at the time of verification) as this is conservative than the validated grid emission factor of 0.7659 tCO₂/MWh provided in the registered PDD /21/ (refer CAR 3 as stated in Appendix A of the report) and is the latest available data for the period considered for verification.
- **Electricity generated by the project activity:** The gross electricity generated by the project activity has been monitored continuously via tri-vector energy meter (Tag no: E38/3721-0201) and recorded on shift basis by shift in charges. The shift readings of the plant are then aggregated into daily readings and maintained in daily plant performance sheet /6/. The gross energy meter used to monitor the gross electricity generation from the project activity is of 1S accuracy class and is tested and calibrated



annually by external third party /11/. During the current verification period (01 October 2007 to 31 July 2008, it has been verified that the project activity has generated 13 567 160 kWh (gross) of electricity /6/ and same has been cross checked against the monthly electricity generation records submitted to electrical Inspectorate /18/.

- **Net electricity exported by the project activity to the southern grid:** The net electricity exported to the grid (difference between the gross export and import to/from grid) has been monitored continuously by tri-vector bi-directional main meter (with serial number: 01955018) and check meter (with serial number: 01955020) and recorded on shift basis in daily plant performance sheet /6/. Summation of value provided in daily plant performance sheet for the month has been cross checked against the readings provided in monthly joint meter readings records (reading recoded in presence of parties, the project developer's representative and KPTCL officials) /5/ and invoices issued to Mangalore Electricity Supply Company Limited (a distribution wing of Karnataka Power Transmission Corporation Limited) /8/. The main energy meter and check meter used to monitor the electricity exported/imported to/from grid are of class 0.5 S accuracy class. These meters are under control of KPTCL and are tested and calibrated annually as per procedures defined in the power purchase agreement signed with state electricity board /7/. During the current verification period (01 October 2007 to 31 July 2008), it has been verified and confirmed that the project activity has exported (net) 11 678 690 kWh of electricity (after application of correction factor due to delay in calibration) from southern grid of India /6/.
- **Biomass used by the project activity:** The fuel quantity (biomass residues) procured by the project activity during the current verification period is monitored by Weigh Bridge calibrated by "Controller of Weights and Measures" department of Karnataka. The receipts of each kind of biomass residues at plant premises is measured on each vehicle basis and reported in the form of Fuel Receipt Notes and aggregated to daily records /16/. Whereas the fuel quantity (biomass residues) consumed in the boiler by the project activity is recorded on daily basis based on bunker level assessment and steam fuel ratio on daily basis in plant performance sheet and has been cross checked from the stock balance prepared on daily basis /17/. During the current verification period project activity has consumed 24 534.2 metric tonnes of biomass residue (3 577.94 metric tonnes of cane trash, 10 905.35 metric tonnes of coconut fronds, 1 188.46 metric tonnes of corn cob, 5 088.43 metric tonnes of toppings, 2 651.81 metric tonnes of husk and 1 122.22 metric tonnes of chips and other residues) /16/.
- **Average calorific value of biomass used:** The calorific value of each kind of biomass residues is monitored in in-house laboratory on daily basis, based on the calorific value of each kind of biomass residues and amount of each kind of biomass used, the weighted average calorific value of biomass is calculated on daily basis and same has been recorded in daily plant performance sheet /6/. As per the monitoring plan of the registered PDD, project proponent is also required to test the calorific value of each kind of biomass residues by independent third party on monthly basis /3/. However during the site visit it was noticed that the testing by independent third party for calorific value was conducted only on yearly basis, which is not in line with the requirement of the monitoring plan of the registered PDD /3/. Hence a deviation request to permit use of yearly testing by independent third party for calorific value of



biomass used was submitted on 10 May 2011 and same got approved on 14 July 2011 /29/.

Project Emission: As the project activity is designed specifically to fire low density crop residues and there is no provision of supplementary firing or co-firing in the project activity boiler. There are no project emissions associated with the project activity as also stated in registered PDD /3/and validation report /4/.

Leakage due to transportation of biomass residues: Leakage emissions due to transport has been calculated based on the total biomass residues procured /16/, average distance between source of procurement of biomass residues and the power plant/16/, number of trips and vehicle type details maintained in Fuel Receipt Note /16/ and the ex-ante validated emission factor of diesel at 2.815 tCO₂/ liter of diesel and mileage of each type of vehicle (validated during the first renewable crediting period based on the historic consumption records) /3/. MPPL procured biomass residues through fixed vendors only and information of each vendor like name and registered address is maintained in the computer database available at weigh bridge record room. At weigh bridge room project proponent maintains a Fuel Receipt Note /16/ which contains following:

- Date (used for procurement date details) /16/
- Vehicle No (used to calculate trips) /16/
- Supplier Name (used to calculate distance based on the address information available in computer database) /16/
- Vehicle Type e.g. Lorry, 4 Wheel Trolley, 2 Wheel Trolley, Bullock Cart (used for specific fuel consumption of each type of vehicle) /16/
- Fuel type (e.g. cane trash, coconut fronds, groundnut husk, rice husk, toppings of various types of plantation wood etc.) /16/
- Gross Weight /16/
- Tare Weight (used to calculate biomass procurement) /16/
- Net Weight (used to calculate biomass procurement) /16/
- Moisture % (used to calculate biomass procurement) /16/
- Since Malavalli Power Pvt. Ltd. uses its own vehicles for transportation of biomass residues, hence project proponent also maintains diesel purchase receipts and records for allocation of diesel to each vehicle and information regarding same can also be verified from the fuel receipt notes /16/.

Based on the information provided in the Fuel Receipt Notes /16/, project proponent estimate emissions from transport that contributes to leakage from biomass supply to the Plant /2/. Leakage due to transportation of biomass for the current verification period (01 October 2007 to 31 July 2008) has been verified to be 249. 476 tCO₂e equivalent /2/. The parameters reported, including source, frequency and review criteria as indicated in the monitoring plan were verified to be correct and in line with the monitoring plan of the registered PDD of 13 February 2006. Necessary management system procedures including responsibility and authority of monitoring activities have been verified to be consistent with the monitoring plan of the registered PDD of 13 February 2006 /3/. Knowledge of personnel associated with the project activity was also found to be satisfactory.

The following tables are related to the parameters in the monitoring plan / methodology:

	Assessment/ Observation
Data / Parameter:	Electricity generation



(as in monitoring plan of PDD):	Meter: Tag no: E38/3721-0201		
Measuring frequency:	Continuously (Online)		
Reporting frequency:	Shift basis aggregated to daily summation in daily plant performance sheet /6/.		
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes		
Type of monitoring equipment:	Tri-vector energy meter		
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	PDD does not specify the accuracy of meters used. 1S accuracy class meter is used to monitor the electricity generation and it represents a good practice.		
Calibration frequency /interval:	Annually		
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes		
Company performing the calibration:	Trans Power /10/		
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes		
Does the validity of the calibration(s) cover the whole reporting period? Show all calibration dates relevant for the reporting period	No, There is one month and nine day delay in calibration of gross energy meter/10/. The calibration for gross energy meter was due on 27 June 2008/10/, but calibration was conducted on 05 August 2008 only/10/. The errors observed during the calibration conducted on 05 August 2008 were found to be lower than the maximum permissible error of the meters (1%)/10/. The electricity units measured through this meter is not directly linked to emission reduction as emission reduction claim is based on the net electricity exported to the grid meter reading.		
	Gross Energy Meter	Calibrated on	Valid till
	E38/3721-0201	28 June 2007 5 August 2008	27 June 2008 4 August 2009
If applicable, has the reported data been cross-checked with other available data?	Yes, with monthly electricity generation report submitted to electrical inspectorate /18/.		
How were the values in the monitoring report verified?	Daily plant performance sheet /6/.		



Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The electrician records the data on shift basis in the log books based on the continuous measurement from the respective energy meter. The data is then compiled and finalized by the shift in charge, which is responsible for data recording as per the monitoring plan of the registered PDD. The daily generation log book records are then forwarded to the Manager Power Plant who verifies the authenticity of the data. Any discrepancies observed are dealt with immediately. The verified report is sent for archive.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not Applicable

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	Electricity exported (net electricity exported to the southern grid) Main Meter: Tag no: 01955018 Check Meter: Tag no: 01955020
Measuring frequency:	Export and import are continuously (Online) monitored. The net electricity exported is the difference of the export and import.
Reporting frequency:	Daily basis in daily plant performance sheet /6/.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Tri-vector bi-directional energy meter.
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	PDD does not specify the accuracy of meters used. 0.5S accuracy class meter is used to monitor the electricity; this is in line with the requirement of power purchase agreement signed /7/ and represents a good practice.
Calibration frequency /interval:	Annually
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes
Company performing the calibration:	Karnataka Power Transmission Corporation Limited /10/.



Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes																
Does the validity of the calibration(s) cover the whole reporting period? Show all calibration dates relevant for the reporting period	No, The calibration for main and check meter was due on 01 January 2008 /10/, but calibration was conducted on 12 February 2008 only/10/. The errors observed during the calibration conducted on 12 February 2008/10/ were found to be lower than the maximum permissible error of the meters (0.5%). Hence the net electricity exported to the grid has been adjusted by decreasing the electricity exported and imported by 0.5% for the period 1 January 2008 to 29 February 2008, in line with the requirement of “Guidelines for assessing compliance with the calibration frequency requirement” version 1 /24/. The details of calibration conducted is provided below: <table><tr><th>Main Meter</th><th>Calibrated on</th><th>Valid till</th></tr><tr><td rowspan="2">01955018</td><td>02 January 2007</td><td>01 January 2008</td></tr><tr><td>12 February 2008</td><td>11 February 2009</td></tr></table> <table><tr><th>Check Meter</th><th>Calibrated on</th><th>Valid till</th></tr><tr><td rowspan="2">01955020</td><td>02 January 2007</td><td>01 January 2008</td></tr><tr><td>12 February 2008</td><td>11 February 2009</td></tr></table>	Main Meter	Calibrated on	Valid till	01955018	02 January 2007	01 January 2008	12 February 2008	11 February 2009	Check Meter	Calibrated on	Valid till	01955020	02 January 2007	01 January 2008	12 February 2008	11 February 2009
Main Meter	Calibrated on	Valid till															
01955018	02 January 2007	01 January 2008															
	12 February 2008	11 February 2009															
Check Meter	Calibrated on	Valid till															
01955020	02 January 2007	01 January 2008															
	12 February 2008	11 February 2009															
If applicable, has the reported data been cross-checked with other available data?	Yes, daily summation of net electricity exported figures mentioned in the daily plant performance sheet /6/ where cross check against the joint meter reading records /5/ and sales invoices raised to Mangalore Electricity Supply Company Limited on a monthly basis /8/.																
How were the values in the monitoring report verified?	Daily plant performance sheet /6/.																
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The electrician records the data on a continuous basis from the respective energy meters in the log books. The data is then compiled and finalized by the shift in charge, who is responsible for data recording as per the monitoring plan of the monitoring plan of registered PDD. The daily generation log book																



	records are then forwarded to the Manager Power Plant who verifies the authenticity of the data. Any discrepancies observed are dealt with immediately. The verified report is sent for archive.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not Applicable.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	Biomass used by project activity
Measuring frequency:	Daily
Reporting frequency:	Daily in the form of fuel receipts /16/
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Weigh bridge (Serial No. 08C-232) /13/
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The PDD does not specify the accuracy of the monitoring equipment. Accuracy Class III /13/ weigh bridge is used to monitor the biomass procured. The weigh bridge is calibrated annually to represent the good monitoring practice.
Calibration frequency /interval:	Annual
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	The PDD does not specify the frequency of calibration; however the selected frequency is in line with local regulation and represents good monitoring practice.
Company performing the calibration:	"Controller of Weights and Measures" Department of Karnataka /13/.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Does the validity of the calibration(s) cover the whole reporting period? Show all calibration dates relevant for the reporting period	No, the calibration for weigh bridge was due on 16 April 2008/13/, but calibration was conducted on 26 April 2008 only /13/. During the calibration conducted on 26 April 2008/13/, the weighbridge functioning was found to be satisfactory. DNV also observed that project proponent has



	no control over the calibration of weighbridge as it is under purview of “Controller of Weights and Measures" Department of Karnataka/13/.								
	<table><tr><td>Weigh bridge</td><td>Calibrated on</td><td>Valid till</td></tr><tr><td rowspan="2">08C-232</td><td>17 April 2007</td><td>16 April 2008</td></tr><tr><td>26 April 2008</td><td>25 April 2009</td></tr></table>	Weigh bridge	Calibrated on	Valid till	08C-232	17 April 2007	16 April 2008	26 April 2008	25 April 2009
Weigh bridge	Calibrated on	Valid till							
08C-232	17 April 2007	16 April 2008							
	26 April 2008	25 April 2009							
If applicable, has the reported data been cross-checked with other available data?	The fuel data procured and consumed during current verification period has been checked from fuel purchase receipts /16/ and stock balance prepared on daily basis /17/.								
How were the values in the monitoring report verified?	Fuel receipt Notes /16/								
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The amount of biomass residues entering the plant is measured using duly calibrated electronic weigh bridge and records of the same are maintained. The data is recorded for further verification from the amount of each kind of biomass residues purchased based on invoices / receipts from fuel contractors.								
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable.								

Calibration records and accreditation certificates have been provided for verification team. There was a delay in calibration of electricity export/import meter has been observed (refer CAR 6), the maximum correction factor ($\pm 0.5\%$) has been applied in the emission reduction calculation /2/. As a conservative measure, Project proponent has applied the correction factor for the whole months in the corresponding period.

3.6 Assessment of data and calculation of emission reductions

DNV confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and the assumptions, emission factors and default values that are applied in the calculation have been justified. As stated in the section 1.4, the emission reductions E_{Ry} by the project activity during the monitoring period is the difference between the baseline emission, project emissions or leakage.

$$E_{Ry} = BE_y - PE_y - L_y$$



3.6.1 Baseline emissions

Baseline emissions: Based on weighted average grid emission factor (ex post) of current generation mix of southern regional grid (0.72193 tCO₂/MW) /21/ and net electricity exported (11 678 690 kWh) /6/, the baseline emissions have been verified to be 8 431.197 tCO₂ equivalent for the period 1 October 2007 to 31 July 2008 /2/.

- **Weighted average grid emission factor (ex post) of current generation mix of southern regional grid:** The registered PDD is not clear whether the actual emission reduction during the crediting period will be claimed based on the validated weighted average grid emission factor or ex-post updated weighted average grid emission factor of current generation mix of southern regional grid of India /3/. However DNV has accepted the use of 0.72193 tCO₂/MWh /21/, updated weighted average grid emission factor (ex post) of current generation mix of southern regional grid for year 2006-07 (latest data applicable at the time of verification) as this is conservative than the validated grid emission factor of 0.7659 tCO₂/MWh provided in the registered PDD /3/ (refer CAR 3 as stated in Appendix A of the report) and is the latest available data for the period considered for verification.
- **Net electricity exported by the project activity to the southern grid:** The net electricity exported to the grid (difference between the gross export and import to/from grid) has been monitored continuously by tri-vector bi-directional main meter (with serial number: 01955018) and check meter (with serial number: 01955020) and recorded on shift basis in daily plant performance sheet /6/. Summation of value provided in daily plant performance sheet for the month has been cross checked against the readings provided in monthly joint meter readings records (reading recoded in presence of parties, the project developer's representative and KPTCL officials) /5/ and invoices issued to Mangalore Electricity Supply Company Limited (a distribution wing of Karnataka Power Transmission Corporation Limited) /8/. The main energy meter and check meter used to monitor the electricity exported/imported to/from grid are of class 0.5 S accuracy class /7/. These meters are under control of KPTCL and are tested and calibrated annually as per procedures defined in the power purchase agreement signed with state electricity board /7/. During the current verification period (01 October 2007 to 31 July 2008), it has been verified and confirmed that the project activity has exported (net) 11 678 690 kWh of electricity (after application of correction factor due to delay in calibration) from southern grid of India /2/.

Hence,

$EG_y = EG_{export} - EG_{import} = 11\,678.690 \text{ MWh}$, and

$BE_y = EF_y * EG_y = 8\,431.197 \text{ tCO}_2\text{e}$

3.6.2 Project emissions

Project Emission: As the project activity is designed specifically to fire low density crop residues and there is no provision of supplementary firing or co-firing in the project activity boiler. There are no project emissions associated with the project activity as also stated in registered PDD /3/ and validation report /4/.

3.6.3 Leakage

Leakage due to transportation of biomass residues: Leakage emissions due to transport has been calculated based on the total biomass residues procured /16/, average distance between source of procurement of biomass residues and the power plant/16/, number of trips and vehicle type details maintained in Fuel Receipt Note /16/ and the ex-ante validated emission



factor of diesel at 2.815 tCO₂/ liter of diesel and mileage of each type of vehicle (validated during the first renewable crediting period based on the historic consumption records) /3/. MPPL procured biomass residues through fixed vendors only and information of each vendor like name and registered address is maintained in the computer database available at weigh bridge record room. At weigh bridge room project proponent maintains a Fuel Receipt Note /16/ which contains following:

- Date (used for procurement date details) /16/
- Vehicle No (used to calculate trips) /16/
- Supplier Name (used to calculate distance based on the address information available in computer database) /16/
- Vehicle Type e.g. Lorry, 4 Wheel Trolley, 2 Wheel Trolley, Bullock Cart (used for specific fuel consumption of each type of vehicle) /16/
- Fuel type (e.g. cane trash, coconut fronds, groundnut husk, rice husk, toppings of various types of plantation wood etc.) /16/
- Gross Weight /16/
- Tare Weight (used to calculate biomass procurement) /16/
- Net Weight (used to calculate biomass procurement) /16/
- Moisture % (used to calculate biomass procurement /16/
- Since Malavalli Power Pvt. Ltd. uses its own vehicles for transportation of biomass residues, hence project proponent also maintains diesel purchase receipts and records for allocation of diesel to each vehicle and information regarding same can also be verified from the fuel receipt notes /16/.

Based on the information provided in the Fuel Receipt Notes/16/, project proponent estimate emissions from transport that contributes to leakage from biomass supply to the Plant/2/. Leakage due to transportation of biomass for the current verification period (1 October 2007 to 31 July 2008) has been verified to be 249. 476 tCO₂e equivalent /2/.

3.6.4 Emission reductions

Therefore, the emission reductions in this monitoring period are:

$$ER_y = BE_y - L_y = 8\,431.197 - 249.476 = 8\,181 \text{ tCO}_2\text{e} /2/.$$

The variation in electricity generation, leakage emissions due to transportation of biomass residues, application of correction factor in electricity export and import figures due to delay in calibration and application of weighted average grid emission factor (ex post) of current generation mix of southern regional grid for year 2006-07 has resulted in corresponding reduction of emission reduction achieved by the project activity in comparison to the estimates provided in the registered PDD of 13 February 2006 /3/. The emissions reductions reported in this monitoring period are tonnes of 8 181 tCO₂ equivalents in the period from 01 October 2007 to 31 July 2008 (i.e. 305 days) /2/. The expected emission reductions in the registered PDD are tonnes of 19 039 tCO₂e equivalent, calculated from PDD based on figures provided for year 2007-08 (i.e. 305 days) /3/ and hence the reported emission reductions 8 181 tCO₂e are 57% lower than the expected.

As outlined above, the input data for calculating the emission reductions, the calculating process and the result are complete and transparent. Therefore, DNV is able to confirm the accuracy of the emission reductions.



3.7 Quality of evidence to determine emission reductions

The data presented in the revised monitoring report, version 02 of 07 January 2012 /1/ was assessed by reviewing in detail the project documentation, interviews with personnel at Malavalli Power Plant Pvt. Ltd., collection of monitored data, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. This has enabled the verification team to assess the accuracy and completeness of the reported monitoring results and verify the correct application of the approved monitoring methodology AMS-I.D, version 07 /23/. All necessary documentation is collected, referenced and aggregated and is easily accessible. The emission reductions reported during 1 October 2007 to 31 July 2008 was verified to be 8 181 tCO₂e /2/.

Sufficient evidences were presented for the reported net emission reductions.

3.8 Management system and quality assurance

Malavalli Power Plant Private Limited has established management procedures and implemented effectively to ensure that the process is consistent. The procedures cover management responsibilities, data monitoring procedures, training procedures, periodical internal audits /9/, management reviews and corrective actions in case of any deviations effectively.



4 CERTIFICATION STATEMENT

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions that have been reported for the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” (UNFCCC Registration Reference No. 0298) for the period 01 October 2007 to 31 July 2008.

The project participants are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project.

It is DNV’s responsibility to express an independent verification statement on the reported GHG emission reductions from the project.

DNV conducted the verification on the basis of the monitoring methodology AMS-I.D (version 07), the monitoring plan contained in the registered Project Design Document of 13 February 2006 and the revised monitoring report (Version 02) dated 07 January 2012. The verification included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

DNV’s verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. DNV planned and performed the verification by obtaining evidence and other information and explanations that DNV considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions of the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” (UNFCCC Registration Ref. No. 0298) for the period 01 October 2007 to 31 July 2008 are fairly stated in the revised monitoring report (Version 02) dated 07 January 2012.

The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AMS-I.D (version 07) and the monitoring plan contained in the registered PDD of 13 February 2006.

DNV Climate Change Services AS is able to certify that the emission reductions from the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” during the period 01 October 2007 to 31 July 2008 amount to 8 181 tonnes of CO₂ equivalent.

Bangalore and Oslo, 2012-01-30

Astakala Vidyacharan
CDM Verifier
DNV Bangalore, India

Edwin Aalders
Approver,
DNV Climate Change Services AS



5 REFERENCES

Documents provided by the Project Participants that relate directly to the GHG components of the project. These have been used as direct sources of evidence for the periodic verification conclusions, and are usually further checked through interviews with key personnel.

/1/	MPPL: Monitoring report for “4.5 MW biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” for period 1 October 2007 to 31 July 2008, version 00, version 01 dated 21 August 2009 and final version 02 dated 07 July 2012.
/2/	MPPL: Malavalli emission reduction spreadsheet_1 October 2007 to 31 July 2008.xls version 1 dated 21 August 2009 and final version 02 dated 07 July 2012.
/3/	MPPL: CDM-PDD for “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” dated 13 February 2006.
/4/	DNV: Validation report for the “4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd DNV Report No. 2005-9065, revision 02 dated 24 February 2006.
/5/	MPPL: Monthly joint meter reading records (reading recoded in presence of parties, the project developer’s representative and KPTCL officials) of net energy exported to the grid for the current verification period (1 October 2007 to 31 July 2008).
/6/	MPPL: Daily and monthly plant performance sheet for the current verification period (1 October 2007 to 31 July 2008).
/7/	MPPL: Power purchase agreements signed between KPTCL and MPPL dated 25 September 2000.
/8/	MPPL: Net electricity exported sales invoices raised to Mangalore Electricity Supply Company limited for the current verification period (1 October 2007 to 31 July 2008).
/9/	MPPL: Internal Audit records for the current verification period (1 October 2007 to 31 July 2008).
/10/	KPTCL: Calibration Certificates of main meter and check meter conducted by KPTCL dated 12 February 2008, valid from 12 February 2008 to 11 February 2009 and previous dated 02 January 2007, valid from 02 January 2007 to 01 January 2008.
/11/	Trans Power: Calibration certificates of gross energy meter conducted by Trans Power dated 28 June 2007 and 05 August 2008.
/12/	Certificate from Boiler inspectorate valid from 18 June 2008 to 17 June 2009 & previous period valid from 08 July 2007 till 07 July 2008.
/13/	Weighing bridge calibration record “Controller of Weights and Measures” department of Karnataka, dated: 26 April 2008 and valid from 26 April 2008 till 25 April 2009 & previous period dated 17 April 2007 and valid from 17 April 2007 till 16 April 2008.



/14/	Karnataka State Pollution Control Board: Consent for operation from Karnataka Pollution control board KSPCB/SEO-4/EO/DEO/AEO/0809-256 valid from 1 July 2008 to 30 June 2009 under water and air act. Consent for operation from Karnataka Pollution control board KSPCB/SEO-4/EO/DEO/2007-08/42 valid from 1 July 2007 to 30 June 2008 under water act. Consent for operation from Karnataka Pollution control board KSPCB/APC/SEO/EO/DEO/2007-08/432 valid from 1 July 2007 to 30 June 2008 under Air Act.
/15/	Ganesh Consultancy & Analytical Services: Average calorific value of biomass residues from independent third party (for each type of biomass residue) dated 20 November 2007 & 23 September 2008 on annual basis.
/16/	MPPL: Fuel purchase receipts, biomass residues consumption data sheet and transportation vehicle details for the current verification period (1 October 2007 to 31 July 2008).
/17/	MPPL: Biomass residue stock balance prepared on daily basis for the current verification period (1 October 2007 to 31 July 2008).
/18/	MPPL: Monthly electricity generation reports submitted to district electrical inspectorate for the current verification period (1 October 2007 to 31 July 2008).
/19/	MPPL: Monthly plant operation and maintenance log book for the current verification period (1 October 2007 to 31 July 2008).
/20/	DNV: Previous Verification reports for "4.5 MW Biomass (low density Crop Residues) based power generation unit of Malavalli Power Plant Pvt Ltd."
/21/	CEA CO ₂ Baseline Database for the Indian Power Sector. Version 3, dated 15 December 2007. http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

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

/22/	CDM Executive Board: Validation and Verification Manual. Version 01.2.
/23/	CDM Executive Board: Simplified baseline and monitoring methodology AMS-I.D - Grid connected renewable electricity generation, Version 07.
/24/	CDM Executive Board: Guidelines for assessing compliance with the calibration frequency requirement version 1.
/25/	CDM Executive Board: Executive Board 28 meeting report available at: http://cdm.unfccc.int/EB/028/eb28rep.pdf
/26/	CDM Executive Board: Executive Board 55 meeting report available at: http://cdm.unfccc.int/filestorage/J/T/V/JTV1YA8FCHR4W2GMEOQ53SK60P9DLX/e/b55_rep.pdf?t=YTN8bHh1Y3A1fDCUpD75TcyfztCCyyEpSiK9
/27/	CDM Executive Board: Executive Board 60 meeting report available at: http://cdm.unfccc.int/filestorage/L/5/W/L5WH0IFPOZY2Q9DUKEB6JMR4V3817X/e/b60_report%20%28version%2001.1%29?t=SGR8bHh1Y3ExfDAhDO6qrSqKCV5YrsB56_Qq



/28/	DNV: Request for resubmission of request of issuance for project activity 0298 “4.5 MW biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” for the period from 01 October 2007 to 31 July 2008 dated 21 September 2010.
/29/	CDM Executive Board: I-DEV0417 deviation request approved on 14 July 2011, regarding annual testing of average calorific value of biomass used by independent third party. http://cdm.unfccc.int/Projects/deviations/70361
/30/	DNV: Verification report submitted for “4.5 MW biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.” for period 1 October 2007 to 31 July 2008, Report No. 2009-0210, revision no 02 dated 16 November 2009.
/31/	Indicative simplified baseline & monitoring methodologies for selected small-scale CDM project activity categories EB 41 Annexure- 20.

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APPENDIX A

CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

Corrective action requests from verification stage:

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 1	Project proponent is requested to revise the monitoring report in order to meet the requirement of EB 48 Annexure- 68 (GUIDELINES ON COMPLETENESS CHECK OF REQUESTS FOR ISSUANCE).	The monitoring report has been revised & details regarding monitoring reporting calibration & comparison of actual emission reductions with estimated emission reduction reported in the registered PDD have been now reported in revised MR version 01.	The monitoring report for the project activity has been revised by project proponent details of monitoring, reporting & calibration has been now included in the revised MR. Comparison of actual emission reductions with estimated emission reduction reported in the registered PDD have been now reported in revised MR version 01 Revised MR dated 21 August 2009 has been reviewed by DNV. OK Accepted. CAR 1 is closed.

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 2	It was witnessed during the site visit the NCV of each kind of biomass residues were monitored on annual basis which is not in line with the monitoring plan of the registered PDD, as registered PDD requires this parameter to be monitored on monthly basis by an independent third party.	The NCV of each kind of biomass residues by third party were monitored on annual basis, however this does not have any effect on the CER calculation.	DNV has accepted the monitoring of NCV from independent third party for each kind of biomass residues on annual basis though this is not in line with the monitoring plan of the registered PDD. DNV's conclusion is based on the fact that monitoring plan of the <i>applied baseline & monitoring methodology AMS I.D version 7</i> does not require this parameter to be monitored. In addition to this, considering Executive Board guidance (EB 41 Annexure 20, Para 12 (b) which states that "Data elements that are generally constant and indirectly related to the emission reductions (E.g. Emission factors, Calorific Value, System Efficiencies) should be measured or calculated at least once in a year, unless detailed specifications are provided as part of the indicated methodology" & monitoring of this parameter will not have any effect on the emission reduction calculation. OK Accepted. CAR 2 is closed.

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 3	During the verification it was noted that the project proponent has used weighted average emission factor of the generation mix of southern regional grid of year 2001 provided in the registered PDD. Though it is not clear from the registered PDD that this parameter will be updated ex post or validated values provided in the registered PDD will be used, PP is requested to use the latest value of weighted average emission factor of the current generation mix of southern regional grid available for the verification period as this value is more conservative than the value provided in registered PDD. PP is requested to correct the emission reduction spread sheet & MR accordingly.	The MR & emission reduction sheet has been corrected & now latest data of weighted average emission factor of the current generation mix of southern regional grid available for the verification period has been used for emission reduction.	DNV has verified that the weighted average emission factor of the current generation mix of southern regional grid available for the verification period has been used for emission reduction calculation and has been sourced from Central Electricity Authority (CEA) database of carbon dioxide emission factors from the power sector in India. Revised MR & emission reduction has been reviewed by DNV. OK Accepted CAR 3 is closed.

Corrective action requests from re-submission stage:

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 4	As committed during the resubmission request submitted to UNFCCC, project proponent needs to seek a deviation request to permit use of yearly testing by independent third party for average calorific value of biomass for the verification period from 01 October 2007 to 31 July 2008.	A deviation request was submitted on 10 May 2011 and same got approved on 14 July 2011.	In line with the commitment made in resubmission request submitted to UNFCCC, project proponent sought a deviation from UNFCCC to permit use of yearly testing by independent third party for average calorific value of biomass for the verification period from 01 October 2007 to 31 July 2008. Deviation request was submitted on 10 May 2011 and same got approved on 14 July 2011. http://cdm.unfccc.int/Projects/deviations/70361 OK Accepted CAR 4 is closed.
CAR 5	Project proponent is requested to revise monitoring report for the project activity keeping in mind the requirement of Guidelines for completing the monitoring report (EB 54 Annexure- 34).	The MR has been revised to reflect changes. Revised MR is enclosed.	Necessary changes have been incorporated in the revised monitoring report version 2 dated 07 January 2012. Revised MR has been reviewed by DNV. OK Accepted. CAR 5 Closed.

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 6	As per the power purchase agreement signed for the project, meter for measuring the electricity supplied to the grid needs to be calibrated on yearly basis, however it has been noted that no calibration was conducted for main energy meters (with serial number 01955018) and check energy meters (with serial number 01955020) was missing for the period from 01 January 2008 to 12 February 2008. PP is requested to apply correction factor for the same period in line with in line with that stipulated in the "Guidelines for assessing compliance with the calibration frequency requirement version 1" (Annex-60 of CDM-EB 52).	The emission reduction calculation has been revised a correction factor for the period from 1 January 2008 to 29 February 2008 has been applied now. MR has been revised to reflect these changes. Revised MR and CER sheet is enclosed.	Revised emission reduction sheet and MR version 02 has been reviewed by DNV. The net electricity exported to the grid has been adjusted by decreasing the electricity exported and imported by 0.5% for the period 1 January 2008 to 29 February 2008. The approach followed is conservative as though the calibration was missing only for period from 1 January 2008 to 12 February 2008; the correction factor has been applied for period from 1 January 2008 to 29 February 2008 as the joint meter reading records provides electricity import and export on monthly basis. OK Accepted. CAR 6 Closed.

Clarification requests from verification stage:

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 1	Not Applicable		

Clarification requests from re-submission stage:

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 1	Not Applicable		

Forward action requests from previous verification

FAR ID	Forward action request	Summary of how FAR has been addressed in this reporting period	Assessment of how FAR has been addressed
FAR 1	Not Applicable		

Forward action requests from this verification

FAR ID	Forward action request	Response by Project Participants	DNV's assessment of response by Project Participants
FAR 1	Not Applicable		

APPENDIX B

CURRICULA VITAE OF THE VERIFICATION TEAM MEMBERS

Gaurav Srivastava

CDM Validator/Verifier, DNV Bangalore, India holds a Master's Degree in Energy Systems. His educational qualification covers the fields of sustainable development, power plant technology, renewable energy technology, performance of thermal & electrical utilities and project financing. He has completed ISO 14001:2004 - Environmental Management System Auditor / Lead Auditor Program, certified by IRCA.

He has experience of more than 4 years in validation and verification of numerous CDM projects in DNV, both in India & abroad. His qualification, training and experience in CDM demonstrate his sufficient sectoral competence in energy generation from renewable energy sources.

Astakala Vidyacharan

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

He has received extensive training in the CDM validation and verification process. He is an appointed validator for the CDM validation and verification program of DNV and has performed validation of several CDM projects. He is also a trained auditor for GHG accounting standards and involved audit of Corporate GHG accounting. He is a qualified ISO9001, ISO 14001 Lead auditor and OHSAS 18001 auditor who has performed several audits for various industrial sectors under these management systems.

His qualification, industrial experience and experience in CDM facilitate him to assess renewable energy based on Hydro and Biomass, Energy Efficiency sectors, in particular to sufficient degree.

Kakaraparthi Venkata Raman

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 includes 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.

CERTIFICATE OF COMPETENCE

Anjana Sharma

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJI-i1)

<i>GHG Auditor:</i>	<i>Yes</i>				
<i>Technical Area</i>	<i>CDM Validator</i>	<i>CDM Verifier</i>	<i>Sector Expert</i>	<i>Methodology Expert</i>	<i>Technical Reviewer</i>
<i>Landfill gas</i>				Jan 2009	Jan 2009
<i>Renewables</i>					
<i>Hydro power</i>	Jan 2009				
<i>Wind power</i>				Jan 2009	Jan 2009
<i>Other renewable</i>					
<i>Biomass</i>					
<i>Grid connection of isolated system</i>					
<i>Cement</i>					
<i>Waste-heat / waste-gas recovery</i>					
<i>Efficiency of thermal power plants</i>					
<i>Coal mine methane</i>					
<i>Fuel switch</i>					
<i>Manure management</i>					
<i>Waste / wastewater treatment</i>					
<i>Energy efficiency</i>					
<i>N₂O</i>					
<i>HFCs</i>					
<i>Flare reduction</i>					
<i>PFCs</i>					
<i>Charcoal</i>					
<i>CO₂ recovery</i>					
<i>Transport</i>					
<i>Non-renewable biomass</i>					
<i>Biofuel</i>					
<i>Pipeline leakage reduction</i>					
<i>SF₆</i>					

Høvik, 9 January 2009

Michael Lehmann

Michael Lehmann

Technical Director, Climate Change Services