

**MONITORING REPORT FORM (CDM-MR) \***  
**Version 01 - in effect as of: 28/09/2010**

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\* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

## MONITORING REPORT

Version number: 01

Date: 20/10/2010

**Title project activity: Ganpati co-generation project at Medak, Andhra Pradesh**

**Reference number: 0370**

**Monitoring Period number: 04**

**Monitoring Period: 25/07/2008 to 31/12/2009**

### SECTION A. General description of the project activity

#### A.1. Brief description of the project activity: >>

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1. Purpose of the project activity and the measures taken to reduce greenhouse gas emissions;

The project activity is a bagasse based co-generation facility installed at Ganpati Sugar Industries Limited's (GSIL) sugar mill at Sanga Reddy, Medak District of Andhra Pradesh, India. The bagasse used as fuel in the project activity is the co-product of sugar production process and is therefore a renewable carbon neutral source of electricity. The project activity is a small scale project activity and conforms to Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

2. Brief description of the installed technology and equipments

The project activity is a grid connected bagasse based co-generation power plant with a high pressure and temperature steam configuration of 67kg/cm<sup>2</sup> and 480°C boiler with an extraction cum condensing type turbo-generator, 55 tonnes per hour capacity boiler using bagasse as the fuel. The power generated from the project is partly utilized for the plant and its auxiliaries. The remaining power is exported to the grid.

3. Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.).

Project implementation Started in 2001

Commercial operations started from 1st January 2003

1<sup>st</sup> Monitoring Period (01 Jan 2003 - 31 Aug 2006) Issued

2<sup>nd</sup> Monitoring Period (01 Sep 2006 - 24 Jun 2007) Issued

3<sup>rd</sup> Monitoring Period (25 Jun 2007 - 24 Jul 2008) Issued

4. Total emission reductions achieved in this monitoring period.

Total Emission Reductions achieved for the

4<sup>th</sup> Monitoring Period (25/07/2008 - 31/12/2009): 14,852 t CO<sub>2</sub>e

#### A.2. Project Participants

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)

Ministry of Environment and Forest, Govt of India (Host Country)	Ganpati Sugar Industries Limited (Project participant)	NO
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### **A.3. Location of the project activity:**

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The project site is located at Kulbagur, Fasalwadi Village, Sanga Reddy Mandal, Medak District of Andhra Pradesh (latitude 17° 35' 07" N and longitude 78° 03' 50" E some 75 Km from Hyderabad)

### **A.4. Technical description of the project**

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The project activity is a small scale project activity and conforms to Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

The project activity is a grid connected bagasse based co-generation power plant with a high pressure and temperature steam configuration of 67kg/cm<sup>2</sup> and 480°C boiler with an extraction cum condensing type turbo-generator, 55 tonnes per hour capacity boiler using bagasse as the fuel. The power generated from the project is partly utilized for the plant and its auxiliaries. The remaining power is exported to the grid.

### **A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:**

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Type I – Renewable Energy Projects

AMS I D - Renewable electricity generation for a grid – Version 07

### **A.6. Registration date of the project activity:**

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29<sup>th</sup> August 2006

### **A.7. Crediting period of the project activity and related information (start date and choice of crediting period):**

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Crediting Period: 01 Jan 2003 - 31 Dec 2009

Choice of the crediting period: Renewable

Starting date of the first crediting period: 01/01/2003

### **A.8. Name of responsible person(s)/entity(ies):**

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Name of the person / entity for completing the monitoring report form: Ganpati sugar Industries Limited

Name: Mr. Mahesh Barasia

Title: President (Commercial), Ganpati sugar Industries Limited

Email: [barasia@hotmail.com](mailto:barasia@hotmail.com), [gsil\\_factory@yahoo.com](mailto:gsil_factory@yahoo.com)

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Mobile: +91-9331018485

Telephone: 91-40-23355212, 23355213, 23355214

Fax: 91-40-23350959

## **SECTION B. Implementation of the project activity**

### **B.1. Implementation status of the project activity**

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This section should include a description of the implementation and operational status of the project as of this monitoring period in accordance with the latest version of the CDM Validation and Verification Manual (CDM-VVM)<sup>1</sup>. The description should include *inter alia*:

1. The starting date of operation of the project activity.

Project implementation Started in 2001

Commercial operations started from 1st January 2003

1<sup>st</sup> Monitoring Period (01 Jan 2003 - 31 Aug 2006) Issued

2<sup>nd</sup> Monitoring Period (01 Sep 2006 - 24 Jun 2007) Issued

3<sup>rd</sup> Monitoring Period (25 Jun 2007 - 24 Jul 2008) Issued

2. The information regarding the actual operation of the project activity during this monitoring period, including information on special events, for example overhaul times, downtimes of equipment, exchange of equipment, etc.
  - Net power export to the grid is 17,263MWh during the monitoring period 25/07/2008 to 31/12/2009
  - Export / Import tariff meters were replaced on 28.08.2009 as per schedule
  - Generator terminal meter was replaced on 29.08.2009 as per schedule
  - Auxiliary & captive meters were replaced by new 0.2 accuracy meters of S.No's 08039598 & 08039570 respectively on 31.10.2009.
  - Co-Gen plant was started on 30.11.2009 at 09.45 am.
  - Captive meter (S.No. 08039570, was stucked from 30.11.2009 to 29.12.2009. On 29.12.2009 meter was corrected by supplier as it is under warranty. During the period i.e., from 30.11.2009 to 31.12.2009 the captive energy was calculated with our internal energy meters
  - Export and Import meter reading were closed on 31.12.2009 mid night as per the January'10 billing month.
3. A brief description of: (i) events or situations that occurred during the monitoring period, which may impact the applicability of the methodology, and (ii) how the issues resulting from these events or situations are being addressed.

Not applicable

### **B.2. Revision of the monitoring plan**

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During 3rd verification (25/06/2007 to 24/07/2008), it was recommended by DOE (FAR 1 in 3rd verification) to include the diesel consumption of DG sets and corresponding electricity generation through DG set in the monitoring plan.

RMP approved by UNFCCC on 20/10/2010

### **B.3. Request for deviation applied to this monitoring period**

>> Not Applicable

### **B.4. Notification or request of approval of changes**

<sup>1</sup> <http://cdm.unfccc.int/Reference/Manuals/index.html>

>> Not Applicable

### SECTION C. Description of the monitoring system

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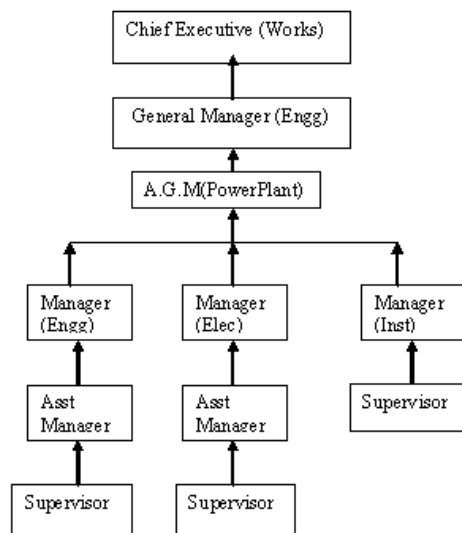
The monitoring provides a range of data measurement, estimation and collection options/techniques in each case indicating preferred options consistent with good practices to allow project managers and operational staff, auditors, and verifiers to apply the most practical and effective measurement approaches to the project. The aim is to enable GSIL project activity to have a clear, credible and accurate set of monitoring, evaluation and verification procedures. The purpose of these procedures would be to direct and support continuous monitoring of project performance/key project indicators to determine project outcomes, greenhouse gas (GHG) emission reductions.

The project revenue is based on the net electricity supplied to the grid by the project activity. Electricity exported to the grid and electricity imported from grid is measured by power meters, main and check meters at the high-tension substation of the APTRANSCO. The monitoring and verification system mainly comprise of these meters as far as power export is concerned. The Net electricity supplied to the grid by the project activity ( $EG_y$ ) = (Electricity exported to the grid after meeting captive & auxiliary power requirements) – (Electricity Import from the grid).

The GSIL project activity has employed the PLC (Programmable Logic Controller) system and Micro processor based instruments which will electronically monitor the main performance and output variables of the power plant, the systems for monitoring the CDM aspect of the project will draw extensively from the above system, monitoring and control equipment that measure, monitor and control various key parameters. All monitoring and control functions will be done as per the internally accepted standards and norms of GSIL. All instruments will be calibrated so that the accuracy of measurement can be ensured all the time.

#### Operational and Management structure:

The operational and management structure of the co generation plant is provided in the following flow chart. The overall responsibility for ensuring the accuracy of the records as well as ensuring complete environmental integrity of the emissions reduction claims will rest with the Board, which has in turn appointed the Chief Executive (Works) to ensure that the details submitted are accurate.



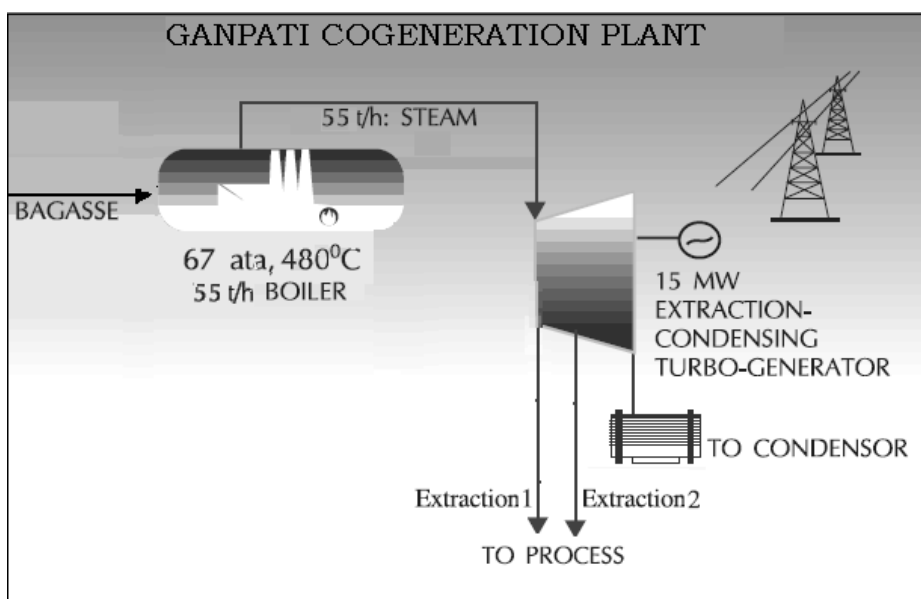
**MONITORED DATA: Parameters being monitored according to Monitoring Plan**

- i. **Net electricity supplied to the grid by the project activity (EG<sub>y</sub>):** The Net electricity supplied to the grid by the project activity is calculated as:  $EG_y = (\text{Electricity exported to the grid after meeting captive \& auxiliary power requirements}) - (\text{Electricity Import from the grid})$ . Total units exported to the grid and imported from the grid are measured by energy meters installed at APTRANSCO sub station on 24<sup>th</sup> day of every month and recorded by representatives of APTRANSCO (Grid operator) and project proponent (GSIL in a monthly Joint Meter Reading (JMR). The Net electricity supplied to the grid by the project activity (EG<sub>y</sub>) will only be considered for CERs calculation purpose.
- ii. **Electricity exported to the grid:** Power supplied to the grid (i.e., Electricity exported to the grid after meeting captive & auxiliary power requirements) is measured by energy meters installed at APTRANSCO sub station on 24<sup>th</sup> day of every month. A Joint Meter Reading (JMR) for the energy exported to the Grid is recorded by representatives of APTRANSCO and Company and the readings are jointly signed by both the parties as a proof of export of Power to the grid from power plant. Billing is based on meter readings provided at substation. Since the billing is based on the measurements at substation and it is more conservative, the parameters were taken from monthly joint meter readings (which is verified by APTRANSCO and jointly signed with PP).
- iii. **Electricity Import from the grid:** Power imported from the grid is measured by energy meters installed at APTRANSCO sub station on 24<sup>th</sup> day of every month. A Joint Meter Reading (JMR) for the energy imported from the Grid is recorded by representatives of APTRANSCO and Company and the readings are jointly signed by both the parties as a proof of import of Power from grid by the power plant. Billing is based on meter readings provided at substation. Since the billing is based on the measurements at substation and it is more conservative, the parameters were taken from monthly joint meter readings (which is verified by APTRANSCO and jointly signed with PP).
- iv. **Diesel Consumption:** Diesel in DG set is used only for emergency purposes (trail runs to maintain its running condition) and not for the power generation purpose in the project activity. The diesel quantity and source are maintained at the point of entry by stores department. Diesel once received by stores department will be issued to DG set department as and when required. Stores department maintains receipt, issue data everyday in excel sheet and takes issue slips from DG set department for the issued Quantity. The amount of diesel consumed by DG set is measured by using a level measuring gauge in the tank and the same is cross verified with the issue slips and same is compiled into monthly reports.
- v. **Electricity generation using diesel:** The monthly diesel consumption for emergency purposes & trial runs, the amount of electricity generation from the DG set (Rating 750KVA) and corresponding diesel consumption for electricity generation is monitored. The amount of electricity generated (if generated) on using diesel in DG set is recorded by energy meter attached to the set. Hence it is assured that both consumption details of diesel and generation details of DG are monitored. The monthly diesel consumption for emergency purposes, the amount of electricity generation from the DG set and corresponding diesel consumption for electricity generation is monitored. Project emissions due to diesel consumption for electricity generation are calculated and will be deducted from emission reductions.
- vi. **Density of diesel:** National Default value is considered for density of diesel. The value is based on standard values published by Central Electricity Authority (CEA) CO2 baseline database version 05 which is considered to be well documented reliable source. The appropriateness of the value is reviewed annually.
- vii. **NCV of diesel:** IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.2 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. Any future revision of the IPCC Guidelines should be taken into account.
- viii. **CO<sub>2</sub> emission factor of diesel:** IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. Any future revision of the IPCC Guidelines should be taken into account.

#### **INFORMATION OF MONITORING EQUIPEMENTS AND ITS POSITIONING FOR ALL MONITORING PARAMETERS**

Description	Main Meter	Check Meter	DG set Energy meter
Accuracy Class	Class 0.2	Class 0.2	Class 1.0
Location	Kandi Substation	Kandi Substation	Energy meter attached to the DG set in plant
Purpose	To measure the electricity exported to APTRANSCO and electricity imported from APTRANSCO grid. The amount of electricity exported to grid measured by this meter and as shown in Joint meter reading cards will only be considered for CERs calculation purpose.	It is a stand by meter for export and import of electricity	It is used to measure the electricity generation from the DG set

### Process Flow Diagram



### MONITORING APPROACH

The general monitoring principles are based on:

Frequency  
Reliability  
Registration and reporting

#### Frequency of monitoring

The project developer has installed all metering and check metering facilities within the plant premises as well as in the grid substation where exported power is connected to the grid. The electricity details are being recorded on monthly basis and measured on continuous basis by both APTRANSCO and the project developer..

#### Reliability

The amount of emission reduction units is proportional to the net energy generation from the project. Thus the final kWh meter reading is the final value from project side. All measurement devices are with best accuracy procured from reputed manufacturers. Since the reliability of the monitoring system is governed by the accuracy of the measurement system and the quality of the equipment to produce the result all power measuring instruments is calibrated once a year for ensuring reliability of the system. Therefore the system ensures the final generation is highly reliable.

### **Registration and reporting**

Daily and monthly reports are prepared stating the generation. In addition to the records maintained by the GSIL, APTRANSCO also monitors the power exported to the grid and certify the same.

### **VERIFICATION**

The performance of the bagasse based power project leads to CO<sub>2</sub> emission reductions. In other words, the longer the cogeneration power plant runs and exports power to the grid more would be the emission reductions. The GSIL project activity has employed PLC (Programmable Logic Controller) system and Micro processor based instruments which will electronically monitor the main performance and output variables of the power plant, the systems for monitoring the CDM aspect of the project will draw extensively from the above system, monitoring and control equipment that measure, monitor and control various key parameters. All monitoring and control functions will be done as per the internally accepted standards and norms of GSIL. All instruments will be calibrated so that the accuracy of measurement can be ensured all the time. The major activities to be verified are as under

- Verification of various measurement and monitoring methods
- Verification of instrument calibration methods
- Verification of data generated.
- Verification of measurement accuracy

### **CALIBRATION AND TESTING OF METERS**

#### **Testing details of energy meters**

The Energy Meters have been calibrated periodically once in a year adopting Calibration Method No.OP/CAL/034 using 3 Phase Energy Meter with Phantom Load by Electronics Test & Development Centre, Government of India, Department of Information Technology, Ministry of Communication & Information Technology, Kamala Nagar, Hyderabad. The details of Energy Meters installed with their location and Serial Numbers are given below.

<b>Meter location</b>	<b>Description</b>	<b>Serial Number</b>	<b>Date of testing</b>	<b>Calibration Validity</b>	<b>Tested by</b>
Check meter at Kandi Substation	Existing meter	3148278	11.08.2009	11.08.2010	ETDC
	Replaced meter (Check meter replaced on 28.08.2009 as per schedule. The change is approved and endorsed by the competent electricity authorities.)	1999438	28.08.08	28.08.09	ETDC
	Replaced meter (Check meter replaced on 08.09.2008 as per schedule. The change is approved and endorsed	3148278	10.09.07	10.09.08	ETDC



	by the competent electricity authorities.)				
Main meter at Kandi Substation	Existing meter	1959480	11.08.2009	11.08.2010	ETDC
	Replaced meter (Main meter replaced on 28.08.2009 as per schedule. The change is approved and endorsed by the competent electricity authorities.)	1959478	28.08.08	28.08.09	ETDC
	Replaced meter (Main meter replaced on 08.09.2008 as per schedule. The change is approved and endorsed by the competent electricity authorities.)	1959480	10.09.07	10.09.08	ETDC

#### SECTION D. Data and parameters

##### D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

*(Copy this table for each data and parameter. To report multiple values, a table may be used)*

<b>Data / Parameter:</b>	EF <sub>electricity,y</sub>
<b>Data unit:</b>	tCO <sub>2</sub> e/GWh
<b>Description:</b>	CO <sub>2</sub> baseline emission factor for the electricity displaced due to the project activity
<b>Source of data used:</b>	CEA Annual Generation Report & Local Statistics Available
<b>Value(s) :</b>	937.41
<b>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</b>	Calculated as the weighted sum of OM and BM Emission Factor. This value is used to calculate the baseline emissions from the project activity. The emission coefficient for the baseline is calculated ex ante.
<b>Additional comment:</b>	-

<b>Data / Parameter:</b>	CEF Operating Margin of the grid
<b>Data unit:</b>	tCO <sub>2</sub> e/GWh
<b>Description:</b>	CEF Operating Margin of the grid
<b>Source of data used:</b>	CEA Annual Generation Report & Local Statistics Available
<b>Value(s) :</b>	1019.80
<b>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</b>	Calculated based on Simple OM CEF as indicated in the baseline methodology. This value is used to calculate the baseline emissions from the project activity. The emission coefficient for the baseline is calculated ex ante.
<b>Additional comment:</b>	-

<b>Data / Parameter:</b>	CEF Build Margin of the grid
<b>Data unit:</b>	tCO <sub>2</sub> e/GWh
<b>Description:</b>	CEF Build Margin of the grid

Source of data used:	CEA Annual Generation Report & Local Statistics Available
Value(s) :	855.03
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculated based on Simple BM CEF as indicated in the baseline methodology. This value is used to calculate the baseline emissions from the project activity. The emission coefficient for the baseline is calculated ex ante.
Additional comment:	-

<b>D.2. Data and parameters monitored</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	<b>EG<sub>y</sub></b>
Data unit:	kWh
Description:	Net electricity supplied to the grid by the project activity
Measured /Calculated /Default:	calculated
Source of data:	Monthly joint meter readings
Value(s) of monitored parameter:	15844000
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is used to calculate the baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<u>Calibration Frequency</u> : Meters based with best accuracy procured from reputed manufacturers are calibrated to national standards. Recalibration frequency is either subject to appropriate intervals according to manufacturer specifications or with a minimum frequency of once a year Accuracy: Class 0.2 Uncertainty level: Low
Measuring/ Reading/ Recording frequency:	<u>Measuring Frequency</u> : Hourly <u>Recording Frequency</u> : Monthly
Calculation method (if applicable):	The Net electricity supplied to the grid by the project activity is calculated as: <b>EG<sub>y</sub></b> = (Electricity exported to the grid after meeting captive & auxiliary power requirements) – (Electricity Import from the grid). Total units exported to the grid and imported from the grid are measured by energy meters installed at APTRANSCO sub station on 24 <sup>th</sup> day of every month <sup>2</sup> and recorded by representatives of APTRANSCO (Grid operator) and project proponent (GSIL in a monthly Joint Meter Reading (JMR). The Net electricity supplied to the grid by the project activity ( <b>EG<sub>y</sub></b> ) will only be considered for CERs calculation purpose.
QA/QC procedures applied:	This will be cross checked with the bills raised by the company as well as the payment details by the grid operator. The actual quantity of electricity delivered to the Grid will be used for the CER computation purposes.

<b>Data / Parameter:</b>	Electricity exported to the grid
Data unit:	kWh
Description:	Electricity exported to the grid
Measured /Calculated	Measured

<sup>2</sup> Metering Date is subjected to the standards of the Agreement made with APTRANSCO (as per the directions of Andhra Pradesh Electricity Regulatory Commission, Govt of AP).

/Default:	
Source of data:	Monthly joint meter readings
Value(s) of monitored parameter:	17263000
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is used to calculate the baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<u>Calibration Frequency:</u> Meters based with best accuracy procured from reputed manufacturers are calibrated to national standards. Recalibration frequency is either subject to appropriate intervals according to manufacturer specifications or with a minimum frequency of once a year Accuracy: Class 0.2 Uncertainty level: Low
Measuring/ Reading/ Recording frequency:	<u>Measuring Frequency:</u> Hourly <u>Recording Frequency:</u> Monthly Total units exported to the grid and imported from the grid are measured by energy meters installed at APTRANSCO sub station on 24 <sup>th</sup> day of every month <sup>3</sup> and recorded by representatives of APTRANSCO (Grid operator) and project proponent (GSIL in a monthly Joint Meter Reading (JMR). The Net electricity supplied to the grid by the project activity ( <b>EG<sub>y</sub></b> ) will only be considered for CERs calculation purpose.
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	This will be cross checked with the bills raised by the company as well as the payment details by the grid operator. The actual quantity of electricity delivered to the Grid will be used for the CER computation purposes.

<b>Data / Parameter:</b>	Electricity Import from the grid
Data unit:	kWh
Description:	Electricity Import from the grid
Measured /Calculated /Default:	Measured
Source of data:	Monthly joint meter readings
Value(s) of monitored parameter:	1419000
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is used to calculate the baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<u>Calibration Frequency:</u> Meters based with best accuracy procured from reputed manufacturers are calibrated to national standards. Recalibration frequency is either subject to appropriate intervals according to manufacturer specifications or with a minimum frequency of once a year Accuracy: Class 0.2 Uncertainty level: Low

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<sup>3</sup> Metering Date is subjected to the standards of the Agreement made with APTRANSCO (as per the directions of Andhra Pradesh Electricity Regulatory Commission, Govt of AP).

Measuring/ Reading/ Recording frequency:	<u>Measuring Frequency:</u> Hourly <u>Recording Frequency:</u> Monthly Total units exported to the grid and imported from the grid are measured by energy meters installed at APTRANSCO sub station on 24 <sup>th</sup> day of every month <sup>4</sup> and recorded by representatives of APTRANSCO (Grid operator) and project proponent (GSIL in a monthly Joint Meter Reading (JMR). The Net electricity supplied to the grid by the project activity ( <b>EG<sub>y</sub></b> ) will only be considered for CERs calculation purpose.
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	This will be cross checked with the bills raised by the company as well as the payment details by the grid operator. The actual quantity of electricity delivered to the Grid will be used for the CER computation purposes.

<b>Data / Parameter:</b>	Diesel Consumption
Data unit:	Litres
Description:	Quantity of diesel consumed in DG set for electricity generation used by project activity
Measured /Calculated /Default:	Measured
Source of data:	Plant Records
Value(s) of monitored parameter:	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is used to calculate the project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The measuring equipment is calibrated at least once a year. The consumption of diesel can be cross checked with the log books to find whether DG set is used for power generation.
Measuring/ Reading/ Recording frequency:	<u>Value:</u> Measured <u>Measuring Frequency:</u> Daily <u>Recording Frequency:</u> Monthly Diesel in DG set is used only for emergency purposes (trail runs to maintain its running condition) and not for the power generation purpose in the project activity. The diesel quantity and source are maintained at the point of entry by stores department. Diesel once received by stores department will be issued to DG set department as and when required. Stores department maintains receipt, issue data everyday in excel sheet and takes issue slips from DG set department for the issued Quantity.
Calculation method (if applicable):	The amount of diesel consumed by DG set is measured by using a level measuring gauge in the tank on daily basis and the same is cross verified with the issue slips
QA/QC procedures applied:	Mostly diesel is used in the DG sets for keeping them in better running condition and rarely diesel may be used for emergency purposes, the

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<sup>4</sup> Metering Date is subjected to the standards of the Agreement made with APTRANSCO (as per the directions of Andhra Pradesh Electricity Regulatory Commission, Govt of AP).

	amount of electricity generation from the DG set and corresponding diesel consumption for electricity generation is monitored.
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<b>Data / Parameter:</b>	Electricity generation using diesel
Data unit:	Kwh
Description:	Quantity of diesel consumed in DG set for electricity generation used by project activity
Measured /Calculated /Default:	Measured
Source of data:	Plant Records
Value(s) of monitored parameter:	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is used to calculate the project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The measuring equipment is calibrated at least once a year. The consumption of diesel can be cross checked with the log books to find whether DG set is used for power generation.
Measuring/ Reading/ Recording frequency:	<u>Measuring Frequency:</u> Daily <u>Recording Frequency:</u> Monthly The amount of electricity generated (if generated) on using diesel in DG set is recorded by energy meter attached to the set.
Calculation method (if applicable):	The amount of diesel consumed by DG set is measured by using a level measuring gauge in the tank on daily basis and the same is cross verified with the issue slips
QA/QC procedures applied:	Mostly diesel is used in the DG sets for keeping them in better running condition and rarely diesel may be used for emergency purposes, the amount of electricity generation from the DG set and corresponding diesel consumption for electricity generation is monitored.

<b>Data / Parameter:</b>	$\rho_{\text{diesel}}$
Data unit:	kg/lit
Description:	Density of diesel
Measured /Calculated /Default:	Default
Source of data:	National Default values
Value(s) of monitored parameter:	0.83 (As per Central Electricity Authority (CEA): "CO2 Baseline Database", Version 05, November 2009.)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is used to calculate the project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	National Default value is considered for density of diesel. The value is based on standard values published by Central Electricity Authority (CEA) CO2 baseline database version 05 which is considered to be well

	documented reliable source. The appropriateness of the value is reviewed annually.
Calculation method (if applicable):	-
QA/QC procedures applied:	-

Data / Parameter:	NCV <sub>diesel</sub>
Data unit:	GJ/ton
Description:	Net Calorific Value of diesel
Measured /Calculated /Default:	Default
Source of data:	IPCC 2006 default values
Value(s) of monitored parameter:	43.3
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is used to calculate the project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.2 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. Any future revision of the IPCC Guidelines should be taken into account.
Calculation method (if applicable):	-
QA/QC procedures applied:	-

Data / Parameter:	EF <sub>CO<sub>2</sub>, diesel</sub>
Data unit:	tCO <sub>2</sub> /GJ
Description:	CO <sub>2</sub> emission factor of diesel
Measured /Calculated /Default:	Default
Source of data:	IPCC 2006 default values
Value(s) of monitored parameter:	0.0748
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is used to calculate the project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

	Any future revision of the IPCC Guidelines should be taken into account.
Calculation method (if applicable):	-
QA/QC procedures applied:	-

## SECTION E. Emission reductions calculation

### E.1. Baseline emissions calculation

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The project derives and calculates the baseline emission co-efficient on ex-ante basis and the actual electricity produced is metered based on ex-post as mentioned in the PDD.

#### Baseline Emissions:

Calculation of Baseline Emissions due to displacement of Electricity

$$BE_{\text{Electricity},y} = EG_y \times EF_{\text{Electricity},y}$$

where

$BE_{\text{Electricity},y}$  Are the baseline emissions due to displacement of electricity during the year y in tons of CO<sub>2</sub>.  
 $EG_y$  Is the Net electricity supplied to the grid by the project activity during the year y in kWh.  $EG_y$  = (Electricity exported to the grid after meeting captive & auxiliary power requirements) – (Electricity Import from the grid).  
 $EF_{\text{Electricity},y}$  Is the CO<sub>2</sub> baseline emission factor for the electricity displaced due to the project activity in during the year y in tons CO<sub>2</sub>/kWh.

Description	Value	unit
$EG_y$ : Net electricity supplied to the grid by the project activity	15844000	kWh
$EF_{\text{Electricity},y}$ The Baseline Emission Factor of grid. Calculated on ex-ante basis and is the weighted sum of OM and BM Emission Factor (value is fixed throughout the first crediting period).	937.41	tCO <sub>2</sub> e / GWh

$$BE_{\text{Electricity},y} = EG_y \times EF_{\text{Electricity},y}$$

$$BE_{\text{Electricity},y} = 14852 \text{ tCO}_2$$

### E.2. Project emissions calculation

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The project activity is renewal based electricity generation and can only fire bagasse as fuel (The local regulation also constraint use of fossil fuels for the bagasse based co-gen system implemented in sugar industry) and the emission reductions are calculated based on the net electricity supplied to the grid. Since it is not a cofired plant, the amount of fossil fuel input to the project activity need not to be monitored.

Fossil fuel combustion (diesel) in standby DG sets during trial runs and maintenance activities only (not for power generation purpose in the project activity) is included as a monitoring parameter. The consumption records of Diesel in DG set for maintenance purposes can be cross checked with the log books and purchase records. If diesel is consumed for the project activity, the project emissions from the same are calculated as below:

Project emissions due to diesel consumption in DG set for electricity generation:

As per formula 1 provided in “Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion”, Version 02, CO<sub>2</sub> emissions from fossil fuel combustion is as follows:

$$PE_{FC,j,y} = \sum FC_{i,j,y} \times COEF_{i,y}$$

For the project activity, since the CO<sub>2</sub> emissions from fossil fuel combustion are only from diesel consumption for electricity generation. The above formula can henceforth be referred as:

$$PE_y = FC_{diesel} \times COEF_{diesel}$$

Where :

$PE_y$  Are the CO<sub>2</sub> emissions from diesel consumption during the year y (tCO<sub>2</sub>/yr);

$FC_{diesel}$  Is the quantity of diesel consumed in process during the year y (tons/yr), which equals to the Quantity of diesel consumed in litres/yr times the density of diesel ( $\rho_{diesel}$ ) in kg/lit and divide by 1000 kg/ton to convert the unit of  $FC_{diesel}$  to tons/yr.

$COEF_{diesel}$  Is the CO<sub>2</sub> emission coefficient of diesel in year y (tCO<sub>2</sub>/ton).  $COEF_{diesel}$  is based on Option B of “Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion”.  $COEF_{diesel} = NCV_{diesel} \times EF_{CO_2, diesel}$

The project emissions will depend on the quantity of diesel if consumed for electricity generation for the project. Since the diesel consumption for electricity generation is zero now, the project emissions from same is zero i.e.,  **$PE_y = 0$  tCO<sub>2</sub>/yr**. However, if any consumption of diesel for electricity generation identified, the project emissions are calculated as per the formula provided below:

$$PE_y = FC_{diesel} \times NCV_{diesel} \times EF_{CO_2, diesel}$$

Where:

$FC_{diesel}$  Is the quantity of diesel consumed in process during the year y (tons/yr),

$NCV_{diesel}$  Is net calorific value of the diesel (GJ/ton)

$EF_{CO_2, diesel}$  Is the CO<sub>2</sub> emission factor of diesel in year y (tCO<sub>2</sub>/GJ)

$$PE_y = 0 \text{ tCO}_2/\text{yr}$$

Parameter	Description	Value	Unit
$FC_{diesel}$	Is the quantity of diesel consumed in process during the year y	0. Diesel in DG set is used only for emergency purposes (trail runs to maintain its running condition) and not for the power generation purpose in the project activity. If diesel is consumed for the project activity, the project emissions from the same are calculated	tons/yr
$\rho_{diesel}$	Is the density of diesel	0.83. Density of diesel is taken from standard values published by Central Electricity Authority (CEA) CO <sub>2</sub> baseline database version 05.	kg/lit
$NCV_{diesel}$	Is net calorific value of the diesel	43.3GJ/ton. Value is taken from IPCC 2006 default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.2 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. Any future revision	GJ/ton



		of the IPCC Guidelines should be taken into account.	
EF <sub>CO<sub>2</sub>, diesel</sub>	Is the CO <sub>2</sub> emission factor of diesel in year y	0.0748 tCO <sub>2</sub> /GJ. CO <sub>2</sub> emission factor of diesel is taken from IPCC 2006 default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. Any future revision of the IPCC Guidelines should be taken into account.	tCO <sub>2</sub> /GJ

### E.3. Leakage calculation

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Not applicable

### E.4. Emission reductions calculation / table

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**Emission reductions from the project activity: ER = Baseline Emissions – Project Emissions – Leakage**

Initial Reading	Final reading	Net Power Import in MWh	Net Power export in MWh	EGy : Net electricity supplied to the grid by the project activity (MWh)	Project Emissions from Fossil Fuel usage (tCO <sub>2</sub> e)	CO <sub>2</sub> e Emission Factor (tCO <sub>2</sub> e/GWh)	Baseline Emissions due to displacement of Electricity	Emission reductions from the project activity
24.07.2008	24.08.2008	93	0	-93	0	937.41	-87	-87
24.08.2008	24.09.2008	101	0	-101	0	937.41	-95	-95
24.09.2008	24.10.2008	98	0	-98	0	937.41	-92	-92
24.10.2008	24.11.2008	120	0	-120	0	937.41	-112	-112
24.11.2008	24.12.2008	54	2890	2836	0	937.41	2658	2658
24.12.2008	24.01.2009	0	4680	4680	0	937.41	4387	4387
24.01.2009	24.02.2009	0	4229	4229	0	937.41	3964	3964
24.02.2009	24.03.2009	79	1141	1062	0	937.41	996	996
24.03.2009	24.04.2009	100	0	-100	0	937.41	-94	-94
24.04.2009	24.05.2009	89	0	-89	0	937.41	-83	-83
24.05.2009	24.06.2009	102	0	-102	0	937.41	-96	-96
24.06.2009	24.07.2009	108	0	-108	0	937.41	-101	-101
24.07.2009	24.08.2009	111	0	-111	0	937.41	-104	-104
24.08.2009	24.09.2009	93	0	-93	0	937.41	-87	-87
24.09.2009	24.10.2009	94	0	-94	0	937.41	-88	-88
24.10.2009	24.11.2009	126	0	-126	0	937.41	-118	-118
24.11.2009	24.12.2009	51	3281	3230	0	937.41	3028	3028
24.12.2009	31.12.2009	0	1042	1042	0	937.41	977	977
Total		1419	17263	15844	0	937.41	14852.32	14852.32

**The total CER generation: 14,852 t Co<sub>2</sub>e**

### E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

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This section shall include a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD.

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO <sub>2</sub> e)	48,552 metric tonnes CO <sub>2</sub> equivalent per annum	Total Emission Reductions achieved for the 4 <sup>th</sup> Monitoring Period (25/07/2008 - 31/12/2009):  14,852 t CO <sub>2</sub> e

<b>E.6. Remarks on difference from estimated value in the PDD</b>
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Not applicable since there is no **increase** in the actual emission reductions achieved during the current monitoring period compared to the estimated value in the PDD

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