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Verification Report

Periodic Verification of the Registered CDM Project
BAGASSE BASED COGENERATION PROJECT AT
PUDUKOTTAI, TAMIL NADU, INDIA

UNFCCC 1139-CDMP

Monitoring period # 1: 14-09-2007 to 30-09-2008

Report No.1278762

18 AUGUST 2011

TÜV SÜD Industrie Service GmbH
Carbon Management Service
Westendstrasse 199 - 80686 Munich - GERMANY

FIRST PERIODIC VERIFICATION

“Bagasse based Cogeneration Project at Pudukottai, Tamil Nadu, India”



Industrie Service

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Report No.	Date of first issue	Revision No.	Date of this revision	Certificate No.
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Subject: First Periodic Verification of CDM Project	
Accredited TÜV SÜD Unit: TÜV SÜD Industrie Service GmbH Certification Body “climate and energy” Westendstr. 199 80686 Munich Germany	TÜV SÜD Contract Partner: TÜV SÜD Industrie Service GmbH Carbon Management Service Westendstr. 199 80686 Munich Germany
Project Participant (Client): EID Parry (India) Limited DARE House, 234, NSC Bose Road, Chennai 600001 India	Project Site / GPS Coordinates: Kurumbur Village, Pudukkottai district, Tamil Nadu, India Latitude: 10.250 ⁰ Longitude: 78.086 ⁰
Registration Number / Project Title:	Project : 1139: “Bagasse based Cogeneration Project at Pudukottai, Tamil Nadu, India”, Version 04 dated 02-07-2007
Applied Methodology / Version:	ACM0006 version 04- Consolidated methodology for grid-connected electricity generation from biomass residues
Scope(s): 1	Technical Area: 1.1
Revised Monitoring Plan: 10-06-2010 (UNFCCC Approved: 29 June 2010)	
Monitoring Period : 14-09-2007 - 30-09-2008	
Emission Reductions: 65,490 tCO ₂ e	
First MR version: Date of issuance: 08-01-2009 Version No: 01 Documents Published on: 16-01-2009	Final MR version: Date of issuance: 25-03-2011 Version No: 2.7
Project documentation link : http://cdm.unfccc.int/Projects/DB/SGS-UKL1179758404.75/view	



Summary:

TÜV SÜD Industrie Service GmbH has performed the first periodic verification of the registered CDM project: "Bagasse based Cogeneration Project at Pudukottai, Tamil Nadu, India". The project involves in of increasing the efficiency of electricity generation by substituting the existing low efficiency cogeneration system with a high efficiency cogeneration system with high pressure 100 tonnes per hour boiler and a 18.0 MW extraction cum condensing turbo generator at EID Parry Sugar complex near Pudukottai of Tamil Nadu, India. The power generated would meet the captive electricity requirements of the sugar factory and extraction the incremental electricity is exported to the TNEB grid. The plant utilizes bagasse, a renewable biomass that is produced from the milling of sugarcane and part of the electricity generated is supplied to the grid thus reducing emissions.

The management of EID Parry (India) Limited is responsible for the preparation of the GHG emissions data and the reported GHG emission reductions.

A document review, followed by a site visit was conducted to verify the information submitted by the project participant regarding the present verification period. Based on the assessment carried out, the verifier confirms that:

- the project has been implemented and operated in accordance with the description given in the registered PDD (version 04, 02-07-2007, registration date 14-09-2007).
- the emission reductions presented in the current monitoring report deviate significantly (24% reduction) from the emission reductions as indicated in the registered PDD. This is due to the project emissions from combustion of fossil fuel in the plant which have not been accounted for in the registered PDD. A total of 59 days plant shutdown also contributed to the reduction in the emission reductions to that of the registered PDD.
- a request for deviation regarding the monitoring of net quantity of electricity generated in the project plant (EG_{project plant,y}) for the current monitoring period has been submitted to the CDM-EB on 10th September 2009 for this deviation in the monitoring plan (<http://cdm.unfccc.int/UserManagement/FileStorage/RRGIEHYBLNTP5377OE6BJ1JUL30HZM>). The EB has accepted this deviation for the current monitoring period on 16th October 2009.
- a request for revision of the monitoring plan was also submitted to EB for incorporating the approved monitoring procedure for EG_{project plant,y} and other parameters which are not as per the methodology in the registered PDD. The CDM-EB has approved the revision in the monitoring plan on 29th June 2010.
- the revised monitoring plan complies with the applied methodology (ACM0006 version 04- Consolidated methodology for grid-connected electricity generation from biomass residues) and the monitoring has been carried out as exactly following the Monitoring Plan.

Installed equipments essential for generating emission reductions run reliably and the meters are calibrated appropriately. The project is generating emission reductions as a CDM project.

The verifier can confirm that the GHG emission reductions are calculated without material misstatements. Our opinion refers to the project's GHG emissions and resulting GHG emission reductions reported, both determined due to the valid and registered project's baseline, its monitoring plan and its associated documents.

Based on the information we have seen and evaluated we confirm that the implementation of the project resulted in 65,490 t CO₂e of emission reductions during the verification period 14-09-2007 to 30-09-2008.

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Further Assessment Team Members:

Bratin Roy, Eswar Murty, Konrad Tausche

Technical reviewers:

Thomas Kleiser

Certification Body responsible:

Thomas Kleiser



Abbreviations

ACM	Approved Consolidated Methodology
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM-EB	CDM Executive Board
CER	Certified Emission Reduction
CM	Combined Margin
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CO₂e	Carbon dioxide equivalent
CR / CL	Clarification Request
DNA	Designated National Authority
DOE	Designated Operational Entity
EF	Emission Factor
EIA / EA	Environmental Impact Assessment / Environmental Assessment
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRL	Information Reference List
KP	Kyoto Protocol
MP	Monitoring Plan
MR	Monitoring Report
NGO	Non-Governmental Organisation
OM	Operational Margin
PDD	Project Design Document
PP	Project Participant
TÜV SÜD	TÜV SÜD Industrie Service GmbH
TNEB	Tamil Nadu Electricity Board
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual

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1 INTRODUCTION

1.1 Objective

EID Parry (India) Limited has commissioned an independent verification by TÜV SÜD Industrie Service GmbH (TÜV SÜD) of its registered CDM project:

“Bagasse based Cogeneration Project at Pudukottai, Tamil Nadu, India”

The objective of the verification work is to comply with the requirements of paragraph 62 of the CDM Modalities and Procedures. According to this assessment TÜV SÜD shall:

- Ensure that the project activity has been implemented and operated as per the registered PDD “Bagasse based Cogeneration Project at Pudukottai, Tamil Nadu, India” Version 04, dated 02-07-2007, and that all physical features (technology, project equipment, monitoring and metering equipment) of the project are in place,
- Ensure that the published MR and other supporting documents provided are complete and verifiable and in accordance with applicable CDM requirements,
- Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology,
- Evaluate the data recorded and stored as per the “Consolidated methodology for grid-connected electricity generation from biomass residues”, ACM0006 version 04.

1.2 Scope

The verification scope is defined as an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the Designated Operational Entity. The verification is based on the submitted monitoring report, the validated project design document (PDD) including its monitoring plan and validation report, the applied monitoring methodology, the revised monitoring plan, relevant decisions, clarifications and guidance from the CMP and the EB and any other information and references relevant to the project activity’s resulting emission reductions. These documents are reviewed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance.

TÜV SÜD has, based on the requirements in the validation and verification manual (VVM) applied a rule-based approach. The principles of accuracy and completeness, relevance, reliability and credibility were combined with a conservative approach to establish a traceable and transparent verification opinion.

The verification considers both quantitative and qualitative information on emission reductions.

The verification is not meant to provide any consultancy towards the client. However, stated requests for clarifications, corrective and/or forward actions may provide input for improvement of the monitoring activities.

1.3 GHG Project Description

Project activity:	Bagasse based Cogeneration Project at Pudukottai, Tamil Nadu, India
UNFCCC number:	1139
Project Participants:	EID Parry (India) Limited
Location of the project:	Kurumbur village, Pudukottai District, Tamil Nadu, India.
GPS Coordinates:	Latitude 10.250 ⁰ Longitude 78.086 ⁰
Date of registration:	14-09-2007
Crediting period:	14-09-2007 to 13-09-2017 (Fixed)



The purpose of the project is increasing the efficiency of electricity generation by substituting the existing low efficiency cogeneration system with a high efficiency cogeneration system. .

Prior to the project activity, there were two boilers on site, one of which has a capacity of 51.5 tonnes per hour and operate at 17 kg/cm^2 and 280°C and the other one has a capacity of 29 tonnes per hour and operates at 17 kg/cm^2 and 280°C . There were two turbo generators of 2 MW and 2.5 MW to meet the process steam and electricity requirement of the sugar plant. All the pre project boilers and turbo generators do not operate in the project activity.

In the project activity, a high pressure/temperature boiler manufactured by ISGEC Thomson was installed with a capacity of 100 tonnes per hour. The outlet pressure and temperature of the boiler are 86 kg/cm^2 and 510°C respectively. An 18 MW extraction cum condensing turbine was also installed. The turbine was supplied by BHEL [10, 11]. The incremental electricity generated is supplied to the TNEB grid. The PP has signed a Power Purchase Agreement with TNEB on 29th March 2005 [8].

2 METHODOLOGY

2.1 Verification Process

The verification process is based on the approach depicted in the VVM version 1.2.

Standard auditing techniques have been adopted. The verification team performs first a desk review, followed by an on-site visit which results in a protocol including all the findings. The next step is to close out the findings through direct communication with the PPs and finally prepare the verification report. This verification report and other supporting documents then undergo an internal quality control by the CB “climate and energy” before submission to the CDM-EB.

2.2 Verification Team

The appointment of the team takes into account the coverage of the technical area(s), sectoral scope(s) and relevant host country experience for verifying the ER achieved by the project activity in the relevant monitoring period for this verification.

The CB TÜV SÜD operates the following qualification levels for team members that are assigned by formal appointment rules:

- Ø Assessment Team Leader (ATL);
- Ø Verifier (V);
- Ø Verifier Trainee (T);
- Ø Technical Experts (TE).

The verification team was consisting of the following members:

Name	Qualification	Coverage of scope	Coverage of technical area	Host country experience
Nikunj Agarwal	ATL	p	-	p
Bratin Roy	Verifier	p	-	p
Eswar Murty	Verifier	p	--	p
Konrad Tausche	Verifier	p	p	p

Technical Reviewer: Thomas Kleiser

2.3 Review of Documents

The Published MR Version 01 submitted by the PP was made publicly available on the UNFCCC website before the verification activities started. The published MR was assessed based on all the relevant documents as listed earlier. The aim of the assessment in the desk review was to accomplish the following:

- Verify the completeness of the data and the information presented in the MR.
- Check the compliance check of the MR with respect to the monitoring plan depicted in the registered PDD and verify that the applied methodology was carried out. Particular attention to the frequency of measurements, the quality of the metering equipment including calibration requirements, and the quality assurance and quality control procedures was paid.
- Evaluate the data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

A complete list of all documents reviewed is available in Annex 2 of this report.



2.4 On-site Assessment and follow-up Interviews

During 29th & 30th January 2009, TÜV SÜD performed a physical site inspection and on-site interviews with project stakeholders to:

- Confirm the implementation and operation of the project,
- Review the data flow for generating, aggregating and reporting the monitoring parameters,
- Confirm the correct implementation of procedures for operations and data collection,
- Cross-check the information provided in the MR documentation with other sources (raw data),
- Check the monitoring equipments against the requirements of the PDD and the approved methodology, including calibrations, maintenance, etc.,
- Review the calculations and assumptions used to obtain the GHG data and ER,
- Identify if the quality control and quality assurance procedures are in place to prevent or correct errors or omissions in the reported parameters.

A list of the persons interviewed during this verification activity is included in Annex 2.

2.5 Quality of Evidence to Determine Emission Reductions

Among many others the following relevant and reliable evidences have been used by the audit team during the verification process:

- On-site interviews and the Digital Control System [1].
- Commissioning certificate of the plant [7].
- Daily and monthly reports of electricity generation from project activity, Joint Meter Readings and Invoices raised to TNEB [26, 27, 28, 37].
- Bagasse and other biomass fuels and fossil fuel consumption in the plant [39, 41].
- Calibration Certificates of energy meters [19, 20, 21, 22, 23].
- Calibration Certificates of Online Weighing Scale and Weighbridge [24, 25].
- Calibration Certificates of Steam and feed water flow meters, Temperature and pressure equipment [45, 46, 47, 48, 49].
- NCV & Moisture content analysis test Certificates for Bagasse and other fuels [29, 30, 31, 32]
- Quality Assurance/ Quality Control documents such as training records, internal audit reports and monitoring responsibilities [34, 35]
- Quantity of bagasse fired in the project plant and annual energy balance based on stock taking data.[39, 42]
- Compliance check with regional/national requirements concerning safety and environment [9]
- Number of days of plant operation during monitored period [33].
- Line diagram of energy meters [43].

Sufficient evidence covering the full verification period in the required frequency is available to validate the figures stated in the final MR. The source of the evidences will be discussed in chapter 3 of this report. Specific cross-checks have been done in cases that further sources were available. All figures in the monitoring report were cross-checked by the audit team against the raw data. The data collection system meets the requirements of the monitoring plan as per the methodology.



2.6 Resolution of Clarification and Corrective and Forward Action Requests

The objective of this phase of the verification process was to resolve any outstanding issues which needed to be clarified for TÜV SÜD's positive conclusion on the GHG emission reduction calculation. The findings raised as Forward Action Requests (FARs) (if any) indicated in previous reports (validation/verification) were clarified during communications between the PP and TÜV SÜD.

To guarantee the transparency of the verification process, the concerns raised, based on the desk review and subsequent on-site audit assessment and follow up interviews, together with the responses given are documented in Annex 1 (verification protocol).

A Corrective Action Request is raised where TÜV SÜD identifies:

- non-conformities in monitoring and/or reporting with the monitoring plan and/or methodology;
- that the evidence provided is not sufficient to prove conformity;
- mistakes in assumptions, data or calculations that impair the ER;
- FARs stated during validation that are not solved until the on-site visit.

A Clarification Request is raised where TÜV SÜD does not have enough information or the information is not clear in order to confirm a statement or data.

A Forward Action Request is raised where TÜV SÜD identifies that monitoring and/or reporting required special attention or adjustments for the next verification period.

Information or clarifications provided as response to a CAR, CL or FAR could also lead to a new CAR.

2.7 Internal Quality Control

As an ultimate step of verification the final documentation including the verification report and the protocol have to undergo an internal quality control by the Certification Body (CB) “climate and energy”, i.e. each report has to be finally approved either by the Head of the CB or the Deputy. In case one of these two persons is part of the assessment team the approval can only be given by the other one. If the documents have been satisfactorily approved, the Request for Issuance is submitted to the CDM-EB along with the relevant documents.



3 VERIFICATION RESULTS

In the following sections the results of the verification are stated. The verification results relate to the project performance as documented and described in the final Monitoring Report (25-03-2011, version 2.7) and the revised monitoring plan (dated 10-06-2010 and approved by CDM-EB on 29th June 2010). The verification findings for each verification subject are presented below:

3.1 FARs from Validation / Previous Verification

Based on the validation report the verification team identified no missing steps. No FARs have been presented in the validation report.

3.2 Project Implementation in accordance with the registered Project Design Document

The project is fully implemented according to the description presented in the PDD. The verifier confirms, through the visual inspection that all physical features of the CDM project activity including data collecting systems and storage have been implemented in accordance with the registered PDD. The project activity is completely operational and the same has been confirmed on-site.

The incremental electricity generated is supplied to the TNEB grid. The energy meters are installed in the plant premises and the same are calibrated and sealed by the third party i.e Electronics and Testing Development Center, Chennai which is accredited by National Accreditation Board for Testing and Calibration Laboratories, India. In addition all the power data is recorded in the Digital Control System (DCS) for continuous monitoring & measurement [16]. According to the registered PDD, all meters are required to be tested for accuracy annually and in a case that it is found to be beyond permissible limits of error, it would be calibrated immediately.

A Request for Deviation was submitted to EB with respect to the monitoring of the parameter “Net quantity of electricity generated in the project plant ($EG_{\text{project plant},y}$)” as it was not in line with the registered PDD.

(<http://cdm.unfccc.int/UserManagement/FileStorage/RRGIEHYBLNTP5377OE6BJ1JUL30HZM>)
The EB has accepted this deviation for the current monitoring period in its 50th meeting on 16th October 2009.

(http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_BMIBWXRD1JX8TR83TSHBMAL4V0U981).

A request for revision of the monitoring plan was also submitted to EB for incorporating the approved monitoring procedure for $EG_{\text{project plant},y}$. The other parameters which are not as per the methodology in the registered PDD are also revised. The CDM-EB has approved the revision in the monitoring plan on 29th June 2010.

(<http://cdm.unfccc.int/UserManagement/FileStorage/ZW6XPBNHMLRO9QS0A5TFK872DIJYEV>)

Electricity generation and heat generation are measured continuously and this data is recorded daily in log books by shift engineer and consolidated into monthly data by the section in-charge. The same is recorded by DCS on daily basis.



The bagasse consumption in the project plant is monitored continuously by the belt scale installed in the fuel conveyors. Apart from bagasse, there is coal and lignite consumption in the project plant and this is also measured continuously in the weighing scale installed in the fuel conveyors.

Quality assurance procedures are in place as for example the data monitoring reports for each month are reviewed for accuracy and correctness by the power plant manager. The recording of data is carried out by switch board attendants who report this to the shift engineer. The engineer in charge reviews the data received and compiles a daily report and sends it to the Plant Head. All the above staff are professionally qualified with experience in operating bagasse cogeneration plants.

The monitored data is reported to Cogeneration plant Head, who is responsible for the monitoring of the project activity. All the above staffs are professionally qualified with experience in operating bagasse cogeneration plants. The staff is aware of the quality assurance procedures and the same have been found to be implemented effectively. Also, Monthly reports are prepared from these daily reports and are subjected to internal audits conducted every six months.

3.3 Compliance of the Monitoring Plan with the Monitoring Methodology

The revised monitoring plan is in accordance with the approved methodology, ACM0006, Version 04, applied by the CDM project activity.

3.4 Compliance of the Monitoring with the Monitoring Plan

The audit team has identified a deviation from the monitoring methodology with respect to the “Net quantity of electricity generated in the project plant ($EG_{\text{project plant},y}$)”. This is done by metering the gross electricity generation and auxiliary consumption and the net electricity generation is calculated by deducting the metered auxiliary consumption from the metered gross electricity generation. Accordingly deviation has been requested for the monitoring of net quantity of electricity generated in the project plant.

The CDM-EB has accepted this deviation for the current monitoring period in its 50th meeting on 16th October 2009.

(http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_BMIBWXRD1JX8TR83TSHBMAL4V0U981).

A request for revision of the monitoring plan was also submitted to CDM-EB for incorporating the approved monitoring procedure for $EG_{\text{project plant},y}$. The other parameters which are not as per the methodology in the registered PDD are also revised. The CDM-EB has approved the revision in the monitoring plan on 29th June 2010.

The monitoring has been carried out in accordance with the revised and approved monitoring plan. All parameters were monitored and determined as per the Revised Monitoring Plan.

The verification of the parameters required by the monitoring plan are provided as follows:

Data / Parameter:	$EG_{\text{Project plant}, y}$
Data unit:	MWh
Description:	Net quantity of electricity generated in the project plant during the period y
Source of data used:	Energy meters EM1, EM2, EM3 and EM4
Means of verification/Comments:	The data in the CER calculation tool and monitoring report have been verified from the daily and the monthly plant log books. The net



	<p>electricity generation is verified from the difference of gross electricity generation and auxiliary consumption of the project plant.</p> <p>The gross electricity generation is monitored from the energy meter EM1 ($EG_{\text{gross generation}}$). The auxiliary consumption ($EG_{\text{Auxiliary consumption}}$) is monitored from the energy meters EM2, EM3 and EM4 ($EG_{\text{Aux, DTR}}$, $EG_{\text{Aux, CTR}}$, EG_{DG}).</p> <p>The net electricity generation is calculated by deducting the auxiliary consumption from the gross electricity generation. The procedure for monitoring of this parameter is as per the revised monitoring plan approved by EB on 29 June 2010. Prior to this, a deviation request was submitted to EB for monitoring the net quantity of electricity generated in the project plant.</p> <p>$EG_{\text{project plant}} = EG_{\text{gross generation}} - EG_{\text{Auxiliary consumption}}$</p>
Cross-check	<p>The parameter $EG_{\text{Project plant, y}}$ is cross checked by two energy meter readings EM5 and EM6 which are the Main meter and Check meters of TNEB for the net electricity exported by EID Parry to TNEB grid. This value is also cross checked by the monthly invoices raised by the plant for grid export and from the quantity of biomass fired in the boiler using annual energy balance. The Main and Check meters are calibrated annually by the Metering Relay Test Services (MRTS) wing of the TNEB.</p>

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net quantity of electricity exported to grid
Source of data used:	Energy meters EM5 and EM6
Means of verification/Comments:	<p>The data in the CER calculation tool and monitoring report have been verified from the daily and the monthly plant log books. The main meter and check meters installed in the plant premises are the source for these readings. This parameter is a cross check parameter for the net quantity of electricity generated in the project plant.</p>
Cross-check	<p>EG_y is the cross check parameter for $EG_{\text{Project plant, y}}$. The parameter is monitored by two energy meter readings EM5 and EM6 which are the Main meter and Check meters of TNEB for the net electricity exported by EID Parry to TNEB grid.</p> <p>This value of EG_y is cross checked by the monthly invoices raised by the plant for grid export and from the quantity of biomass fired in the boiler using annual energy balance.</p> <p>The Main and Check meters are calibrated annually by the Metering Relay Test Services (MRTS) wing of the TNEB.</p>

Data / Parameter:	$BF_{k,y}$
Data unit:	Tons – Dry basis
Description:	Quantity of biomass type k combusted in the project plant during the period y
Source of data used:	Plant records for bagasse consumption
Means of verification/Comments:	<p>The verification is based on the readings of the online weighing belt scale installed in the fuel conveyors. The quantity of biomass consumed in the project plant is directly measured on basis of bagasse fed to the project boiler. The quantity of dry biomass is calculated by deducting the moisture content of biomass. The plant</p>



	<p>uses bagasse, groundnut shell and cane trash. The daily log books have been verified to check the parameter. The groundnut shell and cane trash used in the project plant of the project activity are also biomass residues as per the definition of biomass residues.</p> <p>Though it is not explicitly mentioned in the PDD, the Annex 4 mentions it as “Biomass and other fuels” which gives an indication of the type of biomass fuels. The type of biomass fuels is also in line with the methodology ACM0006 ver.04 as it mentions <i>biomass that is a by-product, “residue or waste stream from agriculture”, forestry and related industries.</i></p> <p>The PDD section B.2 indicates usage of bagasse as the predominant fuel and no mention is made on the type of biomass neither in section B.2 nor in Annex 4. The PP had clearly documented in Annex 4 of the registered PDD that “outside biomass” and “coal” would be “purchased” for “co-firing” during “bagasse shortage situations”. The groundnut shell and cane trash are only biomass residues which have been purchased from outside for co-firing in the project plant during bagasse shortage situations. This has been verified by the audit team also during verification from the fuel purchase records and consumption data.</p>
Cross-check	<p>The weighbridge installed in the plant is also used for crosschecking biomass consumed in the boiler. The quantity is also cross checked by an annual fuel balance based on monthly/annual manufacturing reports, purchase receipts and stock exchanges. This is based on the fuel generated in-house, fuel purchased, opening stock and closing stock in the fuel yard. The parameter is being monitored to perform annual fuel balance. This data will be kept for 2 years after end of crediting period. The weighing scale as well as the weighbridge is calibrated every six months. The calibration is done by an independent agency which is accredited by National Accreditation Board for Testing and Calibration Laboratories, India.</p>

Data / Parameter:	Moisture content
Data unit:	%
Description:	Moisture content of biomass type k
Source of data used:	Measured values from plant log books
Means of verification/Comments:	<p>The value is verified based daily in house laboratory test record as extracted from the plant log books. The moisture content for all types of biomass used in the project plant have been verified from the plant records. The monthly average values of moisture content are calculated and are used in the monitoring report.</p> <p>The mass balance used to measure this moisture content is calibrated once in every six months and the calibration certificates have been checked by audit team.</p>
Cross-check	<p>The value has been cross checked from the NCV analysis reports and biomass combustion record. In addition, the RT-7c forms were checked for the monthly reported values from the sugar plant to the Government [33].</p>



Data / Parameter:	NCV_k
Data unit:	GJ/ton on dry basis
Description:	Net calorific value of biomass residue type k
Source of data used:	Test reports
Means of verification/Comments:	The NCV values for the type of biomass used are verified based on the bi-annual reports from the accredited laboratories. Three samples are analysed for the monitoring of this parameter.
Cross-check	Comparing with previous reports and IPCC data.

Data / Parameter:	NCV_i
Data unit:	GJ/ton on dry basis
Description:	Net calorific value of fossil fuel type i
Source of data used:	Test reports
Means of verification/Comments:	The NCV values for the type of fossil fuel used are verified based on the bi-annual reports from the accredited laboratories. Three samples are analysed for the monitoring of this parameter.
Cross-check	Comparing with previous reports and IPCC data.

Data / Parameter:	$Q_{\text{project plant}, y}$
Data unit:	GJ
Description:	Net quantity of heat generated from firing biomass in the project plant during the period y
Source of data used:	Plant log books
Means of verification/Comments:	<p>The net quantity of heat generated is calculated from the measured values of steam flow and enthalpy, steam pressure and steam temperature data, feed water flow, temperature and pressure from the plant. This parameter is determined based on the difference of the enthalpy of the steam generated minus the enthalpy of the feed water and any condensate return.</p> <p>The steam flow, steam pressure, steam temperature, are measured continuously in the plant and the respective data has been verified from the plant log books. The feed water flow, temperature and pressure is monitored at the entry point of the boiler where it takes care of the enthalpy of condensate return.</p> <p>The monitoring equipment is calibrated on a half yearly basis and the respective calibration certificates have been checked by the audit team [45,46,47,48, 49]. Hence the parameter is monitored as per the monitoring plan</p>
Cross-check	Comparing with boiler efficiency data, The thermal efficiency of the project plant is calculated using the net heat generated and biomass fired in the project plant.

Data / Parameter:	$FF_{\text{Project plant}, y}$
Data unit:	Tonnes
Description:	Quantity of fossil fuel type i combusted in the project plant during the year
Source of data used:	Weighing scale readings and plant log books
Means of verification/Comments:	The verification is based on the readings of the online weighing belt scale installed in the fuel conveyors. The quantity of fossil fuel type consumed in the project plant is directly measured on basis of fuel fed to the project. Coal and lignite are used in the project.



Cross-check	The weighbridge installed in the plant is also used for crosschecking fossil fuel consumed in the boiler. The quantity is also cross checked by an annual fuel balance based on the fuel purchased, opening stock and closing stock. The weighing scale as well as the weighbridge is calibrated every six months. The calibration is done by an independent agency which is accredited by National Accreditation Board for Testing and Calibration Laboratories, India.
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Data / Parameter:	$FF_{\text{Project site } y}$
Data unit:	Tonnes
Description:	Quantity of fossil fuel type i combusted at the project site for other purposes that are attributable to the project activity during the year
Source of data used:	Plant log books
Means of verification/Comments:	The verification is based on the readings of the volume meter and the daily log books to record the diesel consumed in DG sets.
Cross-check	Annual fuel balance based on the fuel purchased, opening stock and closing stock is carried out to cross check the quantity of fuel consumed in the site.

Data / Parameter:	$EC_{PJ, y}$
Data unit:	MWh
Description:	On site electricity consumption attributable to the project activity during the year
Source of data used:	Energy meters EM5 and EM6, daily and monthly log book readings
Means of verification/Comments:	The data in the CER calculation tool and monitoring report have been verified from the daily and the monthly plant log books. This parameter is measured from the main and check meters. This on site electricity consumption excludes the grid import and generation in the DG set as they are covered under auxiliary consumption.
Cross-check	This value is cross checked by the monthly invoices raised by the plant for grid export and electricity bills.

Data / Parameter:	AVDy
Data unit:	Km
Description:	Average return trip distance between biomass fuel supply sites and project site
Source of data used:	Plant log books and distance sheets from truck operators
Means of verification/Comments:	The trip sheets and the plant SAP data for the transportation of biomass to project site have been verified.
Cross-check	The records are cross checked by comparing the distance of project site from all the supply sites based on local information. The individual distance from each of the supply site has been checked to know the actual distance.

Data / Parameter:	TLy
Data unit:	Tonnes
Description:	Average truck load of the trucks used for transportation of biomass
Source of data used:	Weighbridge data



Means of verification/Comments:	The average truck capacity has been checked from plant records. The calibration of the weighbridge is done annually and the calibration certificates are verified by audit team.
Cross-check	The truck load is cross checked by the number of truck trips to the plant.

Data / Parameter:	EF_{km,CO_2}
Data unit:	tCO ₂ /km
Description:	Average CO ₂ emission factor for transportation of biomass with trucks
Source of data used:	Plant records, IPCC default values
Means of verification/Comments:	The fuel consumption per distance travelled by the trucks (tonnes/kms) is calculated based on the product of the inverse of fuel efficiency (litres/km) and the density of fuel (kg/litre). Thus the product of fuel consumption per distance, emission factor of the fuel (tCO₂/TJ) and the net calorific value of the fuel (GJ/tonne) is done to arrive at the parameter ‘Average CO ₂ emission factor for the trucks’ which has the units tCO₂/km . The CO ₂ emission factor value is taken from the IPCC latest data. Hence the values have been correctly and conservatively applied as per paragraph 208 (e), VVM 1.2. Monitoring of the parameter is in compliance with ACM0006 version 04. The parameter is monitored annually.
Cross-check	The fuel efficiency value is cross checked from the total distance travelled by trucks and also compared with the national data for efficiency values and IPCC default values.

Data / Parameter:	$EF_{CO_2,FF,i}$
Data unit:	tCO ₂ /TJ
Description:	CO ₂ emission factor for fossil fuel type i
Source of data used:	IPCC latest default values in case of Coal and diesel and National data in case of Lignite
Means of verification/Comments:	In case of lignite, CO ₂ emission factor is based on India’s National Communication to the UNFCCC. In case of coal and diesel oil, default values as per latest IPCC guidelines are checked. The values applied for emission factor for lignite (106.1) are taken from the National Data. In case of Coal and Diesel oil, IPCC latest data has been applied. Coal (96.1) and Diesel oil (74.1). The most conservative values have been chosen between National Data (106.1) and IPCC latest data (101.1) for the CO ₂ emission factor for Lignite. and the same value has been used in the project emission calculations. IPCC default values have been applied in case of Coal and Diesel oil. Hence the values have been correctly applied as per paragraph 208 (e), VVM 1.2 [44].
Cross-check	--

The calibration of all the energy meters is done on an annual basis and the calibration of the weighing scale is done on a half yearly basis. The relevant calibration documents were viewed by the audit team during the on-site visit. These calibration certificates confirm the calibration status listed in the Monitoring Report for all meters. No further calibration activities are required



for this CDM activity. No deviations exceeding the required frequency or the stated limits were found. Hence raw data of all measured parameter are reliable and serve as solid base for the reported emission reductions.

3.5 Assessment of Data and Calculation of Greenhouse Gas Emission Reductions

The Emission Reduction Calculations are laid down in the Monitoring Report and the excel sheet of CER calculations. As the approach to calculate the baseline emissions is based on the Scenario 14 of the applied methodology i.e. ACM0006/Version 04, a multiplication of the incremental quantity of electricity generated as a result of the project activity and the carbon dioxide emission factor of 0.85 tCO₂/MWh determined in p.37 of the registered PDD yields the emission reductions due to displacement of electricity, such an approach is deemed to be acceptable. The project emissions are deducted from the emissions due to electricity displacement to get the emission reductions due to the project activity for the current monitoring period. The net quantity of electricity generation as a result of the project activity during the year *y* is calculated as per the formula applicable under scenario 14.

The critical parameters for the determination of GHG emissions are based on the following internal parameters that are obtained according to the revised monitoring plan of the registered PDD and approved methodology ACM0006, version 04:

- Net quantity of electricity generated in the project plant during the year
- Quantity of biomass type *i* combusted in the project plant
- Average round trip distance between biomass fuel supply site and project site
- Average truck load of the trucks used for transportation of biomass
- Average CO₂ emission factor for the trucks during the year
- CO₂ emission factor of the fossil fuel type *i*
- Quantity of fossil fuel type *I* combusted in the project plant during the year
- Net quantity of heat generated from firing biomass in the project plant, calculated from measured values of steam flow and enthalpy, steam pressure and steam temperature data from the plant
- Average net energy efficiency of heat generation in the boiler that would generate heat in the absence of project activity
- Moisture content of biomass residues
- On site electricity consumption attributable to the project activity during the year
- Quantity of fossil fuel type *i* combusted at the project site for other purposes that are attributable to the project activity during the year

The external data need to be obtained according to the registered PDD and approved methodology ACM0006, Version 04:

- Net calorific value of biomass residue type *k*
- Net calorific value of fossil fuel type *i*

The reported data has been cross checked against other sources when available as explained above in chapter 3.4.

The emission reductions presented in the current monitoring report deviate significantly (24% reduction) from the emission reductions as indicated in the registered PDD. As per the PDD, the



emission reductions are 86,623 tCO₂e but the emission reductions during this period are 65,490 tCO₂e. This is due to the project emissions from combustion of fossil fuel in the plant which have not been accounted for in the registered PDD as per the methodology ACM0006 version 04. Also a total of 59 days plant shutdown contributed to the reduction in the emission reductions to that of the registered PDD [[36](#), [42](#)].

The verifier confirms that the methods and formulae used to obtain the baseline emissions are appropriate. The same have been done in accordance with the methods and formulae described in the registered monitoring plan and applicable methodology. The verifier confirms that the default values (ex-ante values from PDD) have been correctly justified.



4 SUMMARY OF FINDINGS

The verifier can confirm that the published MR and related documents are complete and verifiable in accordance with CDM requirements. All the findings raised by the verification team, the responses by the PPs and the conclusion from the team are presented in Annex 1, the means of verification (MoV) and resulting changes in the MR or related documents are stated as follows:

Corrective Action Requests

CAR 1: The present status of the existing plant needs to be mentioned in the MR as per scenario 14 of ACM0006.

MoV: The details of the pre project system with technical specifications were verified by the audit team.

Changes: The details of pre project system are included in the MR.

CAR 2: When the high pressure boiler was installed? When was the actual commissioning date of the project activity? Include the same in the monitoring report.

MoV: The commissioning date of the project activity was checked with the certificate.

Changes: The commissioning date has been included in the revised MR.

CAR 3: Please include the plant outage details during the monitoring period of the project activity in the MR. Also mention the troubleshooting procedures in place in the plant.

MoV: The shut down details of the plant were checked from the plant log books.

Changes: The plant outage details for the monitoring period have been included in the revised MR.

CAR 4: In the QA/QC procedures, Mention the calibration frequency, data recording procedure of all the energy meters used in the project activity. Also include how the cross check of the readings is done.

MoV: The calibration certificates were checked by the audit team and the data recording procedures were enquired during the on site visit.

Changes: The QA/QC procedures, data recording and calibration frequency have been included in the revised MR.

CAR 5: Mention the QA/QC procedures of the parameter $EC_{PJ,y}$ as per the methodology.

MoV: The monitoring procedure as per the methodology for the parameter has been checked and the MR is inconsistent.

Changes: The QA/QC procedures have been included in the revised MR.

CAR 6: Include the parameter TL_y as per the methodology as option 2 has been used to calculate project emissions from transportation of biomass.

MoV: The MR has been checked and the parameter TL_y is not included in the MR as per the methodology ACM0006 ver.4.

Changes: The parameter has been included in the revised MR.

CAR 7: Please include measurement methods for fossil fuels combusted in the project in the MR. Also include how the quantity of diesel consumed in the DG sets is monitored

MoV: The monitoring procedure as per the methodology for the parameter has been checked and the MR is found inconsistent.



Changes: The MR is revised to include the changes.

CAR 8: Whether energy balance has been done for the verification period and if so, include the same in the monitoring report.

MoV: The energy balance is the method of crosscheck for the quantity of biomass combusted in the project plant, as per the methodology. The MR as well as the excel sheet has been checked for this parameter.

Changes: The MR as well as the excel sheet is revised to include the energy balance.

CAR 9: The value for pre project efficiency should be the same as that of the registered PDD. Modify it accordingly in the excel sheet as well as the MR.

MoV: The pre project efficiency value in MR is checked with that of the PDD.

Changes: The MR as well as the excel sheet is revised to include the exact pre project efficiency value..

CAR 10: In the excel sheet for daily power generation, the values for Auxiliary DTR consumption on 15th and 17th January & 30th September 2008 do not match with the plant log books. Please change accordingly

MoV: The excel sheet values were checked with the plant log book data.

Changes: The excel sheet is corrected.

CAR 11: In the spreadsheet for calculating project emissions due to transportation of biomass to the project site, the roundtrip distance from project site to sugar mills should be according to the plant records (Trip/distance sheets).

MoV: The excel sheet values were checked with the log book data.

Changes: The excel sheet is corrected.

CAR 12: What kind of consistency measures and quality assurance procedures are adopted to check the values of NCV_k and NCV_i? Provide the details of the same in MR.

MoV: The consistency measures of the parameters are not in line with methodology.

Changes: The MR is revised to include the procedures.

CAR 13: What kind of emergency preparedness plans are set up in the plant? Include the same in monitoring report.

MoV: The emergency preparedness plans were checked with the plant documents.

Changes: The MR is revised to include the emergency procedures.

CAR 14: Include details of all the energy meters, weighing scale and weigh bridge including spare/ stand by meters with the calibration details in the Monitoring Report.

MoV: The calibration certificates of energy meter, weighing scale and weigh bridge are verified during the on site visit.

Changes: The MR is revised to include the details.

CAR 15: Provide a single line diagram showing the metering locations of the plant in the monitoring report.

MoV: The line diagram of the meters at the plant is verified.

Changes: The MR is revised to include the single line diagram.

CAR 16: The parameter 'Net quantity of electricity exported to grid' is not included in the monitoring parameters.



MoV: The net electricity exported to grid, EG_y is in the PDD. This parameter is actually a cross check for the parameter EG_{project plant}. The MR has been checked for this parameter.

Changes: The MR is revised to include the parameter.

CAR 17: It needs to be demonstrated in the MR how the thermal firing capacity is maintained same as that of pre-project plant after project implementation, though the power generation capacity increased.

MoV: The thermal firing capacity of the pre project and project boilers is checked. The thermal capacity is maintained same as that of the pre-project after project implementation. The fuel firing capacity in the pre-project plant boilers are 16 TPH and 29 TPH where as the capacity of the Project Boiler is 45 TPH.

Changes: The MR is revised and the thermal firing capacity is demonstrated.

CAR 18: It needs to be stated in MR why the net electricity generation is significantly lower for the month of November'07 for the monitored period.

MoV: The daily gross generation data was checked and the generation is low in the month of November.

Changes: The MR is revised to include the explanation about low generation.

CAR 19: The GPS coordinates of the project plant needs to be mentioned in the MR (as per the decimal format)

MoV: The GPS coordinates presented in the MR are in degrees, minutes and second format.

Changes: The MR is revised to include the explanation about low generation.

CAR 20: With reference to the EB incompleteness issue, Please clarify how the value of biomass moisture is calculated in the CER spreadsheet for the month of September 2007 (in "Daily Fuel Data" sheet)?

MoV: In the revised excel sheet, this has been shown as a weighted average value for the Monthly moisture content. However the monthly moisture values have been also checked from the RT-7c forms which are submitted by the Sugar plant to the Government.

Changes: The MR and the CER spreadsheet have been revised.

Clarification Requests

CR 1: Please submit the reports of internal audit conducted in the plant.

MoV: The internal audit reports were checked on site.

Changes: The required documents are submitted to the audit team.

CR 2: Please submit the documents supporting the training on equipment and monitoring procedures

MoV: The training records were checked on site.

Changes: The required documents are submitted to the audit team.

CR 3: The net quantity of electricity generated in the project plant needs to be metered as per the methodology and the same is in the monitoring plan of the PDD, where as the MR shows that it is calculated. Also the parameters EG_{gross} and EG_{aux} are not in the monitoring plan

MoV: The net electricity generated in the project plant is actually calculated based on the metered gross generation and auxiliary consumption. The metered gross generation and auxiliary consumption data has been checked by the audit team.

Changes: A deviation request was submitted to EB on the monitoring of this parameter and subsequently EB has accepted the deviation.



CR 4: It needs to be stated in MR why the ER's in the monitoring period are not in line with that of the registered PDD.

MoV: The ERs as per the registered PDD for the same crediting period is 86623 while the ERs claimed for the monitoring period are 61131. The PDD has been checked with the excel sheet.

Changes: The explanation regarding the reduction of ERs has been included in MR.

CR 5: Provide the calibration certificates of the TNEB Export/Import meter installed in the plant.

MoV: The calibration report of main and check meters were verified on site.

Changes: The required documents are submitted to the audit team.

CR 6: The monthly export values given in the excel sheet does not match with that of the export to the grid as per the monthly invoices raised by EID Parry (for any of the months during the monitoring period). Please clarify the exact units of electricity exported to the grid?

MoV: The monthly export to the grid was checked with the monthly invoices raised by EID Parry.

Changes: The explanation has been included in MR.

CR 7: The parameters $EC_{PJ,y}$, Moisture content of biomass residues, $FF_{\text{project site, i,y}}$, $Q_{\text{project plant,y}}$ which are included in the MR are not actually in the monitoring plan of registered PDD.

MoV: The registered PDD does not include some parameters as per methodology while the same were monitored by PP.

Changes: The MP has been revised and now all the parameters are consistent with methodology.

CR 8: The ER's claimed in the published MR are 61131 tCO₂e where as in the final MR, the ER's are 65490 tCO₂e.

MoV: The ERs claimed in the published and final MR were compared. The pre-project efficiency value was not taken as per the PDD in the published MR. There is also a difference in the actual NCV values of bagasse and lignite, which was corrected in the final MR. This has lead to an increase in the ERs from published MR to final MR.

Changes: The explanation for increase was provided in the MR.

CR 9: The project uses different types of biomass (ground nut shell and cane trash) besides bagasse, though it is not explicitly mentioned in the registered PDD/ revised MP. Please clarify.

MoV: The biomass residues, groundnut shell and cane trash are not explicitly mentioned in PDD though they are used in the plant. The same was checked through biomass consumption records from the plant.

Changes: The explanation regarding the other biomass residues is included and the same has been included in the protocol.



5 VERIFICATION STATEMENT

TÜV SÜD Industrie Service GmbH has performed the initial and first periodic verification of the registered CDM project: “Bagasse based Cogeneration Project at Pudukottai, Tamil Nadu, India”. The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC).

The management of EID Parry (India) Limited is responsible for the preparation of the GHG emissions data and the reported GHG emission reductions on the basis set out within the project's Monitoring Plan indicated in the registered PDD version 04, dated 02-07-2007 and the applied methodology ACM0006 -*Consolidated methodology for grid-connected electricity generation from biomass residues-Version 04*.

The verifier can confirm that:

- the development and maintenance of records and reporting procedures are in accordance with the registered monitoring plan;
- the project is operated as planned and described in the validated and registered project design document;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements;
- the emission reductions presented in the current monitoring report deviate significantly (24% reduction) from the emission reductions as indicated in the registered PDD. This is due to the project emissions from combustion of fossil fuel in the plant which have not been accounted for in the registered PDD. A total of 59 days plant shutdown also contributed to the reduction in the emission reductions to that of the registered PDD;
- our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents. The verifier has identified deviation from monitoring plan regarding the net quantity of electricity generated in project plant. Subsequently a request for deviation was submitted to the EB regarding the monitoring of net quantity of electricity generated in the project plant ($EG_{\text{project plant},y}$) for the current monitoring period and the EB has accepted this deviation on 16th October 2009. A request for revision of the monitoring plan was also submitted to EB on for incorporating the approved monitoring procedure for $EG_{\text{project plant},y}$ and other parameters which are not as per the methodology in the registered PDD. The CDM-EB has approved the revision in the monitoring plan on 29th June 2010.
- the revised monitoring plan complies with the applied methodology (ACM0006 version 04- Consolidated methodology for grid-connected electricity generation from biomass residues) and the monitoring has been carried out as exactly following the monitoring plan. The final Monitoring Report (Version 2.7 dated 25-03-2011) complies with the methodology and Monitoring Plan.

The verifier also can confirm that the monitoring plan in registered PDD is as per the approved methodology ACM0006 version 04. Based on the information we have seen and evaluated we confirm the following statement:

Reporting period: From 14-09-2007 to 30-09-2008



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Verified emissions in the above reporting period:

Baseline emissions: 79,866 t CO₂e
Project emissions: 14,376 t CO₂e
Leakage emission: 0 t CO₂e
Emission reductions: 65,490 t CO₂e

Munich, 18-08-2011

Munich, 18-08-2011

A handwritten signature in blue ink, reading "Thomas Kleiser".

Thomas Kleiser
Certification body "climate and energy"

A handwritten signature in blue ink, reading "Nikunj Agarwal".

Nikunj Agarwal
Assessment Team Leader



Annex 1: Verification Protocol

Verification Protocol

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1. Project Activity Implementation

1.1. Technology

PDD	Verified Situation	Conclusion
Location (s) <i>add additional sites if necessary</i>		
<p>Description / Address: The project activity is replacing the low efficiency to high efficiency cogeneration system at the sugar mill and export the incremental electricity to the grid.</p> <p>Location: Kurumbur village, Pudukottai district, TamilNadu, India.</p>	<p>The description of the project activity in the PDD could be proved during the on site visit and evidenced with the PPA and synchronization of the 18 MW cogeneration plant with the TNEB grid on 30th March 2008. The documents were verified on site.</p> <p>The electricity generation has started in March 2008 which could be confirmed through the sales invoice to the grid.</p> <p><u>Corrective Action Request No.1</u></p> <p>The present status of the existing plant needs to be mentioned in the MR as per scenario 14 of ACM0006 ver 4</p> <p><u>Corrective Action Request No.2</u></p> <p>When the high pressure boiler was installed? When was the actual commissioning date of the project activity? Include the same in the monitoring report.</p>	CAR
<p>GPS coordinates as per PDD: 10°15'02" N Latitude, 78°58'12" E Longitude:</p>	The GPS coordinates of the site have been checked and verified.	þ
Technical Equipment – Main Components <i>add additional components if necessary</i>		
<p>Component 1: 100 TPH Boiler, outlet steam parameters 86 kg/cm2 and 510+5 rated temperature</p>	The project activity boiler was verified on site. The technical specifications were in line with the PDD.	þ
<p>Component 2: 18 MW Extraction cum condensing turbine</p>	The project activity turbine was verified on site. The technical specifications were in line with the PDD.	þ

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PDD	Verified Situation	Conclusion
Component 3: Auxiliary equipments such as bagasse handling system, air cooled condenser, electrostatic precipitator	The project activity auxiliary equipment like Aux DTR, Aux CTR and the other equipment were verified on site.	þ
Component : 4 110 kV line	As verified on site, the power generation is stepped to 110 kV line of TNEB grid.	þ
Component 5: Existing plant: 51.5 TPH Boiler 29 TPH Boiler 2 MW TG 2.5 MW TG	Prior to the project activity, there were two boilers on site, one of which has a capacity of 51.5 tonnes per hour and operate at 17 kg/cm ² and 280°C and the other one has a capacity of 29 tonnes per hour and operates at 17 kg/cm ² and 280°C. There were two turbo generators of 2 MW and 2.5 MW to meet the process steam and electricity requirement of the sugar plant. All the pre project boilers and turbo generators do not operate in the project activity.	þ
Operation Status during verification <i>add additional sites if necessary</i>		
Approvals / Licenses N/A	The Project activity has got the consents to operate from TamilNadu Pollution Control Board under Section 21 of the Air(Prevention & control of Pollution) Act,1981 Section 25 of the Water (Prevention & control of Pollution) Act, 1974. This has been verified on site. Also the PPA has been made with TNEB which was verified. The consents and the approvals are verified on site.	þ
Actual Operation Status N/A	Under construction <input type="checkbox"/> In operation þ Out of operation <input type="checkbox"/> Reason (when out of operation):	þ
Remarks to Special Operational Status During the Verification Period	The plant was not in operation for 59 days during the monitoring period due to planned and forced outages and this has been verified from the plant records. <u>Corrective Action Request No.3</u>	CAR

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PDD	Verified Situation	Conclusion
	Please include the plant outage details during the monitoring period of the project activity in the MR. Also mention the troubleshooting procedures in place in the plant.	

1.2. Organization

PDD	Verified Situation	Conclusion
Project Participant (s) <i>add additional participants if necessary</i>		
Entity / Responsible person: EID Parry (India) Limited/ Mr. KN Radhakrishnan, GM(Commercial)	The participants were confirmed on site. EID Parry (India) Limited is the project participant.	p
CDM Project management: Prior to the start of the crediting period, a CDM team will be established as a part of monitoring, with the clear definition of responsibility of each person. The Cogeneration Plant head will be the CDM coordinator and a team will be formed of people from all the departments. The draft procedures of monitoring are included in the Annex 4 of the PDD.	The CDM team was verified on site. Mr.Soundarajan, who is the head of the cogeneration plant is responsible for CDM project management. Mr. Muthukaruppan is the in-charge of maintaining all the records pertaining to electricity generation. They in turn report to the General Works Manager. The same was confirmed through interviews and discussions with the CDM team during on site visit. The documents supporting the roles and responsibilities of personnel for monitoring has been submitted to the DOE.	p

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1.3. Quality Management System

PDD	Verified Situation	Conclusion
Quality Management Manual: No manual is mentioned in the PDD.	CDM specific internal audits are required because the monitoring and measurement of electricity data needs to be done diligently every month as per the procedure that needs to be developed and as a business practice. Hence a permanent control of the figures needs to be established. The same is also in place. <u>Clarification Request No.1</u> Please submit the reports of internal audit conducted in the plant.	CR
Responsibilities: The PP is directly responsible for the QMS.	This was verified on site. See 1.2	p
Qualification and Training:	All the staff is professionally qualified with experience in operating bagasse cogeneration plants. <u>Clarification Request No.2</u> Please submit the documents supporting the training on equipment and monitoring procedures.	CR
Implementation of QM-system	Assess accessibility and usage of documents and forms	p

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1.4. Remaining FARs from previous Verifications (or forwarded issues of validation report)

Remaining Requests from Previous Verifications	Summary of project owner response	Audit team conclusion
Forward action request No. 1:		-

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2. Data Management System

2.1. Description

Structure of raw data archiving				
Describe all the different data collection systems				
Type	Name	Responsible	Procedures	Comments
Electronically	$EG_{Gross, project plant, y}$ $EG_{Aux, project plant, y}$ $EC_{PJ, y}$ $EG_{project plant, y}$	Shift operators at the plant	Continuously monitored and recorded daily	<p>The energy meters are calibrated periodically as per the manufacturer's specifications using the standard procedures by accredited third party Agencies. Also a systematic procedure is followed starting from recording of the readings by the shift engineer to the final perusal by the Executive Director. The same has been verified during on site visit.</p> <p>þ</p>
Electronically	$BF_{k, y}$	Shift operators at the plant	Continuously monitored and recorded daily	<p>The calibration of the online scale is done to ensure the highest level of accuracy. Also a systematic procedure is followed starting from recording of the readings by the shift engineer to the final perusal by the Executive Director. The same has been verified during on site visit.</p> <p>þ</p>
Electronically	$FF_{project plant, i, y}$	Shift operators at the	Continuously monitored and	A systematic procedure is followed

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		plant	recorded daily	starting from recording of the readings by the shift engineer to the final perusal by the Executive Director. The same has been verified during on site visit. p
Electronically	TL _y	Shift operators at the plant	Continuously, aggregated annually	A systematic procedure is followed starting from recording of the readings by the shift engineer to the final perusal by the Executive Director. The same has been verified during on site visit. p
Manual	Monthly record of electricity supplied to grid and electricity imported from grid	Operator at the plant and operator from TNEB sub station	Joint Meter Readings by the substation and plant people. Daily recording of readings by the plant operator.	The monthly JMR will be signed by the engineers from TNEB and the power plant. p
Manual	Moisture content of biomass	Engineer at the plant	The weight of fuel with moisture and without moisture (after drying in oven) is measured to arrive at the moisture content.	Mass balance is calibrated periodically and the same was verified during on site visit. p
Manual	FF _{project site, i,y}	Engineer at the plant	The quantity of fossil fuel (diesel) consumed in the DG sets is measured using the volume meter (dip-stick) method.	A systematic procedure is followed starting from recording of the readings by the shift engineer to the final perusal by the Executive Director. The same has been verified during on site visit. p
Laboratory results	NCV _k	Third party	Monthly reports	A systematic procedure is followed

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	NCV _i			starting from recording of the readings by the shift engineer to the final perusal by the Executive Director. The same has been verified during on site visit. p
Accounting	Invoices for export of power to grid	Accounts Department	The invoice is issued by the project owner based on the joint meter readings.	The invoices were verified during the on site visit. p
External data	EF _{km, CO2}	Plant operators	Plant fuel economy measurement records/IPCC default values	Fuel efficiency (kms/litre fuel) of the trucks by monitoring the fuel type, fuel consumption and distance travelled for all truck types/Net calorific value of diesel (based on Central Electricity Authority data) and its CO ₂ emission factor (IPCC default values). p
External data	EF _{CO2, FF, i}	IPCC default values for fuels	n.a	IPCC default values for fuels p
External data	EF _{grid}	CEA	n.a	The value is fixed ex ante for the whole crediting period. p
Key Reporting Risks: Potential reporting risks of the data management system can be expected to occur in the following fields of action: <ol style="list-style-type: none"> 1. Raw data collection; 2. Data transfer. 3. The electricity generated and auxiliary consumption is recorded in the plant. The daily export values are recorded in the plant log books upon confirmation of the same with the staff of the substation. There is a potential risk of error while entering into log books. Risk Classification: Low				

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Further Remarks: *No further remarks*

2.2. Raw Data Archiving and Protection measures

Name	Description of data archiving and protection measures	Risks and comments	Concl.
Daily/Monthly re-records	The data is monitored continuously in energy meters and the online weighing scale. The shift operator(Electrical) records the energy meter reading on a daily basis in log books. This is monitored in DCS as well as entered into log books. The data is archived both in paper and electronic form.	The same was verified on site	p
Invoices	Invoices are issued every month. The invoices show the energy exported based on joint meter readings. The invoices are stamped by the project owner. Data shall be archived for 2 years following the end of the crediting period. Invoices in paper form are printed out from the computer system, i.e. electronic files serve as back-up for the invoices in paper form.	Verified on site	p
Key Reporting Risks: The potential risk is that the data sheets might be lost Risk Classification: <i>Low</i> Further Remarks: <i>None</i>			

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2.3. Data transfer

Description of data transfer from raw data archiving to calculation tool			
Name	Description and responsibilities	Risks and comments	Concl.
Daily/Monthly records	The recording of data is carried out by switch board attendants who report this to the shift engineer who in turn submits to the section in charge. The section in charge reviews the data received and compiles a daily report and sends it the Plant Head. The Plant Head generates a daily report and sends the same to the Unit Head who reviews it and sends it to the Executive Director.	The same was verified on site	p
Key Reporting Risks: The potential risk could be the incorrect data entry into the log books, which will be transferred into monthly reports and spreadsheets. Risk Classification: Low Further Remarks: None			

2.4. Data Processing

Description of data processing from transferred data to final results in the calculation tool			
Step	Description	Risks and comments	Concl.
Consistency	The description, data units, QA/QC procedures of the monitoring parameters should be in line with the methodology.	<u>Corrective Action Request No.4</u> In the QA/QC procedures, Mention the calibration frequency, data recording procedure of all the energy meters used in the project activity. Also include how the cross check of the readings is done.	CAR

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		<p><u>Corrective Action Request No.5</u> Mention the QA/QC procedures of the parameter $EC_{PJ,y}$ as per the methodology.</p> <p><u>Corrective Action Request No.6</u> Include the parameter TL_y as per the methodology as option 2 has been used to calculate project emissions from transportation of biomass.</p> <p><u>Corrective Action Request No.7</u> Please include measurement methods for fossil fuels combusted in the project in the MR. Also include how the quantity of diesel consumed in the DG sets is monitored.</p> <p><u>Corrective Action Request No.8</u> Whether energy balance has been done for the verification period and if so, include the same in the monitoring report.</p> <p><u>Clarification Request No.3</u> The net quantity of electricity generated in the project plant needs to be metered as per the methodology and the same is in the monitoring plan of the PDD, where as the MR shows that it is calculated. Also the parameters EG gross and EG aux are not in the monitoring plan.</p> <p><u>Clarification Request No.4</u> It needs to be stated in MR why the ER's in the monitoring period are not in line with that of the registered PDD.</p> <p><u>Clarification Request No.5</u> Provide the calibration certificates of the TNEB</p>	
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		Export/Import meter installed in the plant.	
Calculation Tool description	The raw data and calculation processes are presented in the excel sheet. The formulae, intermediate steps and default values are in compliance with the methodology. The default values in the PDD are also checked.	<p><u>Corrective Action Request No.9</u></p> <p>The value for pre project efficiency should be the same as that of the registered PDD. Modify it accordingly in the excel sheet as well as the MR.</p> <p><u>Corrective Action Request No.10</u></p> <p>In the excel sheet for daily power generation, the values for Auxiliary DTR consumption on 15th and 17th January & 30th September 2008 do not match with the plant log books. Please change accordingly</p> <p><u>Corrective Action Request No.11</u></p> <p>In the spreadsheet for calculating project emissions due to transportation of biomass to the project site, the roundtrip distance from project site to sugar mills should be according to the plant records (Trip/distance sheets).</p> <p><u>Corrective Action Request No.12</u></p> <p>What kind of consistency measures and quality assurance procedures are adopted to check the values of NCVk and NCVi? Provide the details of the same in MR.</p>	CAR
Transformation from transferred data to useable data	The data presented in the calculation excel sheet is verified with that of the log books. There is some data mistransfer in some of the spreadsheets.	See above CARs	CAR
Elimination of not plausible data	No implausible data are existed in the monitoring period.	OK	p

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Transformation from useable data to input data for further calculation	The data presented in the calculation excel sheet has been recalculated by the audit team.	OK	p
Ex-ante data	The grid emission factor 0.85 is fixed ex ante in the PDD and has been used in the emission reduction calculations.	OK	p
Default parameter	All the default values used are consistent with the methodology.	OK	p
Formulae check	The formulae in the spreadsheet are consistent with the description of the PDD and the methodology.	OK	p
Rounding functions	The rounding functions are correctly and conservatively applied in the monitoring report.	OK	p
Calculation tool changes and protection measures	The revision history of the calculation sheet needs has been indicated.	OK	p
Key Reporting Risks: All data can be cross-checked; mistakes might happen, but can be traced back, evaluated and deleted. Risk Classification: Low, because cross- check is possible Further Remarks: None			

2.5. Work Instruction out of protocol Algorithms

Description of data processing from transferred data to final results in the calculation tool			
Step	Description	Risks and comments	Concl.
Methodology formulae	As per methodology ACM0006, $PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \cdot PE_{Biomass,CH4,y}$	OK	p

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	$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$ $ER_{heat,y} = 0, BE_{biomass,y}, L_y = 0$ $ER_y = ER_{electricity,y} - PE_y$ $ER_{electricity,y} = EG_y \cdot EF_{electricity,y}$ $EG_y = EG_{project\ plant,y} \cdot \{1 - \epsilon_{el,preproject} / \epsilon_{el,projectplant}\}$ $\epsilon_{el,projectplant} = \frac{EG_{projectplant,y}}{\sum_k NCV_k \cdot BF_{k,y} + \sum_i NCV_i \cdot FF_{projectplant,i,y}}$		
Describe the use of each formula in the calculation tool	$ER_y = \text{ROUNDDOWN}(E5-F5-G5-H5-I5,0)$ <p><i>EF has been calculated ex ante and it is taken as 0.85 tCO2/MWh</i></p> $ER_{electricity,y} = \text{ROUNDDOWN}(D5 \cdot C5,0)$ $PE_y = \text{ROUNDUP}(E6+E4+E8,0)$ <p><i>PE_{FF,y} = 'Total Project Emissions'!E4</i></p> <p><i>PE_{T,y} = 'Total Project Emissions'!E6</i></p> <p><i>PE_{EC,y} = 'Total Project Emissions'!E8</i></p>	OK	p
Report any additional calculation use to obtain values use in the formulae	No additional calculation is required	OK	p

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3. Monitoring Plan Implementation

3.1. List of Parameter to be monitored

ID-PDD	ID-Meth.	ID-Internal	Description	Conclusion
Instrumentation <i>insert all components that are metered by instruments as necessary due to PDD and applied methodology version</i>				
EG _y	EG _y	EG _{Gross, project plant,y}	Gross quantity of electricity generated in the project plant	p
	EG _{project plant,y}	EG _{Aux, project plant,y}	Auxiliary electricity consumption in the project plant	p
		EC _{PJ,y}	On-site electricity consumption attributable to the project activity during the year y	p
		EG _{project plant,y}	Net quantity of electricity generated in the project plant	p
BF _{k,y}	BF _{k,y}	BF _{k,y}	Quantity of biomass residues type k combusted in the project plant	p
FF _{project plant, i,y}	FF _{project plant, i,y}	FF _{project plant, i,y}	Quantity of fossil fuel type i combusted in the project plant	p
TL _y	TL _y	TL _y	Average truck load of the trucks used for transportation of biomass	p
Sampling <i>insert all components that are sampled as necessary due to PDD and applied methodology version</i>				
NA	NA	NA	NA	NA
Accounting <i>insert all components that are accounted as necessary due to PDD and applied methodology version</i>				
		Invoices for export of power to grid	Invoices for export of power to grid	p
External Data <i>insert all components that are coming from external data sources as necessary due to PDD and applied methodology version</i>				

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ID-PDD	ID-Meth.	ID-Internal	Description	Conclusion
EF_{km, CO_2}	EF_{km, CO_2}	EF_{km, CO_2}	Average CO ₂ emission factor for transportation of biomass with trucks	p
$EF_{CO_2, FF, i}$	$EF_{CO_2, FF, i}$	$EF_{CO_2, FF, i}$	CO ₂ emission factor for fossil fuel type i	p
NCV_k	NCV_k		Net calorific value of biomass residue type k	p
NCV_i	NCV_i		Net Calorific value of fossil fuel type i	p
Others <i>insert all miscellaneous components as necessary due to PDD and applied methodology version</i>				
Monthly record of electricity supplied to grid and electricity imported from grid			Monthly record of electricity supplied to grid and electricity imported from grid	p
$FF_{project\ site, i, y}$			Quantity of fossil fuel type i combusted at the project site for other purposes that are attributable to the project activity during the year y.	p
Moisture content of biomass residues			Moisture content of biomass residue type k	p
$Q_{project\ plant, y}$			Net quantity of heat generated from firing biomass in the project plant	p
• boiler			Average net energy efficiency of heat generation in the boiler that is operated next to the project plant	p

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3.2. Monitoring Instrumentation

3.2.1. Instrument i

PDD	Verified Situation	Conclusion
Instrumentation Information <i>list all different instruments which have been used during the monitoring period; use a separate table for each single instrument</i>		
ID-PDD:	EGy	þ
ID-Internal:	EG _{Gross, project plant,y}	þ
Data to be Measured:	Gross quantity of electricity generated in the project plant	þ
Data Logging:	Continuously	þ
Archiving of Raw Data:	Daily recording in log books and compilation of monthly reports	þ
Measurement Principle:	Measured continuously in energy meter EM1	þ
Period of Operating Time:	Begin: 14.09.2007 The instrument was in operation during the monitoring period and no change of meter has taken place.	þ
Instrument Type:	Electricity meter	þ
Serial Number:	ELI 04157	þ
Manufacturer Model Nr.:	ELITE Secure	
Specific Location:	HT Panel Room	þ
Measurement Range:	(1600/1A) / (110V/•3)	þ
Measurement Unit:	kWh	þ

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Calibration:	Calibration is performed by a third party agency and is traceable to national standards. Calibration dates are 01.01.2007, 12.11.2007 and 04.11.2008. All the calibration certificates have been verified by the audit team.	p
Required Calibration Frequency:	Annual	p
Uncertainty Level:	0.2%	p
Monitoring & Calculation		
Reading Frequency:	Continuous	p
Recording Frequency:	Monthly recording	p
Trouble Shooting:	A spare meter is in place in case of any failure of the energy meter	p

Inspection Results During Verification			
Operation of Instrumentation	Method of Verification	Verification Results	Conclusion
Measuring Principle: Continuous measurement Through Current transformer (CT) and potential transformer (PT)	The working status of the meter has been inspected.	The meter is working properly and measuring the electricity continuously.	p
Installation:	The energy meter is installed by EID Parry and has been verified on site.	The meter is installed in the plant. The specifications as well as the calibration details are checked during the on site visit.	p
Functionality: Bi-directional; Ac-	Functionality of the meter has been verified on-site	Normal	p

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tive/reactive power			
Quality assurance: All the meters are tested for accuracy and calibrated every six months. Calibration records of meters are available to the verifier.	Meter verification and calibration certificates have been verified during desk-review.	Calibration is performed annually by a third party agency and is traceable to national standards. The Calibration dates are 01.01.2007, 12.11.2007 and 04.11.2008	p
Maintenance: The meter is maintained by EID Parry	The maintenance status has been verified on-site.	The maintenance is done by the shift operators and checked by the power plant manager.	p

3.2.2 Instrument ii

PDD	Verified Situation	Conclusion
Instrumentation Information <i>list all different instruments which have been used during the monitoring period; use a separate table for each single instrument</i>		
ID-PDD:	EG _y	p
ID-Internal:	EG _{Aux, project plant,y}	p
Data to be Measured:	Auxiliary electricity consumption in the project plant	p
Data Logging:	Continuously	p
Archiving of Raw Data:	Daily recording in log books and compilation of monthly reports	p
Measurement Principle:	The auxiliary equipments are supplied through two transformers (called DTR and CTR) during normal operation. The energy supply through all the three sources is monitored	p

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	through three energy meters, which is summed up to calculate the total auxiliary consumption. $EG_{Aux} = EG_{Aux, DTR} + EG_{Aux, CTR} + EG_{DG}$	
Period of Operating Time:	Begin: 14.09.2007 The instrument was in operation during the monitoring period and no change of meter has taken place.	p
Instrument Type:	Electricity meters EM2, EM3, EM4	p
Serial Number:	Aux. DTR -ELI04161 Aux. CTR- ELI04167 Aux. DG- 5298399	p
Manufacturer Model Nr.:	ELITE Secure	p
Specific Location:	HT Panel Room	p
Measurement Range:	(150/1A) / (110V/•3), (150/1A) / 110V/•3, (2500/5A) / (415/•3 - 110•3)	p
Measurement Unit:	kWh	p
Calibration:	Calibration is performed by a third party agency and is traceable to national standards. Calibration dates: EM2: 01.01.2007, 15.11.2007, 05.11.2008 EM3: 01.01.2007, 12.11.2007, 03.11.2008 EM4: 13.08.2007, 05.03.2008, 11.12.2008 All the calibration certificates have been verified by the audit team	p
Required Calibration Frequency:	Annual	p
Uncertainty Level:	Aux. DTR -0.2% Aux. CTR- 0.2%	p

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	Aux. DG- 0.5%	
Monitoring & Calculation		
Reading Frequency:	Continuous	þ
Recording Frequency:	Monthly recording	þ
Trouble Shooting:	A spare meter is in place in case of any failure of the energy meter which is also calibrated.	þ

Inspection Results During Verification			
Operation of Instrumentation	Method of Verification	Verification Results	Conclusion
Measuring Principle: Continuous measurement Through Current transformer (CT) and potential transformer (PT)	The working status of the meter has been inspected.	The meters are working properly and measuring the electricity continuously.	þ
Installation:	The energy meter is installed by EID Parry and has been verified on site.	The meters are installed in the plant. The specifications as well as the calibration details are checked during the on site visit.	þ
Functionality: Bi-directional; Active/reactive power	Functionality of the meter has been verified on-site	Normal	þ
Quality assurance: All the meters are tested for accuracy and cali-	Meter verification and calibration certificates have been verified during desk-review.	Calibration is performed annually by a third party agency and is traceable to national standards.	þ

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brated every six months. Calibration records of meters are available to the verifier.			
Maintenance: The meter is maintained by EID Parry	The maintenance status has been verified on-site.	The maintenance is done by the shift operators and checked by the power plant manager.	p

3.2.3 Instrument iii

PDD	Verified Situation	Conclusion
Instrumentation Information <i>list all different instruments which have been used during the monitoring period; use a separate table for each single instrument</i>		
ID-PDD:	EG _y	p
ID-Internal:	EC _{PJ,y}	p
Data to be Measured:	On-site electricity consumption attributable to the project activity during the year y	p
Data Logging:	Continuously	p
Archiving of Raw Data:	Daily recording in log books and compilation of monthly reports	p
Measurement Principle:	This data has been measured continuously in TNEB energy meters. There are two energy meters connected in parallel to monitor this data. One is the main meter and another is the check meter. The data is also recorded in the "Joint Meter Reading"(JMR) log book in the presence of both plant and TNEB engineers. The energy meters are also used for cross checking the parameter EG _{project plant,y}	p

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Period of Operating Time:	Begin: 14.09.2007 The instrument was in operation during the monitoring period and no change of meter has taken place.	p
Instrument Type:	Electricity meters EM5 and EM6	p
Serial Number:	5462951, 6489252	p
Manufacturer Model Nr.:	L&T ER 300P	p
Specific Location:	TNEB yard	p
Measurement Range:	(125/1A) / (110V/•3 –110kV/•3)	p
Measurement Unit:	kWh	p
Calibration:	Calibration is performed once in a year by the Metering Relay Test Services (MRTS) wing of the TNEB. Calibration dates are 09.08.2007, 07.05.2008 and 18.06.2009. All the calibration certificates have been verified by the audit team.	CR
Required Calibration Frequency:	Annual	p
Uncertainty Level:	0.2%	p
Monitoring & Calculation		
Reading Frequency:	Continuous	p
Recording Frequency:	Monthly recording	p
Trouble Shooting:	Check meter is in place in case of any failure of the main meter.	p

Inspection Results During Verification			
Operation of Instrumentation	Method of Verification	Verification Results	Conclusion

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Measuring Principle: Continuous measurement Through Current transformer (CT) and potential transformer (PT)	The working status of the meter has been inspected.	The meters are working properly and measuring the electricity continuously.	p
Installation:	The energy meter is installed by EID Parry and has been verified on site.	The meters are installed in the plant. The specifications as well as the calibration details are checked during the on site visit.	p
Functionality: Bi-directional; Active/reactive power	Functionality of the meter has been verified on-site	Normal	p
Quality assurance: All the meters are tested for accuracy and calibrated every six months. Calibration records of meters are available to the verifier.	Meter verification and calibration certificates have been verified during desk-review.	Calibration is performed annually by a third party agency and is traceable to national standards. Calibration dates are 09.08.2007, 07.05.2008 and 18.06.2009. All the calibration certificates have been verified by the audit team.	p
Maintenance: The meter is maintained by TNEB	The maintenance status has been verified on-site.	The maintenance is done by the shift operators and checked by the power plant manager.	p

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3.2.4 Instrument iv

PDD	Verified Situation	Conclusion
Instrumentation Information <i>list all different instruments which have been used during the monitoring period; use a separate table for each single instrument</i>		
ID-PDD:	$BF_{k,y}$	p
ID-Internal:	$BF_{k,y}$	p
Data to be Measured:	Quantity of biomass residues type k combusted in the project plant	p
Data Logging:	Continuously	p
Archiving of Raw Data:	Daily recording in log books and compilation of monthly reports	p
Measurement Principle:	Fuel consumption is measured continuously in on-line weighing scale installed in the fuel conveyors. The dry fuel quantity is calculated by adjusting for the moisture content.	p
Period of Operating Time:	Begin: 14.09.2007 The instrument was in operation during the monitoring period and no change of instrument has taken place.	p
Instrument Type:	Online Weighing Scale	p
Serial Number:	316/00	p
Manufacturer Model Nr.:	IPA BCW32L9	p
Specific Location:	Fuel conveyor to boiler	p
Measurement Range:	0 to 45 tonnes per hour	p
Measurement Unit:	tonnes	p
Calibration:	Calibration is performed once in six months. Calibration dates are 25.06.2008,	p

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	27.12.2007, 28.06.2007 and 19.12.2008.	
Required Calibration Frequency:	Bi annual	p
Uncertainty Level:	0.5%	p
Monitoring & Calculation		
Reading Frequency:	Continuous	p
Recording Frequency:	Monthly recording	p
Trouble Shooting:	--	--

Inspection Results During Verification			
Operation of Instrumen- tation	Method of Verification	Verification Results	Conclusion
Measuring Principle: The monitoring of ba- gasse being fed to the boiler is done continu- ously by monitoring the readings of online belt scale installed in the fuel conveyors.	The procedure was verified on site.	In compliance with the methodology/PDD	p
Installation:	The online weighing scale was installed in the plant.	The specifications as well as the calibration details are checked during the on site visit.	p
Functionality:	Functionality of the instru- ment has been verified on- site	OK	p

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Quality assurance:	The online weighing scale and calibration certificates have been verified during desk-review.	OK	p
Maintenance:	The maintenance status has been verified on-site.	The maintenance is done by the shift operators and checked by the head of the cogeneration plant.	p

3.2.5 Instrument v

PDD	Verified Situation	Conclusion
Instrumentation Information <i>list all different instruments which have been used during the monitoring period; use a separate table for each single instrument</i>		
ID-PDD:	TL _y	p
ID-Internal:	TL _y	p
Data to be Measured:	Average truck load of the trucks used for transportation of biomass	p
Data Logging:	Continuously	p
Archiving of Raw Data:	Daily recording in log books and compilation of monthly reports	p
Measurement Principle:	The quantity of biomass transported by each truck from each source is measured in the weigh bridge and recorded. The average truck load is determined by the average of weight of each truck carrying biomass to the project plant .	p
Period of Operating Time:	Begin: 14.09.2007 The instrument was in operation during the monitoring period and no change of instrument has taken place	p
Instrument Type:	Weigh bridge	p
Serial Number:	EB 99W121	p
Manufacturer Model Nr.:	Avery L225	

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Specific Location:	Plant entrance	p
Measurement Range:	0 to 40000 kg	
Measurement Unit:	kg	p
Calibration:	Calibration is performed annually. Calibration dates are 03.03.2007, 04.01.2008, 21.01.2009.	p
Required Calibration Frequency:	Annual	p
Uncertainty Level:	0.0025	p
Monitoring & Calculation		
Reading Frequency:	Continuous	p
Recording Frequency:	Monthly recording	p
Trouble Shooting:	--	

Inspection Results During Verification			
Operation of Instrumentation	Method of Verification	Verification Results	Conclusion
Measuring Principle:	The procedure was verified on site.	In compliance with the methodology/PDD	p
Installation:	The weighbridge was installed at the plant and were verified.	The weighbridge was installed in the plant. The specifications as well as the calibration details are checked during the on site visit.	p
Functionality:	Functionality of the instrument has been verified on-site	OK	p

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Quality assurance:	The weighbridge data and calibration certificates have been verified during desk-review.	OK	p
Maintenance:	The maintenance status has been verified on-site.	The maintenance is done by the shift operators and checked by the head of the cogeneration plant	p

3.3 Accounting information

PDD	Verified Situation	Conclusion
Accounting Information <i>list all significant accounted components which have been used during the monitoring period; use a separate table for each single component</i>		
ID-PDD:	Not required according to the methodology	p
ID-Internal:	The monthly invoice raised by the project owner to the grid is used to cross check the electricity generated.	p
Description of Accounted Component:	The incremental electricity generated is exported to the grid. The monthly invoice raised by the project owner to the grid is used to cross check the electricity exported. On the other hand, the payment will be made by the project owner according to the consumed power fed from the grid and the receipt will be delivered by the electricity board.	p
Accounting Unit:	kWh	
Quality Assurance Measures / System:	<u>Clarification Request No.6</u> The monthly export values given in the excel sheet does not match with that of the export to the grid as per the monthly invoices raised by EID Parry (for any of the months during the monitoring period). Please clarify the exact units of electricity exported to the grid?	CR

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Account Archived:	Monthly Invoices archived by the Accounts department of the plant and has been checked by the audit team during the site visit.	p
Account Credible / in Line with PDD:	Invoice is used for cross check.	

3.4 External Data

PDD	Verified Situation	Conclusion
External Data <i>list all external data components which have been used during the monitoring period; use a separate table for each single component</i>		
ID-PDD:	EF _{km, CO2}	p
ID-Internal:	EF _{km, CO2}	p
Description of Data / Data Refers to:	Average CO ₂ emission factor for transportation of biomass with trucks	p
Unit of Data (if appropriate):	tCO ₂ /km	p
Date of Data Income:	N.A	p
Source of Data:	EID Parry truck fuel economy measurement records, Central Electricity Authority of India and IPCC default values	p
Reliability of Data Source:	International default values	p
Is the Data up-to-date?	Yes	p
Uncertainty Level:	N.A	p

PDD	Verified Situation	Conclusion
External Data <i>list all external data components which have been used during the monitoring period; use a separate table for each single component</i>		

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ID-PDD:	EF _{CO2,FF, i}	p
ID-Internal:	EF _{CO2,FF, i}	p
Description of Data / Data Refers to:	CO ₂ emission factor for fossil fuel type i	p
Unit of Data (if appropriate):	tCO ₂ /km	p
Date of Data Income:	2006	p
Source of Data:	IPCC latest default values in case of Coal and diesel and National data in case of Lignite	p
Reliability of Data Source:	International default values and National Data	p
Is the Data up-to-date?	Yes	p
Uncertainty Level:	N.A	p

PDD	Verified Situation	Conclusion
External Data <i>list all external data components which have been used during the monitoring period; use a separate table for each single component</i>		
ID-PDD:	NCV _k	p
ID-Internal:	NCV _k	p
Description of Data / Data Refers to:	Net calorific value of biomass residue type k	p
Unit of Data (if appropriate):	GJ/tonne	p
Date of Data Income:	NCV analyses have been done on 20.09.2007, 22.01.2008, 14.05.2008 and 28.08.2008 during the monitoring period. As per the methodology and also as per the monitoring plan, this is to be done bi annually.	p
Source of Data:	Analysis report of third party laboratory	p
Reliability of Data Source:	Accredited laboratory	p

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Is the Data up-to-date?	Yes	p
Uncertainty Level:	N.A	p

PDD	Verified Situation	Conclusion
External Data <i>list all external data components which have been used during the monitoring period; use a separate table for each single component</i>		
ID-PDD:	NCV _i	p
ID-Internal:	NCV _k	p
Description of Data / Data Refers to:	Net calorific value of fossil fuel of type i	p
Unit of Data (if appropriate):	GJ/tonne	p
Date of Data Income:	NCV analyses have been done bi annually as per the methodology and also as per the monitoring plan.	p
Source of Data:	Analysis report of third party laboratory	p
Reliability of Data Source:	Accredited laboratory	p
Is the Data up-to-date?	Yes	p
Uncertainty Level:	N.A	p

3.5 Others

PDD	Verified Situation	Conclusion
Others <i>insert all miscellaneous components as necessary due to PDD and applied methodology version; use a separate table for each single component</i>		
ID-PDD:	FF _{project site, i,y}	p

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ID-Internal:	FF _{project site, i,y}	p
Description of Component:	Quantity of fossil fuel type i combusted at the project site for other purposes that are attributable to the project activity during the year y	p
Unit of Component (if appropriate):	Tonnes	p
Date Component:	---	
Source of Component:	Log books	p
Reliability of Source:	The measured values are cross-checked with an annual fuel balance based on purchased quantities and stock	p
Up-to-date?	Yes	p
Uncertainty Level:	--	p

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4 Data Verification

4.1 Internal Review

Description and performance of internal review			
	Description	Comments	Concl.
Procedure	The recording of data is carried out by switch board attendants who report this to the shift engineer. The engineer in charge reviews the data received and compiles a daily report and sends it to the Plant Head. All the above staff are professionally qualified with experience in operating bagasse cogeneration plants. The monitored data is reported to Cogeneration plant Head, who is responsible for the monitoring of the project activity. All the above staffs are professionally qualified with experience in operating bagasse cogeneration plants. The staff is aware of the quality assurance procedures and the same have been found to be implemented effectively. Also, Monthly reports are prepared from these daily reports and are subjected to internal audits conducted every six months.	OK	p
Documentation	The internal audit reports were checked during onsite audit	OK	p
Responsibilities	The final internal approval of the Monitoring Report was given by the Executive Director of EID Parry	OK	p

4.2 Usage of default values

Description and performance of internal review			
	Description	Comments and Results	Concl.
Procedure	IPCC 2006 default value for emission factor of diesel = 74100	OK	p

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	kgCO ₂ /TJ Central Electricity Authority data for NCV of diesel = 10270 kcal/kg Emission factor of grid= 0.85 tCO ₂ /MWh		
Documentation	--	--	p
Responsibilities	--	--	p

4.3 Reproducibility

Description and performance of the assessment			
	Description	Comments and Results	Concl.
Procedure	A complete check was performed by the audit team on the emission reduction calculation, bagasse consumption data, NCV and EG _{total} . The electricity exported to the grid and the electricity imported from the grid have been cross-checked with meter readings, log books and sales invoices.	The data have the reproducibility.	p

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4.4 Peculiarities

Description of Peculiarities and unexpected Daily Events during the verification period			
	Description	Comments and Results	Concl.
Performance	The turbine was not in operation for 59 days. The outage details of the plant were verified on site.	OK	p
Documentation	Yes, these outages are indicated in the plant records.	<u>Corrective Action Request No.13</u> What kind of emergency preparedness plans are set up in the plant? Include the same in monitoring report.	CR
Measures	Measures are initialized to stabilize the performance of the facility	OK	p

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4.5 Reliability and Plausibility

Description of crosschecks and plausibility checks				
	Description	Comments and Results	Concl.	
Performance	During the desk-review audit, the audit team has cross-checked and verified the following internal and external data:		OK	p
	Parameter	Means of verification		
	Net quantity of electricity generated, calculated from gross generation and auxiliary consumption in the project plant during the year	The data in the CER calculation tool and monitoring report have been verified from the daily and the monthly plant log books. The net electricity generation is verified from the difference of gross electricity generation and auxiliary consumption of the project plant. The gross electricity generation is monitored from the energy meter EM1. The auxiliary consumption is monitored from the energy meters EM2, EM3 and EM4. The net electricity generation is calculated by deducting the auxiliary consumption from the gross electricity generation.		
	Quantity of biomass type i combusted in the project plant	The verification is based on the readings of the online weighing belt scale installed in the fuel conveyors. The quantity of biomass consumed in the project plant is directly measured on basis of bagasse fed to the project boiler. The quantity of dry biomass is calculated by deducting		

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		the moisture content of biomass. The plant uses bagasse, groundnut shell and cane trash. The daily log books have been verified to check the parameter.		
	Net quantity of heat generated from firing biomass in the project plant,	The net quantity of heat generated is calculated from the measured values of steam flow and enthalpy, steam pressure and steam temperature data from the plant. This parameter is determined based on the difference of the enthalpy of the steam generated minus the enthalpy of the feed water and any condensate return.		
	Net calorific value of biomass residue type i	Based on the annual reports from the accredited laboratories		
	Net calorific value of fossil fuel type i	Based on the annual reports from the accredited laboratories		
	Quantity of fossil fuel type i combusted in the project plant during the year	The verification is based on the readings of the online weighing belt scale installed in the fuel conveyors. The quantity of fossil fuel type consumed in the project plant is directly measured on basis of fuel fed to the project. Coal and lignite are used in the project.		
	Quantity of fossil fuel type i combusted at the project site for other	The verification is based on the readings of the volume meter and the daily log books to record the die-		

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	purposes that are attributable to the project activity during the year	sel consumed in DG sets.		
	On site electricity consumption attributable to the project activity during the year	The data in the CER calculation tool and monitoring report have been verified from the daily and the monthly plant log books. This parameter is measured from the main and check meters. This on site electricity consumption excludes the grid import and generation in the DG set as they are covered under auxiliary consumption.		
	Average return trip distance between biomass fuel supply sites and project site	The trip sheets and the plant SAP data for the transportation of biomass to project site have been verified.		
	Average truck load of the trucks used for transportation of biomass	The average truck capacity has been checked from plant records		

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4.5 Completeness and Correctness

Description of completeness and correctness			
	Description	Comments and Results	Concl.
Correctness	The data regarding the energy meters, calibration details, accuracy levels needs to be indicated in the MR.	<p><u>Corrective Action Request No.14</u> Include details of all the energy meters, weighing scale and weigh bridge including spare/ stand by meters with the calibration details in the Monitoring Report.</p> <p><u>Corrective Action Request No.15</u> Provide a single line diagram showing the metering locations of the plant in the monitoring report.</p> <p><u>Corrective Action Request No.16</u> Include the parameter 'Net quantity of electricity exported to grid in MR.'</p> <p><u>Corrective Action Request No.17</u> It needs to be demonstrated in the MR how the thermal firing capacity is maintained same as that of pre-project plant after project implementation, though the power generation capacity increased.</p> <p><u>Corrective Action Request No.18</u> It needs to be stated in MR why the net electricity generation is significantly lower for the month of November'07 for the monitored period.</p> <p><u>Corrective Action Request No.19</u></p>	CAR

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		<p>The GPS coordinates of the project plant needs to be mentioned in the MR (as per the decimal format)</p> <p><u>Clarification Request No.7</u></p> <p>The parameters $EC_{PJ,y}$, Moisture content of biomass residues, $FF_{\text{project site, i,y}}$, $Q_{\text{project plant,y}}$ which are included in the MR are not actually in the monitoring plan of registered PDD. Also some of the parameters, the measurement methods and QA/QC procedures are not consistent with the registered MP.</p> <p><u>Clarification Request No.8</u></p> <p>The ER's claimed in the published MR are 61131 tCO₂e where as in the final MR, the ER's are 65490 tCO₂e.</p> <p><u>Clarification Request No.9</u></p> <p>The project uses different types of biomass (ground nut shell and cane trash) besides bagasse, though it is not explicitly mentioned in the registered PDD/ revised MP. Please clarify.</p>	
Completeness	Data covering the whole monitoring period has been provided to the DOE and verified by the same.	OK	p

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5 Additional requirements

Not Applicable

6 Data Reporting

Description of the Monitoring Report		
	Comments and Results	Concl.
Compliance with UNFCCC regulations	Please see all the above CARs/CRs	CAR CR
Completeness and Transparency	Please see all the above CARs/CRs	CAR CR
Correctness	Please see all the above CARs/CRs	CAR CR
Key Reporting Risks: Low Risk Classification: Low Further Remarks: None		

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7 Compilation and Resolutions of CARs, CRs and FARs

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<p><u>Corrective Action Request #1:</u></p> <p>The present status of the existing plant needs to be mentioned in the MR as per scenario 14 of ACM0006 ver 4.</p>	<p>The pre-project cogeneration system is kept idle at the project site. The status of the system is now included in the section 1 of the MR.</p> <p><u>Further response</u></p> <p><i>The details of the pre-project system with technical specification is now included in the revised MR, please refer page No. 5.</i></p>	<p>Please include the details of the pre project system with technical specifications.</p> <p><u>Final Response by the Audit Team</u></p> <p>The details of pre project system are included in the MR. Hence the issue remains closed.</p> <p>þ</p>
<p><u>Corrective Action Request #2</u></p> <p>When the high pressure boiler was installed? When was the actual commissioning date of the project activity? Include the same in the monitoring report.</p>	<p>The high pressure project activity was commissioned on 28 March 2006. The date is being included in the MR section 1.</p>	<p>The commissioning date has been included in the revised MR. Hence the issue remains closed.</p> <p>þ</p>
<p><u>Corrective Action Request #3</u></p> <p>Please include the plant outage details during the monitoring period of the project activity in the MR. Also mention the troubleshooting procedures in place in the plant.</p>	<p>The planned outage details of the project plant during the monitoring period is now included in the MR.</p> <p>Trouble-shooting procedures are also included in Annex 4 of the MR.</p>	<p>The outage details are included in the MR. This was also verified from the plant records. The troubleshooting procedures are also indicated. Hence the issue remains closed.</p> <p>þ</p>
<p><u>Corrective Action Request #4</u></p> <p>In the QA/QC procedures, Mention the calibration frequency, data recording procedure of all the energy meters used in the project activity. Also include how the cross check of the readings is done.</p>	<p>The calibration frequency, procedure and method of cross-check for each parameter is now included in the revised MR.</p>	<p>The QA/QC procedures are indicated. Hence the issue remains closed.</p> <p>þ</p>

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<p><u>Corrective Action Request #5</u></p> <p>Mention the QA/QC procedures of the parameter EC_{PJ,y} as per the methodology.</p>	<p>For ECPJ,y – “on-site electricity consumption attributable to the project activity”, the metered consumption figures are cross-checked with invoices from the Tamil Nadu Electricity Board (TNEB) for power purchase, as per the QA/QC procedure in ACM0006. The same is now included in the revised MR.</p> <p><u>Further response</u></p> <p><i>Copies of TNEB's invoice for power purchase are now being submitted.</i></p> <p><u>Second response:</u></p> <p><i>The monthly import value reported in the TNEB invoice for a particular period and the value calculated based on the daily monitored import data for that relevant period is reported in the CER excel sheet.</i></p> <p><i>Though both the readings are taken from the same energy meter, there is always a minor difference in value between the reported value in the TNEB invoice and the sum of the daily value for the relevant reported period recorded by EID Parry. This is because of the difference in the time of recording between EID Parry and TNEB persons.</i></p>	<p>The QA/QC procedures are indicated for EC_{PJ,y}. Please submit the invoices from the Tamil Nadu Electricity Board (TNEB) for power purchase.</p> <p><u>Further Response by the Audit Team</u></p> <p>The invoices for power purchase from TNEB are submitted. The values given in the excel sheet for a particular month do not match with the value in the invoice. Please clarify?</p> <p><u>Final Response by the Audit Team</u></p> <p>The response can be accepted based on the fact that the time of recording the readings is different for TNEB and EID Parry. Hence the issue remains closed.</p> <p>þ</p>
<p><u>Corrective Action Request #6</u></p> <p>Include the parameter TL_y as per the methodology as option 2 has been used to calculate project emissions from transportation of bio-</p>	<p>The parameter TL_y has been now included in the calculation of project emission from outside biomass transportation. The revised CER calculation sheet and MR are being submit-</p>	<p>The parameter has been included in the revised MR. Hence the issue remains closed.</p> <p>þ</p>

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mass.	ted.	
<p><u>Corrective Action Request #7</u></p> <p>Please include measurement methods for fossil fuels combusted in the project in the MR. Also include how the quantity of diesel consumed in the DG sets is monitored.</p>	<p>Coal and lignite have been combusted to a minor extent in the project activity. The consumption of these fuels has been monitored using an online-weighing scale installed in the boiler fuel feeding conveyor. The same is now included in the revised MR.</p> <p>The quantity of fossil fuel (diesel) consumed in the DG sets is measured using the volume meter (dip-stick) method. This consists of monitoring the depth of fuel level in the DG set fuel tank before and after the DG operation, using a fixed standard steel Ruler. The differential fuel level (depth) is multiplied with the tank's cross-sectional area to arrive at the volume of fuel consumed</p>	<p>The measurement methods for fossil fuels combusted in the project is indicated. The monitoring procedure for diesel consumption is also included and is in line with methodology. Hence the issue remains closed.</p> <p>þ</p>
<p><u>Corrective Action Request #8</u></p> <p>Whether energy balance has been done for the verification period and if so, include the same in the monitoring report.</p>	<p>Annual energy balance has been performed for the verification period and the same is now included as "Annex 1" in the MR.</p> <p><u>Further response</u></p> <p><i>Month wise fuel and energy balance is now included in the revised CER excel spreadsheet. Please refer to the attached CER excel spread sheet.</i></p> <p><u>Second response:</u></p> <p><i>The percentage deviation of the calculated value from the measured value is now updated in the revised CER sheet.</i></p>	<p>Please include the energy and fuel balance performed in the CER calculation spreadsheet, with month wise data.</p> <p><u>Further Response by the Audit Team</u></p> <p>The fuel balance for bagasse needs to be checked by the PP.</p> <p><u>Final Response by the Audit Team</u></p> <p>The measured value, calculated value and the deviation are indicated in the excel sheet and hence the issue remains closed.</p> <p>þ</p>

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	<i>The measured value consumed in the project activity is based on the measurement taken continuously using online fuel weighing system installed in the fuel conveyors. The calculated value of bagasse is computed as "In-house generation + Opening stock + Fuel purchased - Closing stock". There will always be a minor difference between the measured value and calculated value since the calculated value is based on indirect measurement method of in-house bagasse generated (i.e., using material balance).</i>	
<u>Corrective Action Request #9</u> The value for pre project efficiency should be the same as that of the registered PDD. Modify it accordingly in the excel sheet as well as the MR.	The value for pre-project efficiency is now revised in the MR and CER calculation sheet as per the registered PDD.	The value of pre project efficiency has now been revised as per the PDD. Hence the issue remains closed. p
<u>Corrective Action Request #10</u> In the excel sheet for daily power generation, the values for Auxiliary DTR consumption on 15 th and 17 th January & 30 th September 2008 do not match with the plant log books. Please change accordingly	The values for Auxiliary DTR consumption for the said dates have been entered wrongly in the excel sheet due to transcriptional error. The same has been corrected and the revised excel sheet is being submitted to the DOE.	The excel sheet has been corrected and hence the issue remains closed. p
<u>Corrective Action Request #11</u> In the spreadsheet for calculating project emissions due to transportation of biomass to the project site, the roundtrip distance from project site to sugar mills should be according	The round trip distance from project site to biomass sources are now being corrected in the MR and CER calculation sheet as per the measured records	The excel sheet has been corrected based on the round trip distance from project site to biomass sources. Hence the issue remains closed. p

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to the plant records (Trip/distance sheets).		
<u>Corrective Action Request #12</u> What kind of consistency measures and quality assurance procedures are adopted to check the values of NCV _k and NCV _i ? Provide the details of the same in MR.	The adopted consistency measures and quality assurance procedures are now included in the revised MR for NCV _k and NCV _i . Please refer to page no. 28 of the revised MR.	The consistency measures and QA procedures are indicated for the parameters and are in line with the methodology. Hence the issue remains closed. p
<u>Corrective Action Request #13</u> What kind of emergency preparedness plans are set up in the plant? Include the same in monitoring report.	Emergency preparedness plans are now being included in the MR Annex 4.	Included and hence the issue remains closed. p
<u>Corrective Action Request #14</u> Include details of all the energy meters, weighing scale and weigh bridge including spare/ stand by meters with the calibration details in the Monitoring Report.	Details of all energy meters and other monitoring equipments including the serial number, accuracy etc are being included in the revised version of the MR. <u>Further response</u> <i>The additional requisite details of all energy meters, weighing scale and weigh bride are now included in the revised MR. Please refer to page no. 9 of the revised MR.</i> <u>Second response:</u> <i>The required calibration frequency and measurement range for the energy meters is now included in the revised MR. Please refer to page no. 9 of the revised MR.</i>	The details of all the energy meters, weighing scale and weigh bridge are now included in the revised MR. In addition to that, please include these details in the table. 1. Meter/equipment manufacturing model no. 2. Measurement range 3. Measurement unit 4. Required calibration frequency 5. Recording frequency <u>Further Response by the Audit Team</u> The required calibration frequency for energy meters is not indicated. Also the measurement range needs to be mentioned for energy meters.

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		<u>Final Response by the Audit Team</u> The required calibration frequency and the measurement methods for energy meters are indicated in the MR. Hence the issue remains closed. p
<u>Corrective Action Request #15</u> Provide a single line diagram showing the metering locations of the plant in the monitoring report.	A single line diagram showing the various energy meters and other monitoring equipments are now included in the MR. Separate file is also provided to the DOE.	The single line diagram showing the metering locations of the plant is included in the revised MR and hence the issue remains closed. p
<u>Corrective Action Request #16</u> The parameter 'Net quantity of electricity exported to grid' is not included in the monitoring parameters.	This parameter is monitored as a cross checking measure to verify the net electricity generation from the project activity and is included in the registered PDD as EG _y . The parameter is now included.	The parameter is included and hence the issue remains closed. p
<u>Corrective Action Request #17</u> It needs to be demonstrated in the MR how the thermal firing capacity is maintained same as that of pre-project plant after project implementation, though the power generation capacity increased.	The MR is revised to include the same.	The thermal capacity is maintained same as that of the pre-project after project implementation. The fuel firing capacity in the pre-project plant boilers are 16 TPH and 29 TPH where as the capacity of the Project Boiler is 45 TPH. Hence the issue remains closed. p
<u>Corrective Action Request #18</u> It needs to be stated in MR why the net electricity	The necessary changes incorporated accordingly.	Hence the issue remains closed.

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generation is significantly lower for the month of November'07 for the monitored period.		p
<u>Corrective Action Request #19</u> The GPS coordinates of the project plant needs to be mentioned in the MR (as per the decimal format)	The necessary changes incorporated accordingly.	Hence the issue remains closed. p
<u>Corrective Action Request #20</u> With reference to the EB incompleteness issue, Please clarify how the value of biomass moisture is calculated in the CER spreadsheet for the month of September 2007 (in "Daily Fuel Data" sheet)?	<p>In the earlier submission, Monthly data of moisture considered in the CER spreadsheet is presented as "number/value directly" and not as a "calculated number/value". This moisture data is a calculated monthly value based on weighted average approach.</p> <p>The moisture data in the CER spreadsheet has been now corrected to "calculated number/value as monthly weighted average". <i>In addition, the weighted average moisture data is rounded down to two digits to further demonstrate conservativeness.</i></p> <p>Correction in moisture data for the month of Sep 2007:</p> <p>Own Bagasse: Weighted average moisture data for the period from 14-Sep-07 till 30-Sep-07 is 54.22 %. The weighted average moisture data for the entire month from 01-Sep-07 till 30-Sep-07 is 53.91 % (Calculated value). This data has been considered to demonstrate conservativeness. Relevant copies of the daily log book and RT 7 (c)</p>	<p>The value of Moisture content in the earlier submission is not shown as calculated value in the excel sheet. Though this is calculated based on weighted average approach, the same has not been demonstrated.</p> <p>In the revised excel sheet, this has been shown as a weighted average value for the Monthly moisture content. On a conservative note, this value has been rounded down for emission reduction calculations. However the monthly moisture values have been also checked from the RT-7c forms which are submitted by the Sugar plant to the Government.</p> <p>The overall emission reductions from the earlier submission to those present has been decreased by 1 as a result of the above approach. Hence the approach is conservative. It could be accepted that the values used in the excel sheet are the weighted average data for moisture con-</p>

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Corrective Action Requests by audit team	Summary of project owner response	Audit team conclusion
	<p>forms have been already submitted to DOE. Information on this is also included in the CER spreadsheet in the sheet named "Daily Fuel Data".</p> <p>Purchased Bagasse: Weighted average moisture data for the period from 14-Sep-07 till 30-Sep-07 is 52.00 %. The weighted average moisture data for the entire month from 01-Sep-07 till 30-Sep-07 is 51.16 % (Calculated value). This data has been considered to demonstrate conservativeness. Relevant copies of the daily log book has been already submitted to DOE. Information on this is also included in the CER spreadsheet in the sheet named "Daily Fuel Data".</p> <p>Please refer to the relevant documents (Daily log books and RT 7 (c) forms) for details which have been already submitted to DOE.</p>	<p>tent. Hence the issue remains closed. p</p>
Clarification Requests by audit team	Summary of project owner response	Audit team conclusion
<p><u>Clarification Request #1:</u> Please submit the reports of internal audit conducted in the plant.</p>	<p>Internal audit of the monitored data have been done once every quarter. Management review of the data has been done during the monthly CDM meetings. Copy of the internal audit reports and review meeting documents are being submitted to the DOE.</p> <p><u>Further response</u></p>	<p>The quarterly reports of internal audit needs to be submitted. <u>Final response</u> Submitted and hence the issue remains closed. p</p>

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Corrective Action Requests by audit team	Summary of project owner response	Audit team conclusion
	<i>The quarterly internal audit reports are now being submitted.</i>	
<p><u>Clarification Request #2:</u></p> <p>Please submit the documents supporting the training on equipment and monitoring procedures.</p>	<p>The Operation and Maintenance (O&M) team was initially trained by the equipment suppliers on the different aspects of equipment function.</p> <p>Subsequently, internal training was conducted on the data monitoring and recording aspects and other CDM parameters.</p> <p>Documentary proof for training provided is being submitted to the DOE.</p>	<p>A brief note on the main issues of CDM monitoring training and the personnel attended is submitted.</p> <p>Hence the issue remains closed.</p> <p>p</p>
<p><u>Clarification Request #3</u></p> <p>The net quantity of electricity generated in the project plant needs to be metered as per the methodology and the same is in the monitoring plan of the PDD, where as the MR shows that it is calculated. Also the parameters EG gross and EG aux are not in the monitoring plan.</p>	<p>The net quantity of electricity generated in the project activity is calculated by deducting the auxiliary consumption from the gross electricity generation as $EG_{\text{project plant}} = EG_{\text{gross}} - EG_{\text{Aux}}$. The parameters EG_{gross} and EG_{aux} are monitored, used to calculate the $EG_{\text{project plant,y}}$ and are not included in the registered PDD.</p> <p><u>Further response</u></p> <p>We understand that request for deviation for the parameter $EG_{\text{project plant,y}}$ is necessary at this stage to proceed on with verification closure.</p>	<p>The parameter EG project plant is to be metered as per methodology and the same is in the PDD but the MR says that is calculated based on EG gross and EG aux. The monitoring parameters EG gross, EG aux as stated in the MR are not included in the PDD. Hence, this is a deviation with respect to the monitoring plan for the current monitoring period and needs to be submitted to EB.</p> <p><u>Final Response by the Audit Team</u></p> <p>The “Net quantity of electricity generated in the project plant” is not monitored as per the registered PDD. This is done by metering the gross electricity generation and auxiliary consumption and the net electricity generation is calculated by deducting</p>

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Corrective Action Requests by audit team	Summary of project owner response	Audit team conclusion
		<p>the metered auxiliary consumption from the metered gross electricity generation. Accordingly deviation request has been submitted to the CDM-EB on 10th September 2009 for this deviation in the monitoring plan.</p> <p>(http://cdm.unfccc.int/UserManagement/FileStorage/RRGIEHYBLNTP5377OE6BJ1JUL30HZM)</p> <p>The EB has accepted this deviation for the current monitoring period in its 50th meeting on 16th October 2009.</p> <p>(http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_BMIBWXRD1JX8TR83TSBHMAL4V0U981).</p> <p>Hence the issue remains closed.</p> <p>þ</p>
<p><u>Clarification Request #4</u></p> <p>It needs to be stated in MR why the ER's in the monitoring period are not in line with that of the registered PDD.</p>	<p>The difference in achieved emission reduction (ER) as compared to the estimated ER in the registered PDD is due to project emissions from combustion of fossil fuel in the project plant and combustion of fossil fuel at the project site for other purpose that are attributable to the project activity during the monitoring period.</p>	<p>The plant was in operation for 306 days in the current monitoring period. The emission reductions during the current monitoring period are lower as compared to that of the registered PDD for the same period as there were project emissions of 13842 tCO₂e from combustion of fossil fuel in the project plant and project site for other purpose that are attributable to the project activity during the monitoring period, which</p>

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Corrective Action Requests by audit team	Summary of project owner response	Audit team conclusion
		are not accounted in the registered PDD. The response could be accepted and hence the issue remains closed. p
<p><u>Clarification Request #5:</u> Provide the calibration certificates of the TNEB Export/Import meter installed in the plant.</p>	<p>The Meter Relay Test Services (MRTS) wing of TNEB has performed the calibration of their export/import meter. TNEB has noted the same in the "Joint Meter Reading" log book and the same has been signed by TNEB officials with their official seal. Copy of the same is provided to the DOE.</p> <p><u>Further response</u> <i>Copy of the calibration certificate for EM5 & EM6 issued by TNEB is now being submitted.</i></p>	<p>It has been mentioned in the PDD (page 64) <i>that calibration of instruments and equipments will be carried out once a year and recorded in calibration reports</i>, the calibration certificate of the energy meters EM5 and EM6 needs to be submitted to the DOE.</p> <p><u>Final Response by the Audit Team</u> The letter from TNEB indicating the calibration of main and check meters is submitted. Hence this issue remains closed. p</p>
<p><u>Clarification Request #6:</u> The monthly export values given in the excel sheet does not match with that of the export to the grid as per the monthly invoices raised by EID Parry (for any of the months during the monitoring period). Please clarify the exact units of electricity exported to the grid?</p>	<p>The joint meter reading is carried out by TNEB personnel and EID Parry between 27-29th day of every month. As per this cycle, the monthly billing cycle for TNEB is from 27th to 28th of a month. The monthly invoice for the relevant period would be raised accordingly by EID Parry. However, the electricity export data given in the CER excel spread sheet reflects the power exported from 1st to 30th of the month. The electricity export as per the TNEB invoice for a particular month can be crosschecked with the CER excel spread-sheet by considering the appropriate daily</p>	<p>The electricity export as per the invoice raised by EID Parry for a particular month do not match with the values for the period (27th-28th) of every month. Please clarify?</p> <p><u>Final Response by the Audit Team</u> The difference in the invoice and the readings is due to the time of recording of reading by TNEB and EID Parry which has been explained in the CER excel sheet. . Hence this issue remains closed. p</p>

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Corrective Action Requests by audit team	Summary of project owner response	Audit team conclusion
	<p>values (27th to 28th of a month).</p> <p><u>Second response:</u></p> <p><i>The monthly export value reported in the TNEB invoice for a particular period and the value calculated based on the daily monitored export data for that relevant period is reported in the CER excel sheet.</i></p> <p><i>Though both the readings are taken from the same energy meter, there is always a minor difference in value between the reported value in the TNEB invoice and the sum of the daily value for the relevant reported period recorded by EID Parry. This is because of the difference in the time of recording between EID Parry and TNEB persons.</i></p>	
<p><u>Clarification Request #7</u></p> <p>The parameters $EC_{PJ,y}$, Moisture content of biomass residues, $FF_{project\ site,\ i,y}$, $Q_{project\ plant,y}$ which are included in the MR are not actually in the monitoring plan of registered PDD. Also some of the parameters, the measurement methods and QA/QC procedures are not consistent with the registered MP.</p>	<p>Revision of the monitoring plan:</p> <p>During the initial and first periodic verification, it has been observed that the monitoring plan of the registered PDD is not in accordance with the approved monitoring methodology applied to the project activity i.e. ACM0006 Version 04. In order to fulfil with the monitoring requirement, a request for revision of the registered monitoring plan incorporating the approved monitoring procedure for net electricity generation and other appropriate revisions required as per adopted methodology were sought and have been approved by</p>	<p>A request for deviation regarding the monitoring of net quantity of electricity generated in the project plant ($EG_{project\ plant,y}$) for the current monitoring period has been deviation request has been submitted to the CDM-EB on 10th September 2009 for this deviation in the monitoring plan. The EB has accepted this deviation for the current monitoring period on 16th October 2009.</p> <p>A request for revision of the monitoring plan was also submitted to EB on for incorporating the approved monitoring procedure for $EG_{project\ plant,y}$ and other parame-</p>

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Corrective Action Requests by audit team	Summary of project owner response	Audit team conclusion
	CDM EB on 29/06/2010 ¹ .	ters which are not as per the methodology in the registered PDD. The CDM-EB has approved the revision in the monitoring plan on 29 th June 2010. Hence this issue remains closed. p
<u>Clarification Request #8</u> The ER's claimed in the published MR are 61131 tCO ₂ e where as in the final MR, the ER's are 65490 tCO ₂ e.	Difference in ER reduction value between the webhosted MR and the final MR is due to the following reasons: 1. Consideration of pre-project efficiency as per registered PDD i.e. 0.03654 (Please refer to CAR 11 and its response in the verification protocol) has resulted in increased incremental energy generation from 88031 MWh to 93962 MWh in the final MR. Other corrections such as change in NCV value of Purchased bagasse (which has resulted in reduced heat equivalent), change in NCV value of Lignite (which has resulted in increased heat equivalent) has resulted in overall increase of net heat equivalent of all fuels and reduced the efficiency of electricity generation marginally from 0.1966 to	The ERs claimed in the published and final MR were compared. The pre-project efficiency value was not taken as per the PDD in the published MR. There is also a difference in the actual NCV values of bagasse and lignite, which was corrected in the final MR. This has lead to an increase in the ERs from published MR to final MR. The ERs claimed are deemed to be conservative and correct. Hence this issue remains closed. p

¹ Registered revised monitoring plan:

<http://cdm.unfccc.int/UserManagement/FileStorage/ZW6XPBNHMLRO9QS0A5TFK872DIJYEV>

Validation report of revised monitoring plan:

<http://cdm.unfccc.int/UserManagement/FileStorage/G9KWZR7OP148BTUFLYDINSVJM32EQA>

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	<p>0.1964 presented in the final MR.</p> <p>2. Corrected value of lignite's NCV as per registered revised monitoring plan has resulted in increased project emissions from project activity.</p>	
<p><u>Clarification Request #9</u></p> <p>The project uses different types of biomass (ground nut shell and cane trash) besides bagasse, though it is not explicitly mentioned in the registered PDD/ revised MP. Please clarify.</p>	<p>The project activity was conceptualized for usage of bagasse as the predominant fuel in the project plant. However, some amount of other <u>"outside biomass residues and coal for co-firing"</u> during <u>"bagasse shortages"</u> will be co-fired during drought and/or other emergency situations. Please refer to details provided under the heading <u>"Biomass and other fuels"</u> in Annex 4 (Monitoring information, Page 57) of the registered PDD for details.</p> <p>It is to be noted that</p> <ol style="list-style-type: none"> 1. the other biomass types, i.e. the ground nut shell and cane trash used in the project plant of the project activity are "biomass residues" that is an agro waste (residue or waste stream from agriculture). 2. No other biomass types than biomass residues, as defined in the adopted methodology, are used in the project plant. <p>Thus, the biomass types used in the project activity meets the methodology requirement².</p>	<p>The plant uses different types of biomass residues such as bagasse, groundnut shell and cane trash. Though it is not explicitly mentioned in the PDD, the Annex 4 mentions it as "Biomass and other fuels" which gives an indication of the type of biomass fuels. The type of biomass fuels is also in line with the methodology ACM0006 ver.04 as it mentions <i>biomass that is a by-product, "residue or waste stream from agriculture", forestry and related industries</i>.</p> <p>The PDD section B.2 indicates usage of bagasse as the predominant fuel and no mention is made on the type of biomass neither in section B.2 nor in Annex 4. The PP had clearly documented in Annex 4 of the registered PDD that "outside biomass" and "coal" would be "purchased" for "co-firing" during "bagasse shortage situations". The groundnut shell and cane trash are only biomass residues which have been purchased from outside for co-firing</p>

² Reference from adopted methodology, ACM0006 Version 04: **Biomass residues:** Biomass residues are defined as biomass that is a by-product, "residue or waste stream from agriculture", forestry and related industries. This shall not include municipal waste or other wastes that contain fossilized and/or non-biodegradable material.

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	<p><u>Parameters monitored w.r.t biomass residues:</u></p> <p>It is also to be further noted that all the biomass residue types used in the project activity are being monitored and it meets the monitoring criteria (i.e. requirements) as per adopted methodology, ACM0006 Version 04. Please refer to the revised monitoring plan approved by CDM EB and the validation report of revised monitoring plan.</p> <p><u>Summary of the parameters monitored:</u></p> <p>1) The parameters related to biomass residues used in the “<u>project plant</u>” which includes $BF_{k,y}$ & NCV_k (where k represents the biomass residue type) are being monitored. These two parameters would be used for emission reduction calculation.</p> <p>2) The associated parameters i.e. total quantity of biomass residues purchased in the “<u>project activity</u>” is also being monitored. This would be used to perform annual fuel balance as a cross-checking measure and to improve completeness of information.</p> <p>3) We take this opportunity to further clarify that, though section B.2 indicates usage of bagasse as the predominant fuel and no mention is made on the type of biomass neither in section B.2 nor in Annex 4, the project participant had clearly documented in Annex 4 of</p>	<p>in the project plant_during bagasse shortage situations. This has been verified by the audit team also during verification from the fuel purchase records and consumption data.</p> <p>Hence the explanation provided is acceptable and the issue remains closed.</p> <p>p</p>

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	<p>the registered PDD that <u>“outside biomass”</u> and <u>“coal”</u> would be <u>“purchased”</u> for <u>“co-firing”</u> during <u>“bagasse shortage situations”</u>.</p> <p>4) <i>The exact phrase/statement from Annex 4 of the PDD is presented as follows for ready reference. “Bagasse and other fuels: The quantity of bagasse generated is monitored based on the cane crushed. Periodic sampling is done for testing and monitoring the calorific value. Annual bagasse balance will be done to verify the figures. <u>“Purchase of outside biomass and coal for co-firing during bagasse shortages”</u> will be measured at the weigh bridge during entry into the premises. The values will be cross checked with purchase invoices. The calorific values of purchased fuels will also be monitored in the laboratory.”</i></p> <p>5) It is to be noted that <u>“groundnut shell and cane trash are biomass residues”</u> and are the <u>“only biomass residues”</u> which have been <u>“purchased from outside for co-firing in the project plant”</u> during bagasse shortage situations. 6) It is also to be further noted that <u>“no other fuel (i.e. the biomass resi-</u></p>	

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Corrective Action Requests by audit team	Summary of project owner response	Audit team conclusion
	<u>due) than groundnut shell and cane trash was available</u> ” for the project participant in the region where the project plant exist. Thus the fuel used in the project activity is in line with the requirement as per registered PDD.	
Forward Action Requests by audit team	Summary of project owner response	Audit team conclusion
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Annex 2: Information Reference List

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
1		Onsite interview carried out by TÜV SÜD team: Eswar Murty Interviewed Persons: K.N.Radhakrishnan EID Parry A.N.Soundararajan EID Parry A.NagaseshaReddy EID Parry K.M.Muthukaruppan EID Parry M.Mahesh Kumar Consultant S.Nataraj Consultant	29.01.2009 -30.01.2009	
2	UNFCCC Webpage	Project :1139 “Bagasse based Cogeneration Project at Pudukottai,Tamil Nadu, India” http://cdm.unfccc.int/Projects/DB/SGS-UKL1179758404.75/view	08.01.2009	Published MR version 01
3	UNFCCC Webpage	http://cdm.unfccc.int/methodologies/DB/XFJ41S3J17TLQCW904D26WJK7ST8TL/view.html		Methodology- ACM0006 ver.04
4	UNFCCC Webpage	Request for Deviation and Approval: http://cdm.unfccc.int/UserManagement/FileStorage/RRGIEHYBLNTP5377OE6BJ1JUL30HZM http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_BMIBWXR1JX8TR83TSHBMAL4V0U981	16.10.2009	
5	UNFCCC	Revised Monitoring Plan Approval	29.06.2010	

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
	Webpage			
6	EID Parry	Final Monitoring Report version 2.7	25.03.2011	
7	TNEB	Letter for synchronization of power plant with grid	31.03.2006	Commissioning of plant
8	EID Parry TNEB	Power Purchase Agreement	29.03.3005	
9	TNPCB	Consent from TNPCB under section 21 of the Air(Prevention and control of Pollution) Act,1981 Consent from UPPCB under section 25 & 26 of the Water (Prevention and control of Pollution) Act,1974	25.04.2008	Regulatory norms
10	EID Parry	Purchase Order of 18 MW TG	30.12.2005	Project equipment
11	EID Parry	Purchase Order of 100 TPH Boiler	21.09.2005	Project equipment
12	ISGEC	Boiler Efficiency reports	28.03.2008	
13	ISGEC	Technical specifications of Boiler		
14	BHEL	Technical specifications of TG		
15		Technical specifications of Auxiliary equipment		
16	Honeywell	Hardware design manual for DCS	30.12.2005	
17		Technical specifications of Online Weighing Belt scale		
18		Operation and Management manual of Online Weighing Belt scale		
19	ETDC	Calibration certificates of Gross generation energy meter EM1	01.01.2007, 12.11.2007,	

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
			04.11.2008	
20	ETDC	Calibration certificates of Auxiliary consumption meters EM2	01.01.2007, 15.11.2007, 05.11.2008	
21	ETDC	Calibration certificates of Auxiliary consumption meters EM3	01.01.2007, 12.11.2007, 03.11.2008	
22	ETDC	Calibration certificates of Auxiliary consumption meters EM4	13.08.2007, 05.03.2008, 11.12.2008	
23	TNEB	Calibration certificates of energy meters Main meter-05462951, Check meter-06489252	09.08.2007, 07.08.2008	
24		Calibration certificate of Online Weighing Belt scale	27.12.2007, 15.06.2008, 19.12.2008	
25		Calibration certificate of Weighbridge	03.03.2007, 04.01.2008, 21.01.2009	
26	EID Parry	Invoices raised to TNEB	Monitoring period	
27	TNEB	Electricity consumption bills	Monitoring period	
28	TNEB	Joint Meter Readings	Monitoring period	
29	SGS EAU	NCV & Moisture content analysis test Certificates for Bagasse: Report No.CHGL-8110026365,07,83,68	28.08.2008, 14.05.2008, 22.01.2008, 20.09.2007	
30	SGS	NCV & Moisture content analysis test Certificates for Cane trash Report No.CHGL-8110026367	28.08.2008, 03.02.2008, 12.09.2007	

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
31	SGS	NCV & Moisture content analysis test Certificates for Groundnut shell Report No.CHGL-8110026366	28.08.2008, 03.02.2008, 12.09.2007	
32	EAU Chemical	NCV & Moisture content analysis test Certificates for Coal and lignite Report No. 07&14	14.05.2008, 02.05.2008, 02.12.2007, 12.06.2007	
33	EID Parry	RT-7C form for Final manufacturing report	Sep'07-Sep'08	
34	EID Parry	Internal Audit Reports	Sep'07-Sep'08	
35	EID Parry	Training record sheets	11.04.2008	
36	EID Parry	Details of outages during monitoring period	Sep'07-Sep'08	
37	EID Parry	Log book sample sheets for electricity generation and fuel consumption		
38	EID Parry	Emergency preparedness plan	30.07.2007	
39	EID Parry	Monthwise Fuel consumption data for the monitoring period	14.09.2007-30.09.2008	
40	EID Parry	Daily Electricity generation and Auxiliary consumption data	14.09.2007-30.09.2008	
41	EID Parry	Details of purchased fuels	14.09.2007-30.09.2008	
42	EID Parry	Revised CER calculation spreadsheet	25.03.2011	
43	EID Parry	Meter Single line diagram		
44	IPCC	http://www.ipcc-nggip.iges.or.jp/EFDB/ef_detail.php		
45	Profitech	Calibration Reports of Steam flow meter	09.05.2008, 09.11.2008, 13.03.2007 & 13.09.2007	
46	Profitech	Calibration Reports of Steam Temperature equipment	09.03.2008,	

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
			09.11.2008 , 11.03.2007 & 11.09.2007	
47	Profitech	Calibration Reports of Steam pressure equipment	09.05.2008, 09.11.2008, 13.03.2007 & 13.09.2007	
48	Profitech	Calibration Reports of Feed water flow meter	14.09.2007, 12.03.2008, 09.12.2008 & 14.03.2007	
49	Profitech	Calibration Reports of Feed water temperature and pressure equipment	09.03.2008 , 09.11.2008 , 13.03.2008, 13.09.2008 09.11.2009, 11.03.2007 & 11.09.2007	



Annex 3: Appointment Certificates



Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Kleiser, Thomas, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	25.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		25.03.11	25.03.11	25.03.11	25.03.11	

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	25.03.11				
Financial Expertise					
Date	25.03.11				

Qualification in technical areas	
Technical Area	Date
1.1_4.10_Thermal energy generation...	25.03.11
1.2_Energy generation from renewable energy source	25.03.11
4.1_Cement sector	25.03.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0027/00.

Date	Signature
25.03.11	



Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Agarwal, Nikunj, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	22.03.11					

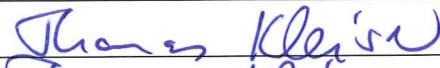

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		22.03.11	22.03.11	22.03.11	22.03.11	

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	22.03.11				
Financial Expertise					
Date	29.03.11				

Qualification in technical areas	
Technical Area	Date
1.2_Energy generation from renewable energy source	22.03.11
13.1_Waste handling and disposal	12.04.11
3.1_Energy demand	27.04.11
13.2_15.2_Animal waste management	21.07.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH. In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0001/05.

Date	Signature
27.04.11	
21.07.11	



Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Tausche, Konrad, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	30.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		30.03.11	30.03.11	30.03.11	30.03.11	

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	30.03.11				
Financial Expertise					
Date	30.03.11				

Qualification in technical areas	
Technical Area	Date
1.1_4.10_Thermal energy generation...	30.03.11
5.1_4.9_11.1_12.1_Chemical process industries	30.03.11
13.1_Waste handling and disposal	30.03.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0035/00.

Date	Signature
30.03.11	



Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Roy, Bratin, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	29.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		29.03.11	29.03.11			

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	29.03.11				
Financial Expertise					
Date	29.03.11				

Qualification in technical areas	
Technical Area	Date
13.1_Waste handling and disposal	29.03.11
1.2_Energy generation from renewable energy source	29.03.11
3.1_Energy demand	29.03.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0028/00.

Date	Signature
29.03.11	



Industrie Service

CERTIFICATE OF APPOINTMENT

Mr. Murty, Eswar, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	06.05.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		06.05.11	10.05.11			

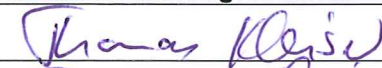
Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	06.05.11				
Financial Expertise					
Date					

Qualification in technical areas	
Technical Area	Date
1.2_Energy generation from renewable energy source	06.05.11
6.1_Construction	06.05.11
13.1_Waste handling and disposal	06.05.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0055/00.

Date	Signature
06.05.11	
10.05.11	