VERIFICATION / CERTIFICATION REPORT

LDEO BIOMASS STEAM AND POWER PLANT IN MALAYSIA

(UNFCCC Registration Ref. No. 0395)

Verification Period:
1 July 2007 to 31 December 2007

REPORT NO. 2008-0021

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DET NORSKE VERITAS

VERIFICATION / CERTIFICATION REPORT

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Summary:

Det Norske Veritas Certification AS (DNV) has performed the verification of the emission reductions reported for the "LDEO Biomass Steam and Power Plant in Malaysia" project (Registration Ref No. 0395) for the period between 1 July 2007 to 31 December 2007.

In our opinion, the GHG emission reductions reported for the project in the monitoring report version 2 of 31 March 2008 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology AMS-I.C and AMS-III.E for small scale CDM project activities, the revised monitoring plan approved on 17 July 2008 and the registered Project Design Document of 18 April 2006.

Det Norske Veritas Certification AS (DNV) is able to certify that the emission reductions from the "LDEO Biomass Steam and Power Plant in Malaysia" project during the period 1 July 2007 to 31 December 2007 amount to 34 245 tonnes of CO_2 equivalent.

Report No.: 2008-0021	Subject Group: Environment	
Report title: LDEO Biomass Steam and Power Plant in Malaysia		
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Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
ERU	Emission Reduction Units(s)
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
LDEO	Lahad Datu Edible Oil
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
UNFCCC	United Nations Framework Convention for Climate Change
GWP	Global Warming Potential

1 INTRODUCTION

LDEO Energy Sdn. Bhd. has commissioned Det Norske Veritas Certification AS (DNV) to carry out the verification of emission reductions reported for the "LDEO Biomass Steam and Power Plant in Malaysia" project in Lahad Datu, Sabah, Malaysia (the project) for the monitoring period 1 July 2007 to 31 December 2007. This report contains the findings from the verification and a certification statement for the certified emission reductions.

1.1 Objective

Verification is the periodic independent review and *ex-post* determination by the 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 verification period.

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

The objective of this verification is to verify and certify emission reductions reported for the "LDEO Biomass Steam and Power Plant in Malaysia" project for the period 1 July 2007 to 31 December 2007.

1.2 Scope

The verification scope 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 emissions 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 the 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.

The validation team has, based on the recommendations in the Validation and Verification Manual /6/, employed a risk-based approach, focusing on the identification of significant reporting risks and verifying the mitigation measures for these.

1.3 Description of the Project Activity

Project Parties:	Malaysia, Canada and Germany
Title of project activity:	LDEO Biomass Steam and Power Plant in Malaysia
UNFCCC registration No:	0395
Project Entity:	LDEO Energy Sdn Bhd
Location of the project activity:	Lahad Datu, Sabah, Malaysia

The project uses empty fruit bunches (EFB), a waste product of the palm oil milling process, as the fuel for a biomass-fired cogeneration system to supply steam and electricity to the Lahad Datu Edible Oils Sdn. Bhd. (LDEO) palm oil refinery in Sabah, Malaysia.

The project is implemented in two stages. In the first stage, 35 t/h of steam is generated for the palm oil refinery process consumption. This stage is already operational. Due to financial constraints of the project participants, phase 2 is being implemented in two stages. A 1.2 MW steam turbine was commissioned in October 2006 and the implementation of a 5MW steam turbine is currently ongoing.

The project activity aims to reduce emissions in three ways:

i) by displacing fuel oil, which is used to generate 35 t/h of steam,

ii) by displacing fuel oil, from the local grid, and

iii) by reducing methane emissions from the rotting EFB waste piles.

2 METHODOLOGY

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

i) quantity of steam supplied to the plant, electricity consumed by the plant and weight of EFBs combusted;
ii) the applicability of constants used in the calculations and the consistency in the use of these constants.

Verification team

Lai Chee Keong	DNV Malaysia	Team Leader, CDM Validator
Denise Lai Siew Sit	DNV Malaysia	GHG Auditor
Tan Siew Ling	DNV Malaysia	GHG Auditor (Under training)
Ramesh Ramachandran	DNV India	CDM Verifier, Sector Expert
Hendrik Brinks	DNV Norway	Technical reviewer (applicant)
Michael Lehman	DNV Norway	Technical reviewer

Duration of verification

Preparations: 10 January 2008- 13 January 2008

On-site verification: 15 January 2008

Reporting/QA: 18 January 2008 – 10 July 2008

The verification process was guided by a verification checklist developed for this project, which ensures a transparent verification process, and at the same time documents how emission reductions have been verified and how the verification findings have been reached. The verification checklist is included in Appendix A.

2.1 Review of Documentation

Key documents assessed during the verification include:

i) Monitoring Report for the period 1 July 2007 to 31 December 2007, version 1 dated 4 January 2008 and version 2 dated 31 March 2008,
ii) The registered Project Design Document (PDD), dated 18 April 2006,
iii) The revised monitoring plan approved on 17 June 2008
iv) DNV's Validation Report, dated 26 April 2006, and
v) DNV's Verification/Certification Report version 01 dated 26 June 2007 and version 02 dated 21 December 2007.

The monitoring report of 4 January 2008 has been made publicly available on the CDM website in 08 January 2008.

During the on-site audit, the documents reviewed included weighing tickets, daily production reports (includes fuel use, utilities consumption, steam production), biomass boiler log sheets, daily biomass fuel receiving log book, steam turbine log sheets and daily electricity meter readings. A list of key documents is given in the reference section of this report.

2.2 Site Visits

On 15 January 2008, DNV conducted an on-site audit at the "LDEO Biomass Steam and Power Plant in Malaysia". During this site visit, DNV verified that the actual implementation of the project was as described in the monitoring report. This included confirming the operational stages of the project with physical and documented evidence.

Figures quoted in the monitoring report were cross-checked by reviewing operation records. The persons interviewed during the audit are listed in the reference section of this report.

2.3 Assessment

Verification was conducted through the following means:

- Review of the project documentation, specifically the monitoring report for the period 1 July 2007 to 31 December 2007, the registered PDD dated 18 April 2006 and the revised monitoring plan approved on 17 June 2008.
- Verification of compliance of actual monitoring with the monitoring plan included in the PDD.
- On-site inspection included review of performance records, interviews with assistant plant manager, operations and maintenance personnel, confirming all data sources and constants used in the Monitoring Report.
- Determination of the accuracy of the GHG emissions reduction calculations.

Details of all findings are recorded in the verification protocol in Appendix A to this report.

2.4 Reporting of Findings

During the site visit, the calibration records of the steam flow meter were not available and this was raised as a verification finding with regard to the accuracy of readings of steam generated between the 14 December and the 31 December 2007. This issue was closed on 29 January 2008 when the supplier confirmed that no calibration is required and only recommended that onsite calibration is to be conducted every two years after operation. The date of installation is on the 14 December 2006 and LDEO has recently just conducted an onsite calibration on 29 January

2008. No inconsistencies were found during the verification. The formal report was submitted to DNV on the 30 January 2008.

Monitoring reports (version 01 dated 4 January 2008 and version 02 dated 31 March 2008) were reviewed and found to be accurate. The revision of the monitoring plan was due to the request for review at EB38 with regard to a previous issuance request for the project where the Board requested that the inclusion of monitoring of the amount of each type of biomass consumed in the boiler. The use of other biomasses than EFB, i.e. Palm Kernel Shells and Mesocarp Fibres are being monitored and was included in the monitoring plan.

3 VERIFICATION FINDINGS

3.1 Remaining Issues, CARs, FARs from Previous Validation or Verification

The project does not have any outstanding issues. All outstanding issues from the previous verification have been resolved.

3.2 Project Implementation

The project is implemented in two stages. The first stage involves the installation of a biomass boiler which supplies the adjacent palm oil refinery with up to 35 t/hr of steam. This stage was completed on 1 June 2006 and the boiler is operating in good condition.

The second stage involves the installation of a 5 MW steam turbine, which will supply electricity to the biomass plant and the refinery. However, due to financial constraints of the project participants, phase 2 is being implemented in two stages. A 1.2 MW steam turbine was commissioned in October 2006 and the implementation of a 5MW steam turbine is currently ongoing.

3.3 Completeness of Monitoring

The revised monitoring plan dated 17 June 2008 requires the monitoring of the following data:

i) thermal energy (steam) supplied to the refinery,
ii) electrical energy supplied to the refinery,
iii) electrical energy consumed by the biomass plant,
iv) biomass consumed by the steam boiler, and
v) energy content of biomass.

This was found to be done accordingly and detailed in item B.1 of the verification checklist in appendix A to this report.

The electrical energy supplied to the refinery by the biomass plant is monitored as the 1.2 MW steam turbine is already operational.

3.4 Accuracy of Emission Reduction Calculations

Consistencies in the emissions reduction calculations were determined between derivation of project and baseline emissions figures, as detailed in item B.2 of the verification checklist. No inconsistencies were found.

The documentation checked included weighing tickets, daily production reports (includes fuel use, utilities consumption, steam production), biomass boiler log sheets, daily biomass fuel receiving log books, steam turbine log sheets and daily electricity meter readings. These data are manually transferred into a master excel spreadsheet that links input data such as incoming biomass and electricity consumed by the biomass plant to emissions reductions calculations.

No inconsistencies were observed.

These individual data inputs were checked and were also found to be consistent, matching production figures with records of downtimes. See item B.1 of verification checklist for an elaboration on this.

3.5 Quality of Evidence to Determine Emission Reductions

Emissions reductions are calculated by adding the amount of steam generated by the biomass boiler, grid electricity displacement from electricity supplied by the steam turbine to the refinery and methane emissions avoided by the project activity and subtracting project emissions due to electricity consumption by the biomass boiler plant and CH_4 and N_2O emissions from the combustion of biomass in the boiler.

During the site visit, the verification team has reviewed records on purchases of biomass, invoices on steam and electricity supplied, biomass boiler logsheets, boiler downtime reports and calibration & maintenance records. The electricity meter calibration records were made available for inspection. The team visited the control room to confirm the equipment serial numbers and reading for the day. These were further cross-checked with the calibration certificates that were available at that point of time.

There was no supply of electricity from October to December 2007 as the demand was low during this period. No inconsistencies were observed in the data input.

3.6 Management System and Quality Assurance

Monitoring and reporting of GHG parameters is part of daily operations and the daily roles and responsibilities of individual personnel. All biomass boiler related personnel are experienced and have received adequate training during the installation of the plant. Records of such training are maintained as a good practice and also in line with ISO 9001:2000, which the organization intends to subscribe to. Discussions with suppliers are also on-going as visits by suppliers are frequent to discuss and trouble-shooting with key personnel running boiler. See item A.3 of the verification checklist in appendix A this report.

Data integrity is checked internally by LDEO Energy Sdn Bhd staff. This is detailed in items C.1, C.3 and C.4 of the verification checklist in appendix A to this report.

4 PROJECT SCORECARD

Risk Areas		Conclusions			Summary of findings and comments	Error/Discounted Uncertainty
		Baseline Emissions	Project Emissions	Calculated Emission Reductions		
Completeness	• Source coverage/ boundary definition	Good	Good	Good	The source coverage was complete as per the registered PDD and validation report. Phase 2 of the project has yet to be implemented.	No error was found
Accuracy	• Physical Measurement and Analysis	Good	Good	Good	The physical measurement / recording of data was found to be accurate.	No error was found
	• Data calculations	Good	Good	Good	Formulae and calculation of CERs and relevant data were found to be accurate.	No error was found
	• Data management & reporting	Good	Good	Good	The relevant GHG data was achieved and readily retrievable.	No error was found
Consistency	• Changes in the project	Good	Good	Good	No changes in the project.	No error was found

5 CERTIFICATION STATEMENT

Det Norske Veritas Certification AS (DNV) has performed a verification of the emission reductions reported for the "LDEO Biomass Steam and Power Plant in Malaysia" project (UNFCCC Registration Reference No. 0395) for the period 1 July 2007 to 31 December 2007.

The project participants are responsible for the collection of data in accordance with the monitoring plan contained in the registered PDD 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 in the monitoring report version 2 dated 31 March 2008.

DNV conducted the verification on the basis of the monitoring methodology AMS-I.C (version 07) and AMS-III.E (version 07), the monitoring plan included in the registered PDD dated 18 April 2006, the revised monitoring plan approved on 17 June 2008 and the monitoring report version 2 dated 31 March 2008. The verification included:

i) checking whether the provisions of the monitoring methodology and the monitoring plan in the PDD 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.

The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AMS-I.C (version 07) and AMS-III.E (version 07) and the monitoring plan and formulae provided in the validated PDD of 18 April 2006 and the revised monitoring plan approved on 17 June 2008. The emission reductions reported from the "LDEO Biomass Steam and Power Plant in Malaysia" project for the period 1 July 2007 to 31 December 2007 are fairly stated.

Det Norske Veritas Certification AS (DNV) is able to certify that the emission reductions from the "LDEO Biomass Steam and Power Plant in Malaysia" project during the period 1 July 2007 to 31 December 2007amount to 34 245 tonnes of CO_2 equivalent.

Kuala Lumpur and Oslo, 15 August 2008

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APPENDIX A

VERIFICATION CHECKLIST

Table 1: Data Management System/Controls

The project operator's data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the table. A score is assigned as follows:

- Full - all best-practice expectations are implemented.
- Partial - a proportion of the best practice expectations is implemented
- Limited - this should be given if little or none of the system component is in place.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
A. Defined organisational structure, responsibilities and competencies		
A.1. Position and roles *Position and role of each person in the GHG data management process is clearly defined and implemented, from raw data generation to submission of the final data. Accountability of senior management must also be demonstrated.*	F	Organization chart of LDEO Energy Sdn Bhd was made available. Job Description for personnel demonstrated that key personnel have been assigned clear responsibility in recording, reviewing, monitoring and verification of data collected. Key personnel include Plant Engineer who is responsible in checking and confirming production report, overall incharge of the Energy Plant operation and preparing CDM monitoring report. Plant Engineer also prepares production report and maintenance/ downtime report, verifying all daily reports generated and ensuring instruments are in good order. Boilerman controls and maintains required daily steam pressure, recording of utilities into the 'Biomass Boiler Log Sheet'. Electrical Chargeman ensures daily electricity usage is recorded correctly and ensuring. Senior Operation Executive take charge of the receiving of biomass and verifying and confirming the daily biomass receiving report. Weighbridge operator checks incoming biomass carrying lorry weights to the biomass boiler site and printing of weighing tickets for outgoing lorries. Data is still being recorded manually and keyed into the daily spreadsheets manually. Backup is made on computer and data burned into disks.
A.2. Responsibilities *Specific monitoring and reporting tasks and responsibilities are included in job descriptions or special instructions for employees.*	F	The LDEO Energy Sdn. Bhd. has incorporated the job description for standard as well as GHG related roles and responsibilities. Job Descriptions made available "LDEO Energy Sdn Bhd Management Responsibility" which includes responsibility and authority of key personnel.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
A.3. *Competencies needed* *Competencies needed for each aspect of the GHG determination process are analysed. Personnel competencies are assessed and training programme implemented as required.*	F	On going training is mainly on the maintenance of the boiler and this is evidenced by training records maintained. Fire-fighting course were introduced to the personnel.
B. Conformance with monitoring plan		
B.1. Reporting procedures *Reporting procedures should reflect the monitoring plan content. Where deviations from the monitoring plan occur, the impact of this on the data is estimated and the reasons justified.*	F	Monitoring plan requires monitoring of the following: a. thermal energy (steam) supplied to the refinery (TJ), b. electrical energy supplied to the refinery (kWh), c. electrical consumed by the biomass plant (kWh), d. biomass consumed by the steam boiler (tonnes), and e. energy content of biomass (TJ/t). These were all found to be monitored according to the revised monitoring plan approved on 17 June 2008. The monitoring plan has included other type of biomass besides EFB namely Palm Kernel Shell and Mesocarp Fibres during this period. It needs to be noted that monitoring of the amount of the biomasses have been captured in the excel spreadsheet throughout the verification period. The changes were merely in the monitoring plan in the Monitoring Report. This is found to be inline with the EB 38 requirement.
B.2. Necessary Changes *Necessary changes to the monitoring plan are identified and changes are integrated in local procedures as necessary.*	F	Emergency Response Plan and Standard Operating Procedures (SOP) to handle potential emergency situation has been established. SOP mainly covering on the water level in the biomass boiler. This is an improvement since the last verification. 3 fire wardens have been appointed covering the 3 shifts operating pattern. The large number of palm oil mills (110) within Lahad Datu does not pose a risk of shortage of biomass.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
C. Application of GHG determination methods		
C.1. Methods used *There are documented description of the methods used to determine GHG emissions and justification for the chosen methods. If applicable, procedures for capturing emissions from non-routine or exceptional events are in place and implemented.*	F	In the tabulation of GHG data, job descriptions give job title which also specifies forms used for carrying out the responsibility. These includes Energy plant production report, Biomass delivery production, weight tickets, daily weighing summarised reports, weighing tickets. These documentation are sufficient to meet the needs of the monitoring plan. All key monitoring data is then transferred from individual logsheets to an excel spreadsheet, done manually. For the month of October 2007 to December 2007, no electricity was displaced and these were captured accordingly. During this period, LDEO is drawing electricity from grid, SESB and also fossil fuel boiler in the case where electricity from grid is not available and captured as project emission in the spreadsheet. This was not due to the breakdown of the boiler but instead due to demand required. No inconsistency detected.
C.2. Information/process flow *An information/process flow diagram, describing the entire process from raw data to reported totals is developed.*	F	Process Flow Diagram for Biomass Fired Steam Generating Plant was available. The spreadsheet submitted shows information that links incoming biomass quantities to the electricity generation and subsequent GHG emission reduction calculations. No inconsistency was detected during the verification sampling exercise.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
C.3. Data transfer *Where data is transferred between or within systems/spreadsheets, the method of transfer (automatic/manual) is highlighted - automatic links/updates are implemented where possible. All assumptions and the references to original data sources are documented.*	F	Raw data from daily production reports, reports of biomass, electricity, steam are manually recorded. These are transferred into an excel spreadsheet manually for the whole month. Currently, LDEO has not implemented direct automatic transfer for primary data into spreadsheet. File is however kept by Plant Engineer in computer hard disk. File is checked by the Plant Manager before it is sent to others, available as 'read only'. Samples for thermal energy, electricity generated (only 3rd quarter i.e. July – September 2007) and electricity consumed were sampled, inconsistencies were not found. Sampling of data were done for the following dates: a. October 10th and 20th b. November 10th and 20th c. December 10th and 20th Electricity generated and invoiced: a. July to September 2007 Thermal Energy (Steam) generated and invoiced: a. July to December 2007 No inconsistency were detected during the site visit.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
C.4. Data trails *Requirements for documented data trails are defined and implemented and all documentation are physically available.*	F	Yes, the organisation has clearly demonstrated that documentation have been clearly defined, tabulated and were available during verification. The master excel spreadsheet for emission reduction calculation ensures tracking of formulae used as well as cross-checks e.g. on quantity of biomass fed against daily biomass supply invoices. Biomass quantity supplied by suppliers was verified. As agreed in earlier verification, the slight difference in the weights recorded by suppliers and LDEO is due to the moisture content of biomass which is acceptable. The weight differences have been rectified by taking the lower reading of the two in the emission reduction calculation purpose. Calibration record of weighing bridge has been inspected, and calibration validating period is valid until 16 June 2008 and 26 March 2008 for the 60,000 kg and 50,000 kg weigh bridges. A new weighbridge of 60,000 has been installed and this will be used for weighing the incoming biomass. Calibration was done on the 14 June 2007 and have the validity till 13 June 2008. Serial No. 043940267. Samples checked from biomass suppliers: a. Seberang Mill for supply of 22nd November & October, 18th October and 20th July, b. QL Plantation 2 (Ton Len 2) for supply of 6th November, 15th September, 20th August and 19th July, c. Tung Hup for 21st December, 12th November and 20th October, d. Trushidup for 21st December, e. Pinangah for 11th December, 22nd November, 19 September and 21st July.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
D. Identification and maintenance of key process parameters		
D.1. Identification of key parameters *The key physical process parameters that are critical for the determination of GHG emissions (e.g. meters, sampling methods) are identified.*	F	In the absence of a formal boiler test report, it was confirmed based on name-plate information for the Biomass Boiler the following information: Design Pressure : 29.0 Barg Max Working Pressure: 25.0 Barg Rated Capacity: 35,000 kg/hr. This is consistent with previous information, as well as figures used in steam enthalpy calculation in the Monitoring Report.
D.2. Calibration/maintenance *Appropriate calibration/maintenance requirements are determined.*	P	Calibration records were verified for the three weighbridges (50,000 kg and two 60,000 kg) used for biomass. It was confirmed by the Plant Engineer that in future only the new 60,000kg weighbridge located next to the biomass plant will be used for the biomass. The electricity meter calibration records were made available for inspection. No calibration was carried for the steam flow meter since 14 December 2006. However, the supplier has made a six monthly visit to the plant for the inspection of all the equipment installed in the facility. In addition, the supplier has confirmed that no calibration is required but onsite verification recommended after two years of operation or earlier if necessary. It is confirmed that it is still within the 2 years period and LDEO has recently conducted the verification on the 28 January 2008 and it shows an accurate result. Formal report will be issued in February 2008.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
E. GHG Calculations		
E.1. Use of estimates and default data *Where estimates or default data are used, these are validated and periodically evaluated to ensure their ongoing appropriateness and accuracy, particularly following changes to circumstances, equipment etc. The validation and periodic evaluation of this is documented.*	F	There are no changes in default data used as stated in Monitoring Report.
E.2. Guidance on checks and reviews *Guidance is provided on when, where and how checks and reviews are to be carried out, and what evidence needs to be documented. This includes spot checks by a second person not performing the calculations over manual data transfers, changes in assumptions and the overall reliability of the calculation processes.*	F	Checks are done by the key LDEO Energy personnel, Plant Engineer and Assistant Accounts Manager on all primary data generated. It is the Plant Manager who will do the second internal check on the data.
E.3. Internal verification *Internal verifications include the GHG data management systems, to ensure consistent application of calculation methods.*	F	As in E.2., LDEO Energy Plant Manager checks primary data records. He will also check relevant CER data is recorded and maintained to meet requirements of the monitoring plan.
E.4. Internal validation *Data reported from internal departments should be validated visibly (by signature or electronically) by an employee who is able to assess the accuracy and completeness of the data. Supporting information on the data limitations, problems should also be included in the data trail.*	F	In addition to checks by the LDEO Energy Plant Engineer on LDEO Energy primary data records, all invoices generated by LDEO Energy to LDEO are also cross-checked against related primary data (e.g. quantity of biomass purchased, electricity consumption, steam generation claimed) by the Assistant Accounts Manager.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
E.5. Data protection measures *Data protection measures for databases/spreadsheets should be in place (access restrictions and editor rights).*	F	Files are kept in server as well as the hard disk of the LDEO Energy personnel. Data are burnt into CD on monthly basis to ensure no data loss. Backup server is in place, close to the main server. However, GHG related data is sourced mainly away from the biomass plant control room, no risk seen at present to emissions reductions related data. Master excel spreadsheet when sent for information is password protected and locked to prevent accidental changes to formulas.
E.6. IT systems *IT systems used for GHG monitoring and reporting should be tested and documented.*	F	SCADA system is calibrated and operated according to supplier instructions. Any breakdowns will require supplier presence for repairs.

Table 2: GHG calculation procedures and management control testing

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
Identify and list potential reporting risks based on an assessment of the emission estimation procedures	*Identify and key controls for each area with potential reporting risks. Assess the adequacy of the key controls and eventually test that the key controls are actually in operation.*	*Identify areas of residual risks, i.e. areas of potential reporting risks where there are no adequate management controls to mitigate potential reporting risks. Areas where data accuracy, completeness and consistency could be improved should be highlighted.*
D.2 Calibration records.	Calibration records and requirement of the steam flow meter were not obtained.	It was found that no calibration was carried out for the steam flow meters since 14 December 2006. The supplier normally made a six monthly visit to the plant for the inspection of all the equipment installed in the facility. Hence, further clarification were requested. A response was submitted after the site visit by LDEO and the supplier confirmed that no calibration is required but onsite verification is recommended after two years of operation or earlier if necessary. It is confirmed that it is still within the 2 years period and LDEO has recently conducted the onsite calibration on 28 January 2008 and this calibration confirmed that the steam flow meter is measuring accurately. The formal report of the calibration was issued on 30 January 2008.

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