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# VERIFICATION REPORT

## Triveni Engineering and Industries Limited

## Bagasse based Co-generation Power Project at Khatauli

## Verification of Voluntary Carbon Unit

**PROJECT NO.** CCP.VOL0149 - A
**DATE:** 20 DECEMBER, 2007

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| Date of first issue: 20/12/2007 | Project No.: CCP.VOL0149 - A |
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| Approved by: Siddharth Yadav | Organisational unit: SGS Climate Change Programme |
| Client: Triveni Engineering and Industries Limited | Client ref.: Sameer Sinha |


Summary:

SGS United Kingdom Ltd has performed the Voluntary Emission Reduction verification of the CDM project Baggase based Co-generation Power Plant at Khatauli UNFCCC Ref. Number 0826. The verification includes confirming the implementation of the monitoring plans of the registered PDD UNFCCC reg. no 0826 and the application of the monitoring methodology as per ACM 0006, version 03 dated 19/05/2006. A site visit was conducted to verify the data submitted in the monitoring report.

The project activity has been utilizing the bagasse generated in the sugar mill to generate steam and electricity for captive consumption and has been exporting the surplus power to the Uttar Pradesh Power Corporation Limited (UPPCL). The project activity involved installation of one number of 120 TPH nominal capacity high pressure boilers with steam outlet pressure of 87 kg/cm2, one number of extractions cum condensing turbo generator of 23 MW. Steam produced in project plant has been exported to sugar manufacturing unit whereas the electricity produced in the project plant is partially exported to sugar unit and partially to Uttar Pradesh Power Corporation Limited (UPPCL).

SGS confirms that the project is implemented in accordance with the validated and registered Project Design Document. The monitoring system is in place and the emission reductions are calculated without material misstatements. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information seen and evaluated we confirm that the implementation of the project has resulted in 29557 tCO2e during period 19/10/2005 up to 31/03/2006.


| Report No.: CCP.Vol 0149 - A | Subject Group: GHG Project verification |
|---|---|
| Report title: Bagasse based Co-generation Power Project at Khatauli | |
| Work carried out by: Nikunj Agarwal , Lead Assessor<br>Kaviraj Pradhan, Local Assessor | |
| Work verified by: Dr. Jochen Gross | |

| Date of this revision: | Rev. No.: | Number of pages: |
|---|---|---|
| 20/12/2007 | 00 | 13 |

**Indexing terms**

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**Abbreviations**

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| | |
|---|---|
| CAR | Corrective Action Request |
| CDM | Clean Development Mechanism |
| CEA | Central Electricity Authority |
| CEF | Carbon Emission Factor |
| CER | Certified Emission Reductions |
| $CO_2$ | Carbon dioxide |
| $CO_2e$ | Carbon dioxide equivalent |
| DNA | Designated National Authority |
| DOE | Designated Operational Entity |
| GHG | Green House Gas(es) |
| IPCC | Intergovernmental Panel on Climate Change |
| MP | Monitoring Plan |
| MR | Monitoring Report |
| NIR | New Information Requests |
| ODA | Official Development Assistance |
| PDD | Project Design Document |
| VCS | Voluntary Carbon Standard |
| VCUs | Voluntary Carbon Units |
| UPPCL | Uttar Pradesh Power Cooperation Limited |

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## 1 INTRODUCTION

SGS United Kingdom Ltd was contracted by Triveni Engineering and Industries Limited to verify the reduction in greenhouse gas emissions through the implementation of the the project Baggase based Co-generation Power Plant at Khatauli according to Voluntary Carbon Standard version 01. This report covers the monitoring period from 19/10/2005 to 31/03/2006. This report presents the findings of the first periodic assessment and provides justification for the verification process and the verification and certification opinion.

### 1.1 Objective

The client has commissioned an independent verification by SGS United Kingdom Ltd. of its reported greenhouse gas emission reductions from the Baggase based Co-generation Power Project at Khatauli project. The verifiers have reviewed the GHG data collected to date for the period between 19/10/2005 and 31/03/2006

The purposes of this verification exercise are, by review of objective evidence, to independently review :

- Whether the project has resulted in emission reductions as declared by the organisation or GHG project's GHG assertion
- The data reported are accurate, complete, consistent, transparent and free of material error or omission.

### 1.2 Scope

This engagement covers verification of emission reductions from anthropogenic sources of greenhouse gases included within the project boundary of the 'Baggase based Co-generation Power Project at Khatauli, criteria in proposed Voluntary Carbon Standard (VCS) has been taken into account for this verification.

Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. Our examination includes assessment, on a test basis, of evidence relevant to the amounts and disclosures in relation to the project's GHG emission reductions for the defined reporting period.

### 1.3 Description of the Project Activity

| | |
|---|---|
| Project Parties: | Triveni Engineering & Industries Limited |
| Title of project activity: | Bagasse based Co-generation Power Project at Khatauli |
| Project Entity: | Triveni Engineering & Industries Limited |
| Location of the project activity: | Khatuali, District - Muzzafarnagar , Uttar Pradesh/ India<br>Latitude: 29 $^{0}$N16' Longitude: 77 $^{0}$E 42' |

## 2 METHODOLOGY

The verification process is a two-stage process.

In the first stage, SGS completed a strategic review and risk assessment of projects activities and processes in order to gain a full understanding of:

- Activities associated with all the sources contributing to the project emissions and emission reductions, including leakage;
- Protocols used to estimate or measure GHG emissions from these sources;
- Collection and handling of data;

- Controls on the collection and handling of data;
- Means of verifying reported data; and
- Compilation of the monitoring report.

At the end of this stage, SGS produced:

- A Periodic Verification Checklist which, based on the risk assessment of the parameters and data collection and handling processes for each of those parameters, describes the periodic verification protocol.
- Corrective Action Requests and New Information Requests, if necessary.

In the second stage, SGS verified the implementation of the monitoring plan and the data presented in the Monitoring Report for the period in question, using the Periodic Verification Checklist. This involved site visit and a desk review of the monitoring report.

At the end of this stage, SGS produced this verification report which will form the basis of verification statment.

***Verification team***

The verification team considered of the following personnel:

| *Name* | *Role* | *SGS Office* |
|---|---|---|
| Nikunj Agarwal | Lead Assessor | SGS India |
| Kaviraj Pradhan | Local Assessor | SGS India |

**Duration of verification**

Preparations: From 01/09/2007 to 06/09/2007

On-site verification: 16/11/2007

Reporting: From 20/11/2007 to 25/12/2007

## 2.1 Review of Documentation

The verification is performed primarily as a document review of the monitoring report, the project design document against the approved CDM methodology ACM0006 version 03. The assessment is performed by trained assessors using a verification protocol. The verification team have also assessed the production log books, Receipt and Analysis Report of Fuels, calibration records of the meters for the period of 19/10/2005 to 31/03/2006 and the working requirement for the operation staff and training records of the operation staff.

## 2.2 Site Visits

Kaviraj Pradhan has visited the site at Triveni Engineering and Industries Limited on 16/11/2007. During the site visit the following personnel was interviewed for the referred project.

| | |
|---|---|
| Management Approach to GHG commitment | Mr. Ashish Awasthi DGM-Coordination |
| Assessment of Project Boundary | Mr. S. M. Ramesh Head Power Plant |
| CDM monitoring & reporting documentation | Mr. Sudharkar Rao |
| Monitoring Plan and QA/QC Procedures | Mr. Nitin Arora Sr. Consultant E& Y |
| Quality Assurance – Management and operating system | Mr. Satyanaryana Yadav |
| Emergency procedures | Mr. K. Hari Krishana, |

Main topics covered by the interview were: Installation plan, Project management and monitoring; Operational issues and records, GHG source, Data archiving...etc.

### 2.3 Assessment

The parameters and values presented in the monitoring report were assessed through review of detailed project documentation and production records, interviews with personnel at Triveni Engineering & Industries Limited, check of log book, collection of fuel analysis report, observation of established monitoring and reporting practices and assessment of the reliability of measuring equipment.

Information which was not available during site visit was reported as New Information Request (NIR), following submission of additional information, monitoring and operational records, and the reconsolidation of all reported data was assessed again.

### 2.4 Reporting of Findings

As an outcome of the verification process, the team can raise different types of findings

In general, where insufficient or inaccurate information is available and clarification or new information is required the Assessor shall raise a **New Information Request (NIR)** specifying what additional information is required.

Where a non-conformance arises the Assessor shall raise a **Corrective Action Request (CAR).** A CAR is issued, where:

I. mistakes have been made with a direct influence on project results;

II. validation protocol requirements have not been met; or

III. there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be verified.

The verification process may be halted until this information has been made available to the assessors' satisfaction. Failure to address a NIR may result in a CAR. Information or clarifications provided as a result of an NIR may also lead to a CAR.

**Observations** may be raised which are for the benefit of future projects and future verification actors. These have no impact upon the completion of the verification activity.

## 3 VERIFICATION FINDINGS

| S. No. | Months | Reported value (ER) | Verified value (ER) |
|---|---|---|---|
| 1 | OCT 05 - DEC 05 | 12221 | 12221 |
| 2 | JAN 06 - MAR 06 | 17337 | 17337 |
| **Total VERs for the period from 19/10/2005 to 31/03/2006** | | 29557 | 29557 |

CAR01 was rasied to bring more clarity why the quantity of electricity generated is mentioned in kWh whereas with reference to PDD it should have been in MWh. Responding to CAR01 PP has mentioned that the installed meters are monitoring the elecricity generation in the kWh so values are reported in kWh, although these values are converted into MWh for emission reduction calculations in line with registered PDD. The recorded values were checked in plant log sheet (kWh) and in spread sheets (MWh) for emission reduction calculations. The data unit required changes were made in the monitoring report and found correct so raised CAR01 was closed out.

NIR02 was raised to get the information about the source of $CO_2$ emission factor used to calculate project emissions. PP has provided the cea web site link (www.cea.nic.in) which was checked and found correct so rasied NIR02 was ressolved successfully.

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

No outstanding or remaining issues from previous verification, was observed since it is the first voluntary verification.

### 3.2 Project Implementation

The physical components, project boundaries are in conformity with description in the registered PDD and monitoring report. No additional emission sources used for project activity.

The project was commissioned on 18/10/2005 and this was verified from the minutes of meetings (MoM) held on 18/10/2005 between UPPCL and project proponent. The MoM states that the energy is recieved on UPPCL 132 KV substation on 18/10/2005 and the MoM are signed by the UPPCL Executive Enginner and TEIL management. However, the crediting period (present monitoring report) starts from 19/10/2005.

### 3.3 Completeness of Monitoring

The monitoring of the project activity is found to be in conformity with monitoring methodology described in ACM0006 version 03 and monitoring plan indicated in the registered PDD of project activity.

The required monitoring systems have been installed and operational. The meters comply with appropriate quality standards applicable for the used technology.

The sustaining records were sufficient to enable verification of emission reductions.

### 3.4 Accuracy of Emission Reduction Calculations

The total quantity of electricity generated $EG_{total, v}$(MWh) was cross checked against the the plant log sheets and calibration certificates of energy meter was also checked for validity.

Auxiliary consumption of electricity $EG_{aux, y}$(MWh) was cross checked against the plant log sheets and calibration certificates of energy meter was also checked for validity.

Net Electricity generation at the project plant (MWh) is net power supplied to plant is measured by taking the difference of the gross power generated and the auxiliary power consumption in the plant. The plant log sheets were checked for data collection by checking the calibration certificates of two energy meter (gross power and auxiliary power). The calculations in the excel sheet was also checked.

Quantity of biomass combusted in the project (tonnes) was checked against the stock inventory and calibration certificate of weigh bridge was also checked for validity.

Net quantity of heat generated by firing biomass in the plant (MWh) is calculated from the parameters viz. Steam Quantity, pressure and temperature are being monitored continuously. Plant log sheets were checked for data collection and archiving. Calibration certificate of steam flow meter was also checked for its date of validity.

Thermal energy efficiency (%) is calculated from the heat input (from biomass combustion) and the enthalpy of the steam and not being monitored directly. The calculation was checked in the excel sheet.
Net Calorific Value of bagasse MWh / tonne was checked from the lab reports. The NCV of biomass was analysed only by third party.
$CO_2$ emission factor (Baseline) $tCO_2/kWh$ was calculated by TEIL as per ACM0002 and this was checked against the methodology ACM0002 and found correct.
$CO_2$ emission factor (project emission due to diesel consumption in biomass transportation) $tCO_2/GJ$ values was taken from the Central Electricity Authority (CEA) web site. These value was checked from the Baseline Carbon Emission Data Base Version 02, available publically at CEA web site (www.cea.nic.in), and found correct.

### 3.5 Quality of Evidence to Determine Emission Reductions

Operational records and other evidences have been documented, collected and archived in either hard-copies or electronic manners. The energy generation is metered by calibrated meters. The biomass consumption is measured by Weigh Bridge calibrated after every two year by state government organisation. Steam quantity, temperature and pressure are measured by calibrated meters. The date of calibration and next due date of calibration was checked against the calibration certificates. All the values were checked from the source data i.e. plant records. The calorific value of biomass was checked against the third party analysis reports.

### 3.6 Management System and Quality Assurance

The company has made the Green House Gas Emission Manual which states management system and monitoring and reporting procedures. The monitoring team at the shop floor level (comprising of Boiler Operator, Instrumentation Supervisor, Turbine Operator, and Electrician) records the daily observations and report the same in the plant log books. The competency of the opererators was checked by interviewing them about their understanding for green house gases and found satisfacory. The daily report generated by the floor level team is then sent to the shift in charge. The shift in charge reviews the daily report, transforms it into the soft format and forwards the same to the general manager (cogeneration plant). The reports were checked for the signature of the general manager and precision in the values and all was found in compliance.
In order to avoid any kind of discrepancy in the monitoring process, regular internal audits are planned. The audit team comprise of the in house technical experts and the senior officials from the corporate office.

### 3.7 Additionality

The Additionality of the project activity was referred from the registered PDD and validation report. (UN No. 0826).

The Additionality of the project was demonstration by following the "tool for the demonstration and assessment of additionality". Taking into account the guidelines given by this tool, the PDD complies with each defined step. The start of project activities has been before the registration date of the first clean development mechanism project. Via barrier analysis the project demonstrates that it is not the baseline scenario. The barrier due to prevailing practice describes that it is not common to operate baggase fueled high pressure boiler systems in the Indian sugar industry for efficient electricity generation in order to export electricity to the grid. The project is one of the first projects in Uttar Pradesh with all of them applying for CDM registration. In addition other barriers related to complex clearance procedures and the export of electricity seems to prevent the implementation without CDM incentive. The analysis is substantiated by respective literature and documents.

## 4 TESTING ON VCU VERIFICATION CRITERIA

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| # | Criterion | Finding/Conclusion |
|---|---|---|
| 1 | **Project Category** | Energy industries (renewable - / non-renewable sources) |
| 2 | **Geographic Location** | In conformity with the description in PDD. |
| 3 | **Eligible GHGs** | Carbon dioxide |
| 4 | **Project Start Date** | 18/10/2005 |
| 5 | **Emission reduction start date** | Emission Reduction start date is 19/10/2005 |
| 6 | **Public Funding and Grants** | As per the registered PDD & validation report there is no indication that project has employed Public Funding, grants or Official Development Assistance ("ODA") for construction or running operations in the geographic location of the Project Activity. |
| 7 | **Project Boundary/GHG Assessment Boundary** | The project boundary is in compliance with the registered PDD. |
| 8 | **Calculation Methodology** | CDM methodology ACM0006 version 03 |
| 9 | **Secondary Effects** | No significant secondary effects are foreseen. |
| 10 | **Project Additionality** | Confirmed, please refer to section 3.7 for details. |
| 11 | **Quality of Reductions** | Relevant permits have been obtained by project owner. Project's design and implementation has been carried out in compliance with all relevant local and national environmental and social legislation in Uttar Pradesh, India. |
| 12 | **Monitoring Process** | CDM monitoring methodology ACM0006 version 03 has been used, sustaining records were sufficient to enable verification of emission reductions. |

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## 5 VERIFICATION STATEMENT

***Reporting period***: From 19/10/2005 to 31/03/2006

***Verified emission in the above reporting period:***

| | | |
|---|---|---|
| Project emissions | 55 | t CO2 equivalents |
| Baseline emissions | 29613 | t CO2 equivalents |
| Emission reductions | 29557 | t CO2 equivalents |

***Verification Statement***

**Introduction**

SGS United Kingdom Ltd. has been engaged by Triveni Engineering and Industries Limited to examine the greenhouse gas (GHG) emission reductions reported from the Bagasse based Co-generation Power Project at Khatauli for the period, equating to 29557 tonnes of $CO_2$ equivalents.

Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported for the period 19/10/2005 to 31/03/2006 and the verification testing conducted against the GHG Assertion of the Triveni Engineering and Industries Limited and the PDD of Bagasse based Co-generation Power Project at Khatauli

**Responsibilities of Triveni Engineering and Industries Limited and SGS United Kingdom Ltd.**

The management of the Triveni Engineering and Industries Limited is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Monitoring and Verification Plan. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project is the responsibility of the management of the Triveni Engineering and Industries Limited.

It is our responsibility to express an independent GHG verification opinion on the GHG emissions from the project for the period 19/10/2005 to 31/03/2006 and on the calculation of GHG emission reductions from the project based on the verified emissions for the same period.

**Basis of GHG verification opinion**

Our verification approach was based on the requirements as defined in Voluntary Carbon Standard version 1.

Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. Our examination includes assessment, on a test basis, of evidence relevant to the amounts and disclosures in relation to the project's GHG emission reductions for the period 19/10/2005 to 31/03/2006.

We planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that the amount of GHG emission reductions for the period 19/10/2005 to 31/03/2006, prepared on the basis of the Monitoring and Verification Plan dated 14/11/2007, are fairly stated.

We conducted our verification with regard to the client's GHG projects PDD and monitoring report which included Baggase based Co-generation Power Plant at Khatauli at project plan, baseline applied and baseline GHG emissions or removals, Monitoring and Verification Plan, GHG Emission reduction, removal enhancements. This assessment included:

- collection of evidence supporting the reported data

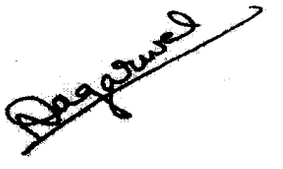
- checking whether the provisions of the Monitoring and Verification Plan in the PDD were consistently and appropriately applied

We have verified whether the information included in the monitoring report representing the project baseline is current and has been extracted from the project site and the emission reduction achieved has been determined by correctly substracting emissions for the monitoring period 19/10/2005 to 31/03/2006 from the baseline figures for the comparable period.

**Opinion**

Based on process and procedures conducted, in our opinion, Triveni Engineering and Industries Limited GHG assertion on emission reductions for the Baggase based Co-generation Power Plant at Khatauli Project during the reporting period 19/10/2005 to 31/03/2006 is materially correct and is a fair representation of the GHG data and information and the emission reductions are fairly stated. The GHG emission reductions were calculated correctly on the basis of approved monitoring methodology ACM0006 version 03.

[SGS United Kingdom Limited] [SGS India Pvt. Ltd] 09/01/2008



Siddharth Yadav Nikunj Agarwal

## 6 REFERENCES

/1/ Voluntary Carbon Standard, Version 1.
/2/ Approved monitoring methodology ACM0006 Version 03.
/3/ Project Design Documents version 04 dated 4th December 2006.
/4/ Monitoring reports of Bagasse based Co-generation Power Project at Khatauli version 01 dated 14th November 2007
/5/ Monitoring reports of Bagasse based Co-generation Power Project at Khatauli version 02 dated 26/12/2007
/6/ Calibration Certificates.
/7/ Record for Plant Log Book for the period of October 2005 up to March 2006.
/8/ Calculation Excel sheet
/9/ Commissioning Record for the project activity.
/10/ Validation report (UNFCCC No. 0826)

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