



**MONITORING REPORT (CDM-MR)**  
**Version 01, 20/07/2010**

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**MONITORING REPORT****Version 01, 20/07/2010****11.3 MW Renewable Energy Project for a Grid System by K.M.Power (P) Limited****Reference NO: 0750****5<sup>th</sup> Monitoring Report Period : 24/03/2009 to 23/03/2010 (first and last days included)****SECTION A. General description of the project activity****A.1. Brief description of the project activity: >>**

&gt;&gt;

The project activity is a bundled project comprising of three projects and generates electrical power using hydro potential available in Nippulavagu a tributary of Galeru river in Kurnool District of Andhra Pradesh state and exporting the generated electricity to the state owned power utility APTRANSCO.

The project is a run-of-the-river hydroelectric scheme that comprises a diversion structure, power canal, penstocks, powerhouse, and power evacuation system and tailrace canal. After power generation the water goes back into the river. The generated power will be exported to the grid through a 33/11 kV substations of APTRANSCO. In this process there are no greenhouse gas emissions or burning of any fossil fuels. Thus electricity is generated through sustainable means without causing any negative effect on the environment.

The details of major equipment of the project activity are furnished below:

<b>S.No</b>	<b>Location of plant</b>	<b>Equipment details</b>
1	Guntakandala small hydro plant	2x2000 KW Vertical Kaplan Turbine, Adjustable runner & indicating and recording instruments guidevanes, etc  Synchronous generator of 3 Phase, 6.6 kV, k 15%, 50 c/s, 750 RPM, 0.8 PF and rated output 2000 KW  Supplier: M/s Boving Fouress Ltd, Bangalore
2	Velpanur small hydro plant	2x1650 KW Vertical Kaplan Turbine, Adjustable runner & indicating and recording instruments guidevanes, etc  Synchronous generator of 3 Phase, 6.6 kV, k 15%, 50 c/s, 750 RPM, 0.8 PF and rated output 2000 KW  Supplier: M/s Boving Fouress Ltd, Bangalore
3	Madhavaram small hydro plant	2x2000 KW Vertical Kaplan Turbine, Adjustable runner & indicating and recording instruments guidevanes, etc  Synchronous generator of 3 Phase, 6.6 kV, k 15%, 50 c/s, 750 RPM, 0.8 PF and rated output 2000 KW  Supplier: M/s Boving Fouress Ltd, Bangalore



The Guntakandala small hydro project commissioned in February 2002, Velpanuru small hydro project commissioned in November 2002 and Madhavaram small hydro project commissioned in December 2003 and units of all projects are in operation to till date.

The present monitoring report is chosen from 24 Mar 2009 to 23 Mar 2010. The net electricity exported to the State grid by the project activities is 16.6459 GWh and the net emission reductions are of 12,470 tCO<sub>2</sub>e for the present monitoring period.

## A.2. Project Participants

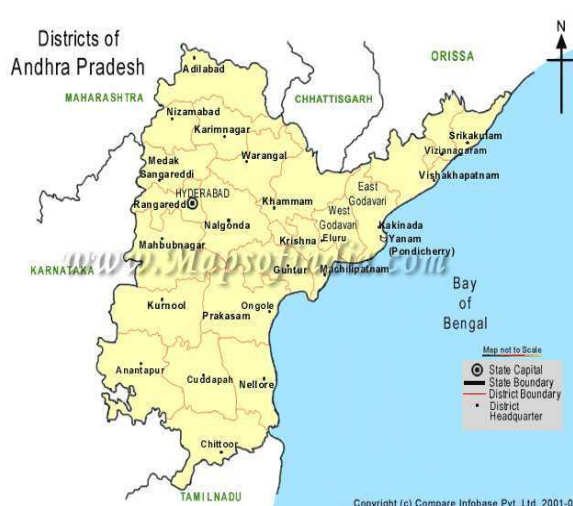
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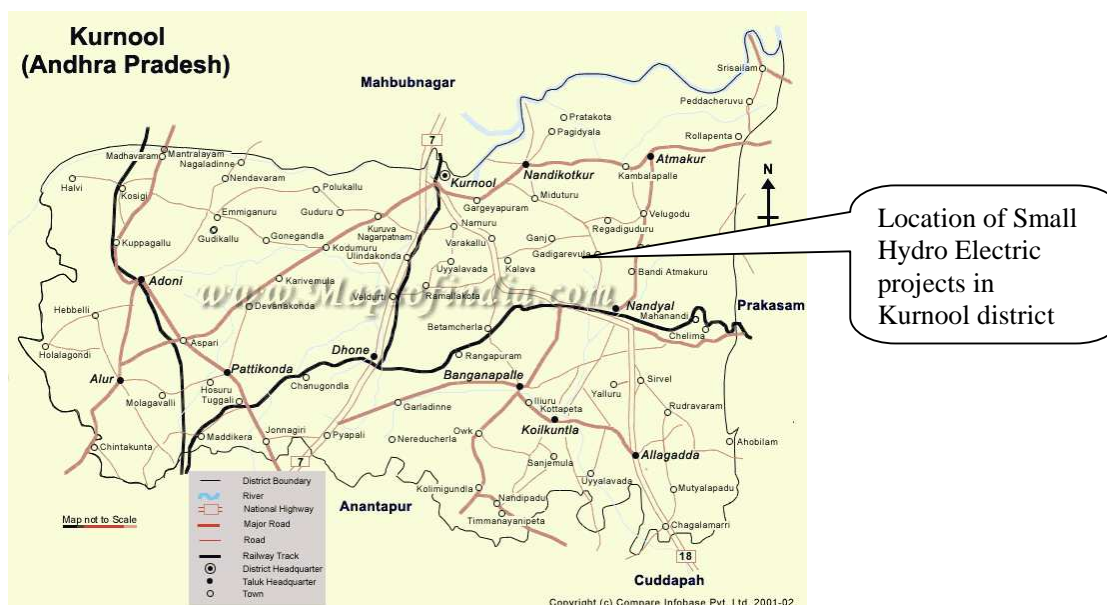
Name of the party involved(*) ((host) indicates a host party)	Private and/or public entity (ies) project participants	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	Private Entity: K.M.POWER (P) LIMITED	No.
United Kingdom (U.K)	Noble Carbon Credits Limited	No.
Japan	Mitsubishi Corporation	No.

## A.3. Location of the project activity:

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All three project activities were located at a distance of about 17 km from Velgodu which is Mandal headquarter and is about 70 km from Kurnool. Kurnool is located at a distance of 200 km from Hyderabad the state capital of Andhra Pradesh.





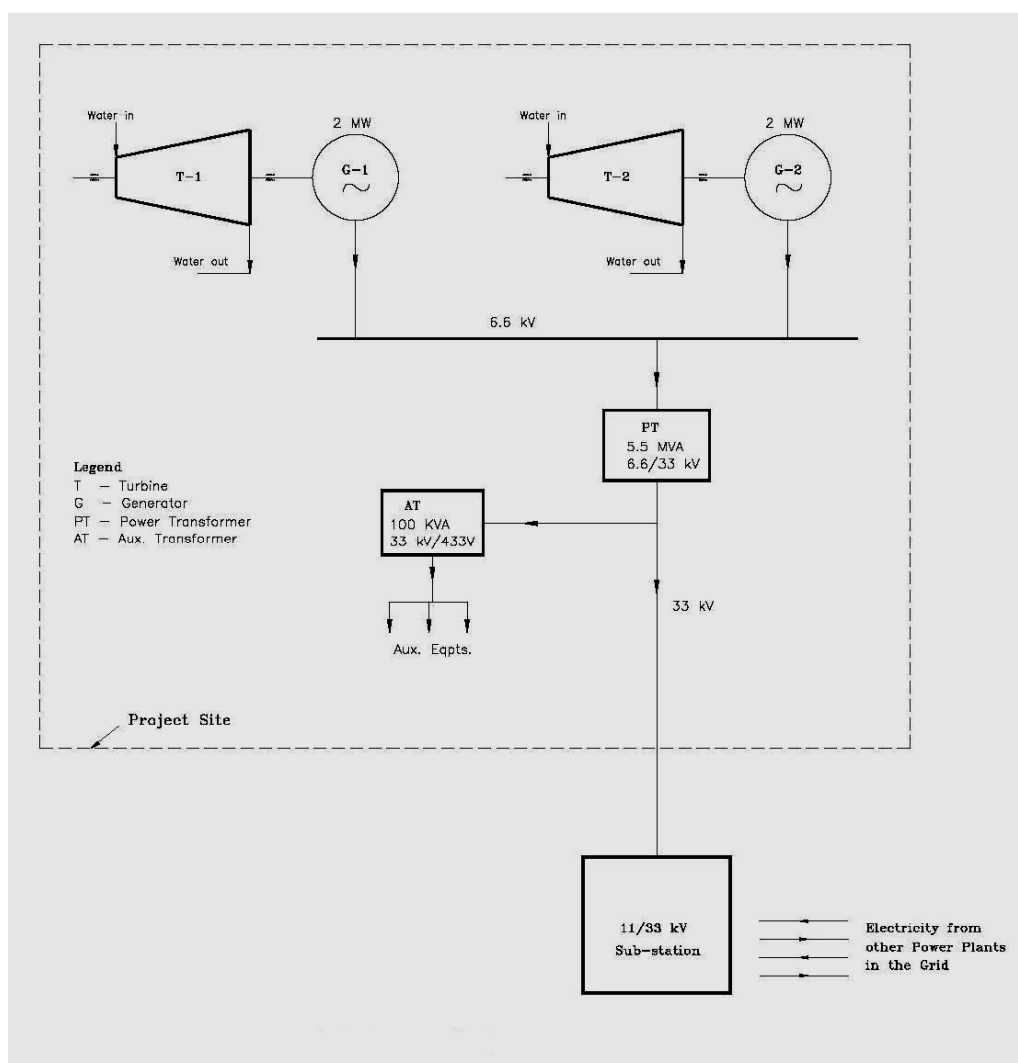
#### A.4. Technical description of the project

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The technology or power generation process using hydro resources is converting the potential energy available in the water flows into mechanical energy using hydro turbines and then to electrical energy using alternators. The generated power will be transformed to match the nearest grid sub-station for proper interconnection and smooth evacuation of power.

The generated power will be exported to the grid through a 33/11 kV substation located at Velugodu village at a distance of 5 km in respect of Guntakandala SHP and Velpanur SHP and Gadivamula village in respect of Madhavaram SHP located at a distance of 11 km from the plant location.

Detailed technical process diagram of the project activity is furnished below:



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

&gt;&gt;

Sectoral Scope : 1 : Energy industries (renewable - / non-renewable sources)

Methodology : AMS-I.D. Ver. 9 - Renewable electricity generation for a grid

<http://cdm.unfccc.int/Projects/DB/DNV-CUK1162557680.05/view>

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

&gt;&gt;

14 Jan 2007

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

&gt;&gt;

06 Feb 2002 to 05 Feb 2012 (Fixed)

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



&gt;&gt;

Name/Entity	Project Participant (Yes/No)
Mr. G. Ramanarayan Reddy KM Power (P) Ltd. Telephone: +91- 40- 2341 4635 E-Mail : <a href="mailto:kmpowerltd@yahoo.co.in">kmpowerltd@yahoo.co.in</a>	Yes
Mr. B. Venu Bahadur Reddy Zenith Energy Services (P) Limited Telephone : +91- 40- 2337 6630, 2337 6631 E-Mail : <a href="mailto:venu@zenithenergy.com">venu@zenithenergy.com</a>	No

## SECTION B. Implementation of the project activity

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

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The project has already started commercial operations in February 2002. The project promoter has installed the monitoring equipments to monitor the parameters, which were described in the registered CDM-PDD.

The details of the project operations during this monitoring period are presented below:

		Total available hours (Hr:MM)	Running hours (Hr:MM)	Non-running hours <sup>a</sup> (Hr:MM)
Guntakandala	Unit-1	8760:00	2857:25	5902:35
	Unit-2	8760:00	2791:00	5969:00
Velpanuru	Unit-1	8760:00	1592:00	7168:00
	Unit-2	8760:00	3572:25	5187:35
Madhavaram	Unit-1	8760:00	8066:55	693:05
	Unit-2	8760:00	6036:15	2723:45

<sup>a</sup> Due to less water in the river, most of the time the project has been operated effectively by interchanging Units. For major plant outages and reasons for the reported period is furnished in Annex-4.

No significant events occurred during this monitoring period, which may impact the applicability of the methodology.

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

&gt;&gt;

Not applicable

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

&gt;&gt;

Not applicable

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

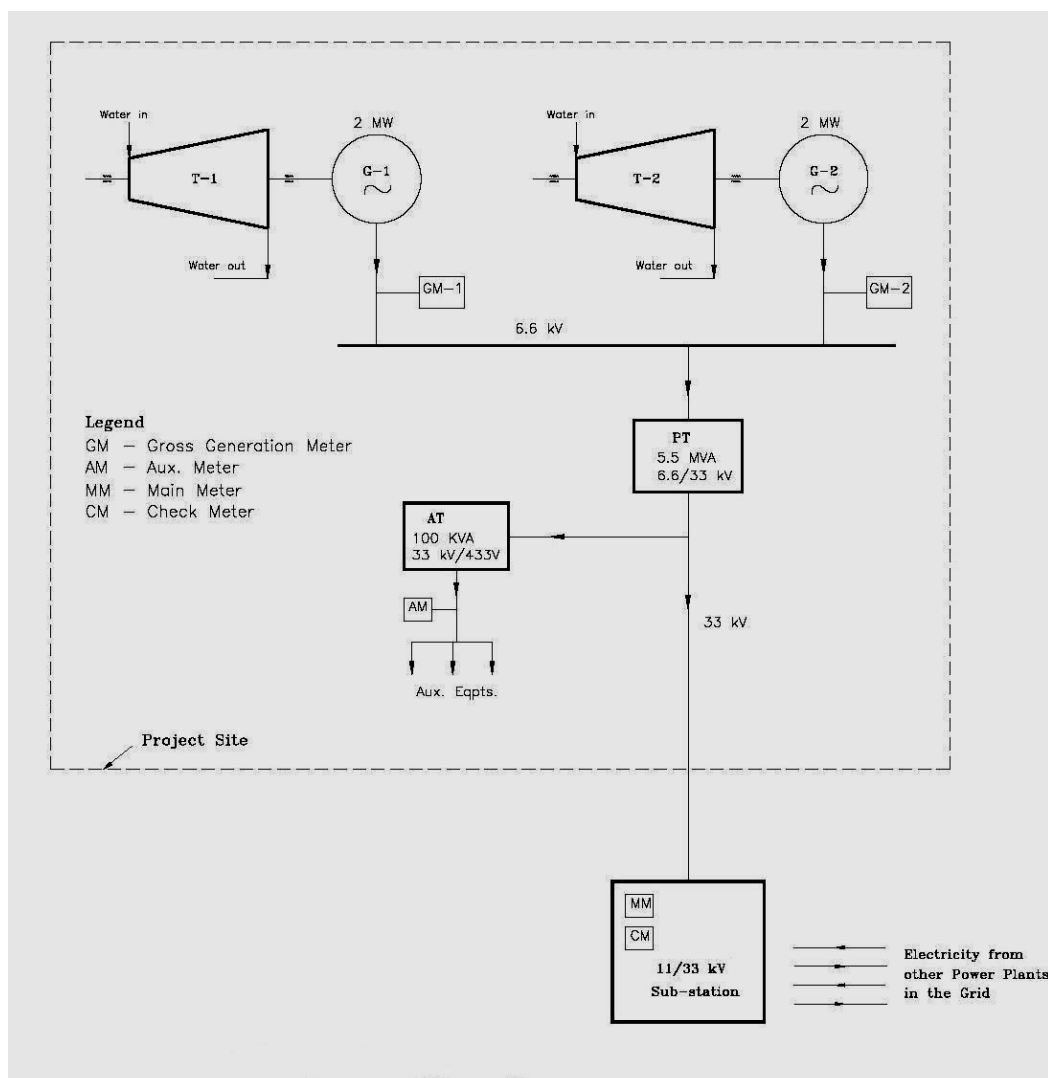
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The Project has been implemented as mentioned in the registered CDM-PDD. Hence, no notification or request of approval of changes have been made for the project.

#### SECTION C. Description of the monitoring system

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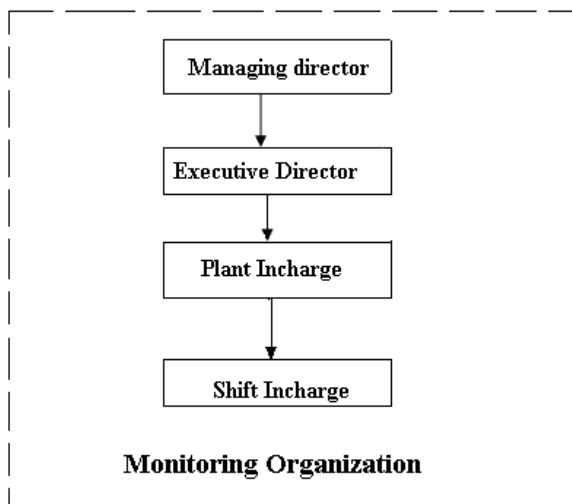
The project had been provided the monitoring equipments which were described in the registered CDM-PDD and the line diagram for the monitoring parameters are furnished below:



#### Monitoring Organisation Structure

A CDM team has been formed in KM Power (P) Limited. (KMPPL) for monitoring and verification of all the monitoring parameters as per the guidelines formulated by the management of KMPPL. Qualified and trained people monitor the parameters and emission reduction calculations. KMPPL is

the sole agency responsible for implementation and monitoring of the project activity. The monitoring organisation structure is shown below:



### **Roles and Responsibilities**

#### **Managing Director**

Managing Director is responsible for the total monitoring plan. The Managing Director will examine the reports generated by the ED. He also examines the internal audit reports prepared by internal auditor and also suggest/modify the structure of report and data recording formats as and when required.

#### **Executive Director (ED)**

The Executive Director will examine the reports generated by the Plant Incharge with respect to the monthly electricity generated, exported and annual emission reduction calculations as per the monitoring plan.

#### **Plant Incharge**

The General Manager is responsible for the electricity generations at project site. He will review the monitored parameters for correctness and take corrective measures in case of minor errors in the monitored data. He also prepares a daily summary on project operation & electricity generations and report to Managing Director for any abnormality. The calibration of the meters installed will be taken care by him as per the monitoring plan.

#### **Shift Incharge**

Shift Incharge is responsible for recording the total electricity generation, auxiliary consumption, electricity export, electricity import, plant shut down times, etc. The monthly reports will be generated and submitted to the General Manager for verification and emission reduction calculations.

### **Training procedures for KM Power personnel:**

Plant Incharge will prepare Annual training program calendar in consultation with the Managing Director (MD). MD will identify the faculties & arrange for the training as per training schedule. The training details of all the employs will be maintaining in the training record registry.

### **Calibration**





Main and Check meters are being tested and certified at least once in year against an accepted laboratory standard meter in accordance with electricity standards. The calibration of the meters is carried out by APTRANSCO. The meters are deemed to be working satisfactorily if the errors are within the meter specifications of 0.2 accuracy class.

#### **Methods of data transfer and archiving policy**

The data will be recorded both at the project site as well as at the grid substation, which is under the control of APTRANSCO. The energy will be measured using calibrated meters and recorded at the APTRANSCO substation. Records of measurements will be used for verification of emissions reductions. Sales bills / receipts may be compared as an alternative proof of the power exported to the grid.

The responsibility of storage and archiving of information in good condition also lies with the designated person in charge. The person in charge will undertake periodic verifications and onsite inspections to ensure the quality of the data collected by the team and initiate steps in case of any abnormal conditions.

The project had been provided the monitoring equipments which were described in the registered CDM-PDD and the line diagram for the monitoring parameters are furnished below:

#### **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**

N.A.

##### **D.2. Data and parameters monitored**

<b>Data / Parameter:</b>	
Data unit:	kWh
Description:	Gross Generation
Measured /Calculated /Default:	On-site measurement
Source of data:	Daily generation log sheets
Value(s) of monitored parameter:	Please see Annex-2 for monthly values
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This value is not used in the emission reduction calculation. The same is used to cross check for electricity export to grid by the project activity.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Details are furnished in Table-2
Measuring/ Reading/ Recording frequency:	Measured hourly and aggregated for daily.
Calculation method (if applicable):	----
QA/QC procedures applied:	Meter is Calibrated and Regularly inspected by APTRANSCO

<b>Data / Parameter:</b>	
Data unit:	kWh



Description:	Auxiliary consumption
Measured /Calculated /Default:	On-site measurement
Source of data:	Daily generation log sheets
Value(s) of monitored parameter:	Please see Annex-2 for monthly values
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This value is not used in the emission reduction calculation. The same is used to cross check for electricity export to grid by the project activity.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Details are furnished in Table-2
Measuring/ Reading/ Recording frequency:	Measured hourly and aggregated for daily.
Calculation method (if applicable):	-----
QA/QC procedures applied:	Meter is recalibrated periodically at third party reputed lab. and Regularly inspected by APTRANSCO

<b>Data / Parameter:</b>	
Data unit:	kWh
Description:	Power Import
Measured /Calculated /Default:	On-site measurements
Source of data:	Monthly Joint Meter Readings Reports certified by APTRANSCO officials
Value(s) of monitored parameter:	Please see Annex-2 for monthly values
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Details are furnished in Table-1
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	-----
QA/QC procedures applied:	Meters are recalibrated & inspected periodically by APTRANSCO. Records of measurements are used for verification of emissions reductions. Sales bills / receipts are used for cross verification.

<b>Data / Parameter:</b>	
Data unit:	kWh
Description:	Power Export
Measured /Calculated /Default:	On-site measurements
Source of data:	Monthly Joint Meter Readings Reports certified by APTRANSCO officials
Value(s) of monitored parameter:	Please see Annex-2 for monthly values



Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Details are furnished in Table-1
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	----
QA/QC procedures applied:	Meters are recalibrated & inspected periodically by APTRANSCO. Records of measurements are used for verification of emissions reductions. Sales bills / receipts are used for cross verification.

<b>Data / Parameter:</b>	
Data unit:	tCO <sub>2</sub> /GWh
Description:	Grid Emission Factor (EF)
Measured /Calculated /Default:	Calculated
Source of data:	Central Electricity Authority (CEA) is a government body which calculates the grid emission factors. <a href="http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm">http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm</a>
Value(s) of monitored parameter:	749.22 (Details are provided in Annex-3)  Weighted Average Emissions Rate (Excl. Imports) for the most recent year (2008-09) available for Southern Region grid. The same has been considered based on the clarification given on approved methodologies (AM_CLA_0038).
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	N.A
QA/QC procedures applied:	This data item is required for estimating the baseline emissions and emission reductions.

**Table- 1: Main Meter & Check Meter Recalibration Test Details**

Project	Description	Main Meter		Check Meter	
un ta ka nd	Period	24.03.09 to 11.11.09	11.11.09 to 23.03.10	24.03.09 to 11.11.09	11.11.09 to 23.03.10



	Serial No.	01988435	01988419	01988436	01988431
	Type	Tri-vector meter	Tri-vector meter	Tri-vector meter	Tri-vector meter
	Accuracy class	0.2s	0.2	0.2s	0.2s
	Calibration frequency	Annual	Annual	Annual	Annual
	Date of calibration	20.10.2008	19.10.2009	20.10.2008	19.10.2009
	Validity	19.10.2009	18.10.2010	19.10.200	18.10.2010
Velpalur	Period	24.03.09 to 23.12.09	23.12.09 to 23.03.10	24.03.09 to 23.12.09	23.12.09 to 23.03.10
	Serial No.	07033700	01988435	07033710	01988436
	Type	Tri-vector meter	Tri-vector meter	Tri-vector meter	Tri-vector meter
	Accuracy class	0.2s	0.2	0.2s	0.2
	Calibration frequency	Annual	Annual	Annual	Annual
	Date of calibration	18.11.2008	13.11.2009	18.11.2008	13.11.2009
	Validity	17.11.2009	12.11.2010	17.11.2009	12.11.2010
Madhavaram	Period	24.03.09 to 24.04.09	24.04.09 to 23.03.10	24.03.09 to 24.04.09	24.04.09 to 23.03.10
	Serial No.	01988419	06607932	01988431	01988399
	Type	Tri-vector meter	Tri-vector meter	Tri-vector meter	Tri-vector meter
	Accuracy class	0.2s	0.2s	0.2s	0.2
	Calibration frequency	Annual	Annual	Annual	Annual
	Date of calibration	15.04.2008	01.04.2009	15.04.2008	01.04.2009
	Validity	14.04.2009	31.03.2010	14.04.2009	31.03.2010

**Table- 2: Gross Energy Generation Meter & Auxiliary Power Consumption Meter Recalibration Test Details**

Project	Description	Gross Energy Meter	Aux. Power
Guntakandala	Serial No.	A3211033 & A3211032	F40/853-502
	Type	Energy meter	Energy meter
	Accuracy class	0.02	0.02
	Calibration frequency	Every Year	Every Year

	Date of calibration	5.01.2009	5.01.2009
Velpanur	Serial No.	A3220424 & A3220426	F40/853-502
	Type	Energy meter	Energy meter
	Accuracy class	0.02	0.02
	Calibration frequency	Every Year	Every Year
	Date of calibration	5.01.2009	5.01.2009
Madhavaram	Serial No.	A32300614 & A32300613	F40/1536-603
	Type	Energy meter	Energy meter
	Accuracy class	0.02	0.02
	Calibration frequency	Every Year	Every Year
	Date of calibration	5.01.2009	5.01.2009

## SECTION E. Emission reductions calculation

### E.1. Baseline emissions calculation

&gt;&gt;

The baseline emissions are calculated as follows:

$$BE_y = EG_y \cdot EF_y$$

Where  $EG_y$  is the net electricity export to grid in a given year (GWh)  
 $EF_y$  is the emission factor for a given year (tCO<sub>2</sub>/GWh)

### E.2. Project emissions calculation

&gt;&gt;

The project emissions from the project activity are considered as zero.

### E.3. Leakage calculation

&gt;&gt;

Leakage is not considered from the project activity.

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

&gt;&gt;

The following formula is adopted for calculating emission reductions generated by the project activity:

$$ER_y = BE_y - PE_y - L_y$$

Where  $ER_y$  is emission reductions in a given year

BE<sub>y</sub> is baseline emissions in a given year

PE<sub>y</sub> is project emissions in a given year

L<sub>y</sub> is leakage in a given year

Parameter	Unit	Guntakandala	Velpanuru	Madhavaram	Total
Electricity Exported to Grid	kWh	7,311,400	5,349,400	4,005,300	16,666,100
Electricity Imported from Grid	kWh	4,100	7,200	8,900	20,200
Net Electricity Exported to Grid	kWh	7,307,300	5,342,200	3,996,400	16,645,900
	GWh	7.307	5.342	3.996	16.646
Emission Factor	t CO <sub>2</sub> /GWh	749.22	749.22	749.22	
Baseline Emissions	t CO <sub>2</sub> e	5,474	4,002	2,994	12,470
Project Emissions	t CO <sub>2</sub> e	0	0	0	0
Leakages	t CO <sub>2</sub> e	0	0	0	0
Net Emission Reductions	t CO <sub>2</sub> e	<b>5,474</b>	<b>4,002</b>	<b>2,994</b>	<b>12,470</b>

*The detailed calculation of emission reductions are presented in excel spread sheet.*

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

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Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
<b>Emission reductions (tCO<sub>2</sub>e)</b>	<b>25,511</b>	<b>12,470</b>

#### E.6. Remarks on difference from estimated value in the PDD

>>

The project activity had been envisaged for usage of water flows of Nippulavagu which is a tributary to Galeru river flowing in the same district (Kurnool). The net emission reductions are 51.1% lower than estimated in the registered CDM-PDD. During the reported period, the units of all three project activities were badly affected by heavy floods<sup>1</sup> due to which the units stopped generations for more than 2 months for equipment cleaning & overhauling.

<sup>1</sup> <http://www.eha-health.org/emergencies/eharesponse/2009andhrafflood>



[Annex -1](#)

Additional Monitoring Information

A. The following document is made available to this report

/1/ Spread sheet for Emission Reduction calculations

B. Copies of the following documents are provided to DOE for verification

/1/ Monthly Joint Meter Readings certified by APTRANSCO

/2/ Calibration reports for the reported period

[Annex -2](#)Consolidated Report for Monitored Parameters During the Monitored Period

Monitored Period	Gross Electricity Generated, kWh			Aux. Power Consumption, kWh		Electricity Exported to Grid	Electricity Imported from Grid	Net Electricity Exported to Grid
	UNIT-1	UNIT-2	TOTAL	Measured at Project site (See Note-1)	Calculated (See Note-2)	kWh	kWh	kWh
<b>GUNTAKANDALA POWER HOUSE</b>								
24.03.09 to 24.04.09	287060	0	287060	2981	7860	279400	200	279200
24.04.09 to 23.05.09	0	0	0	0	100	0	100	-100
23.05.09 to 23.06.09	0	0	0	0	100	0	100	-100
23.06.09 to 23.07.09	0	0	0	0	200	0	200	-200
23.07.09 to 24.08.09	690	543170	543860	5087	14660	529600	400	529200
24.08.09 to 23.09.09	1032130	523720	1555850	7246	34150	1522400	700	1521700
23.09.09 to 22.10.09	425190	0	425190	1586	-17310	442600	100	442500
22.10.09 to 23.11.09	0	0	0	0	0	0	0	0
23.11.09 to 23.12.09	327780	56360	384140	3256	8840	376800	1500	375300
23.12.09 to 23.01.10	613570	778800	1392370	6328	30670	1362200	500	1361700
23.01.10 to 22.02.10	528580	1153040	1681620	7262	28920	1652700	0	1652700
22.02.10 to 23.03.10	349840	822780	1172620	6802	27220	1145700	300	1145400
<b>Sub-Total</b>	<b>3564840</b>	<b>3877870</b>	<b>7442710</b>	<b>40548</b>	<b>135410</b>	<b>7311400</b>	<b>4100</b>	<b>7307300</b>
<b>VELPANUR POWER HOUSE</b>								
24.03.09 to 24.04.09	0	290330	290330	3369	7830	283300	800	282500
24.04.09 to 23.05.09	0	0	0	1117	1200	0	1200	-1200
23.05.09 to 23.06.09	0	0	0	934	1200	0	1200	-1200
23.06.09 to 23.07.09	0	0	0	792	1000	0	1000	-1000
23.07.09 to	460	475450	475910	4565	11910	464500	500	464000





24.08.09								
24.08.09 to 23.09.09	546550	880860	1427410	6633	28510	1399500	600	1398900
23.09.09 to 22.10.09	267600	299470	567070	2510	10270	556900	100	556800
22.10.09 to 23.11.09	0	0	0	0	0	0	0	0
23.11.09 to 23.12.09	0	1260	1260	509	1460	700	900	-200
23.12.09 to 23.01.10	141000	536360	677360	3862	12060	665900	600	665300
23.01.10 to 22.02.10	380070	818490	1198560	6505	19360	1179300	100	1179200
22.02.10 to 23.03.10	205400	610440	815840	6731	16740	799300	200	799100
<b>Sub-Total</b>	<b>1541080</b>	<b>3912660</b>	<b>5453740</b>	<b>37527</b>	<b>111540</b>	<b>5349400</b>	<b>7200</b>	<b>5342200</b>
<b>MADHAVARAM POWER HOUSE</b>								
24.03.09 to 24.04.09	0	308510	308510	3598	8610	301200	1300	299900
24.04.09 to 23.05.09	0	0	0	1360	1600	0	1600	-1600
23.05.09 to 23.06.09	0	0	0	800	1100	0	1100	-1100
23.06.09 to 23.07.09	0	0	0	965	1300	0	1300	-1300
23.07.09 to 24.08.09	0	479710	479710	4110	11810	468500	600	467900
24.08.09 to 23.09.09	441295	1104760	1546055	6032	16755	1529600	300	1529300
23.09.09 to 22.10.09	233845	378120	611965	2300	5565	606400	0	606400
22.10.09 to 23.11.09	0	0	0	0	-100	200	100	100
23.11.09 to 23.12.09	0	0	0	0	700	0	700	-700
23.12.09 to 23.01.10	0	0	0	0	800	0	800	-800
23.01.10 to 22.02.10	0	319650	319650	1018	5050	315400	800	314600
22.02.10 to 23.03.10	93470	701760	795230	5011	11530	784000	300	783700
<b>Sub-Total</b>	<b>768610</b>	<b>3292510</b>	<b>4061120</b>	<b>25194</b>	<b>64720</b>	<b>4005300</b>	<b>8900</b>	<b>3996400</b>
<b>Grand Total</b>	<b>5874530</b>	<b>11083040</b>	<b>16957570</b>	<b>103269</b>	<b>311670</b>	<b>16666100</b>	<b>20200</b>	<b>16645900</b>

**Note-1:** Measured aux. consumption includes part of electricity generated by the project activity and electricity imported from grid taken through energy meter located on LT panel at project site. The losses on account of power transformer & transmission



**Note-2:** Computed based on the gross electricity generation recorded in the plant and electricity exported to the grid & electricity imported from grid readings certified by APTRANSCO & Plant personnel.

## Annex -3

### Baseline Information

From Carbon Dioxide Baseline Data base, Version 5, November 2009 published by Government of India, Ministry of Power Central Electricity Authority, Government of India.

(<http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>)

### Appendix B Grid Emission Factors

*Table A: Values for all regional grids for FY 2005-06 until FY 2008-09, Excluding inter regional and cross-border electricity transfers. Note: values are rounded off to two decimals see the web link given above for additional decimals places (Database – Excel worksheet)*

#### Weighted Average Emission Rate (tCO<sub>2</sub>/MWh) (excl. Imports)

	2005-06	2006-07	2007-08	2008-09
NEWNE	0.84	0.83	0.82	0.844339
South	0.73	0.72	0.72	0.749227
India	0.82	0.80	0.80	0.82

#### Simple Operating Margin (tCO<sub>2</sub>/MWh) (excl. Imports) (1)

	2005-06	2006-07	2007-08	2008-09
NEWNE	1.02	1.02	1.01	1.02
South	1.01	1.00	0.99	0.97
India	1.02	1.01	1.01	1.01

#### Build Margin (tCO<sub>2</sub>/MWh) (excl. Imports)

	2005-06	2006-07	2007-08	2008-09
NEWNE	0.67	0.63	0.60	0.68
South	0.71	0.70	0.71	0.82
India	0.68	0.65	0.63	0.71

#### Combined Margin (tCO<sub>2</sub>/MWh) (excl. Imports) (1)

	2005-06	2006-07	2007-08	2008-09
NEWNE	0.85	0.82	0.81	0.85
South	0.86	0.85	0.85	0.89
India	0.85	0.83	0.82	0.86

[Annex -4](#)Details of major shut downs and reasons for the monitored period**Guntakandala Power House- Unit I:**

Period	Type of Shut down (Hr:Mn)			Reason
	Others	Planned	Forced	
27.03.09 to 28.03.09			36:00	Low discharge of water
07.04.09 to 08.04.09			18:00	
09.04.09 to 28.07.09	2424:00			Off-season
29.07.09 to 27.08.09			712:45	Low discharge of water
03.09.09 to 04.09.09			26:40	
02.10.09			7:40	
03.10.09 to 09.12.09			1623:30	Equipment overhauling due to Heavy floods
12.12.09 to 13.12.09			22:00	Low discharge of water
25.12.09 to 30.12.09			72:40	
04.01.10 to 08.01.10			120:00	
24.01.10 to 30.01.10			146:15	
02.02.10			12:00	
96.03.10 to 23.03.10			374:20	
* short interruption			306:45	
<b>Total</b>	<b>2424:00</b>	<b>0:00:00</b>	<b>3478:35</b>	

\* Short interruption includes the both grid failures and transmission line problems

**Guntakandala Power House- Unit II :**

Period	Type of Shut down (Hr:Mn)			Reason
	Others	Planned	Forced	
24.03.09 to 08.04.09			384:00	Low discharge of water
09.04.09 to 28.07.09	2424:00			Off-season
29.07.09 to 31.07.09			47:00	Low discharge of water
25.08.09			9:35	Grid failure
27.08.09 to 31.08.09			108:30	Low discharge of water
02.09.09 to 08.09.09			131:35	



16.09.09 to 18.09.09			50:15	
19.09.09 to 02.10.09			336:00	
03.10.09 to 18.12.09			1842:00	Equipment overhauling due to Heavy floods
20.12.09 to 03.01.10			325:05	Low discharge of water
16.03.10 to 17.03.10			15:55	
*short interruption			295:05	
<b>Total</b>	<b>2424:00</b>	<b>00:00</b>	<b>3545:00</b>	

### Velpanur Power House- Unit I :

Period	Type of Shut down (Hr:Mn)			Reason
	Others	Planned	Forced	
24.03.09 to 08.04.09			384:00	Low discharge of water
09.04.09 to 28.07.09	2424:00			Off-season
29.07.09 to 30.08.09			792:00	Low discharge of water
31.08.09 to 02.09.09			53:15	Trash Cleaning & Low discharge of water level
93.09.09 to 08.09.09			107:25	Low discharge of water
30.09.09 to 02.10.09			30:30	Supply Failed, Trash Cleaning & Low discharge of water level
03.10.09 to 11.01.10			2417:45	Equipment overhauling due to Heavy floods
13.01.10 to 18.01.10			123:25	Bearings Problem
25.01.10 to 30.01.10			134:00	Low discharge of water
02.02.10			13:10	
06.03.10 to 23.03.10			391:400	
*short interruptions			297:30	
<b>Total</b>	<b>2424:00</b>	<b>0:00</b>	<b>4744:00</b>	

### Velpanur Power House- Unit II :

Period	Type of Shut down (Hr:Mn)			Reason
	Others	Planned	Forced	
24.03.09 to 08.04.09			35:45	Low discharge of water
09.04.09 to 28.07.09	2424:00			Off-season
29.07.09 to 31.07.09			44:05	Low discharge of water



02.09.09 to 04.09.10			33:20	Trash Cleaning & Low discharge of water level
13.09.10			8:35	PT, Resistor and cooling motor problem
02.10.09			9:30	Supply Failed, Trash Cleaning & Low discharge of water level
03.10.09 to 04.01.10			2245:45	Equipment overhauling due to Heavy floods
24.01.10 to 25.01.10			16:20	Low discharge of water
14.03.10 to 17.03.10			37:10	
*short interruptions			333:05	
<b>Total</b>	<b>2424:00</b>	<b>0:00</b>	<b>2763:35</b>	

### Madhavaram Power House- Unit I :

Period	Type of Shut down (Hr:Mn)			Reason
	Others	Planned	Forced	
24.03.09 to 06.04.09			336:00	Low discharge of water
09.04.09 to 28.07.09	2424:00			Off-season
29.07.09 to 06.09.09			960:00	Low discharge of water
01.10.09 to 02.10.09			31:00	
03.10.09 to 04.03.10			3664:15	Equipment overhauling due to Heavy floods
09.03.10			15:35	Generator gear box problem
10.03.10 to 23.03.10			336:00	Low discharge of water
*Short Interruption			300:05	
<b>Total</b>	<b>2424:00</b>	<b>0:00</b>	<b>5642:55</b>	

### Madhavaram Power House- Unit II :

Period	Type of Shut down (Hr:Mn)			Reason
	Others	Planned	Forced	
27.03.09			9:20	Line break down due to failure of pin insulator at NDL s.s
03.04.09 to 08.04.09			65:00	Low discharge of water
09.04.09 to 28.07.09	2424:00			Off-season
29.07.09 to 30.07.09			33:00	Low discharge of water
02.10.09			12:30	208 DP all disc insulators burned & high capacity of flood water plant



				was damage
03.10.09 to 10.02.10			3140:35	Equipment overhauling due to Heavy floods
17.02.10			9:20	Transmission line problem
20.02.10			4:25	Supply failed at NDL S.S due to L.C maintenence purpose
09.03.10			5:30	Supply Failed at NDL S.S declared L.C due to somayajula palli breaker failure
15.03.10 to 17.03.10			27:15	Low discharge of water
20.03.10			7:00	
*Short Interruption			298:20	
<b>Total</b>	<b>2424:00</b>	<b>0:00</b>	<b>3612:15</b>	