

FOURTH MONITORING REPORT

Ver. 01, 19 June, 2009

(Monitoring period chosen from 25 Mar 2008 to 23 Mar 2009 both days included)

**11.3 MW renewable energy project for a grid system by
K.M.Power (P) Limited, India**

UNFCCC Reference No. 0750

Net Emission Reductions: 20257 tCO₂e

Project Locations

4.0 MW Hydro Electric Project at Guntakandala Village,
District Kurnool, A.P, India.

3.3 MW Hydro Electric Project at Velpanuru Village,
District Kurnool, A.P, India.

4.0 MW Hydro Electric Project at Madhavaram Village
District Kurnool, A.P, India.

Registered Office

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1. Current Status of the Projects

K.M. Power (P) Ltd (KMPL) has established 11.3 MW Small Hydro Projects bundled of 4 MW at Guntakandala Village, 3.3 MW at Velpanur and 4 MW at Madhavaram villages of Velugonda Mandal, Kurnool District, Andhra Pradesh.

The Guntakandala small hydro project commissioned in February 2002, the Velpanuru small hydro project commissioned in November 2002 and Madhavaram small hydro project commissioned in December 2003 and all projects are in continuous operation.

The Project Activity was registered by the CDM Executive Board on 14th January 2007 and the crediting period of the project activity has been commenced from 6th February 2002. This is the fourth Periodic Monitoring Report for the project activity. The details of the earlier periodic verifications of CERs as mentioned below:

Description	Monitoring Period	Net Electricity Displaced GWh	Net Emission reductions (tCO ₂ e)	Status
1 st Periodic Verification	06.02.2001 to 24.03.2006	78.79	60602	Issued
2 nd Periodic Verification	25.03.2006 to 23.03.2007	33.87	24911	Issued
3 rd Periodic Verification	24.03.2007 to 24.03.2008	37.48	27060	Issued
Total		150.14	112573	

2. Monitoring Period

The Monitoring period is chosen from 25th March 2008 to 23rd March 2009. The net electricity exported to the State grid by the project activity is 28.048 GWh and the net emission reductions are of 20257 tCO₂e for the present reported period.

3. Details of Major Equipment of the Projects & Plant shut downs for the Monitored Period

The details of major equipment of the project and suppliers are presented below:

Table 1 – Details of Plant Major Equipments and Suppliers

S.No	Location of plant	Equipment details
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1	Guntakandala small hydro plant	2x2000 KW Vertical Kaplan Turbine, Adjustable runner & indicating and recording instruments guide vanes, 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 guide vanes, 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 guide vanes, 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

Table 2: Guntakandala Power House - Details of Running & Non-Running Hours during Monitored period – Unit wise

Monitored Period	Total Available Hours (HH:MM)	Total Running hrs		Total Non-Running hrs	
		Unit-I	Unit-II	Unit-I	Unit-II
25.03.08 to 23.04.08	719:40	0:00	97:05	719:40	622:35
23.04.08 to 23.05.08	719:20	0:00	0:00	719:20	719:20
23.05.08 to 24.06.08	768:15	0:00	0:00	768:15	768:15
24.06.08 to 23.07.08	697:00	0:00	0:00	697:00	697:00
23.07.08 to 23.08.08	744:20	140:50	129:45	603:30	614:35
23.08.08 to 23.09.08	743:10	710:30	708:30	32:40	34:40
23.09.08 to 23.10.08	720:45	625:40	693:45	95:05	27:00
23.10.08 to 24.11.08	768:25	412:40	556:20	355:45	212:05
24.11.08 to 23.12.08	694:40	673:30	36:50	21:10	657:50
23.12.08 to 24.01.09	766:50	755:45	0:00	11:05	766:50
24.01.09 to 21.02.09	671:30	659:35	11:10	11:55	660:20
21.02.09 to 23.03.09	719:25	542:50	106:55	176:35	612:30
Total	8733:20	4521:20	2340:20	4212:00	6393:00

Table 3: Velpanur Power House - Details of Running & Non-Running Hours during Monitored period – Unit wise

Monitored Period	Total Available Hours (HH:MM)	Running Hours (HH:MM)		Non-Running Hours (HH:MM)	
		UNIT - I	UNIT - II	UNIT - I	UNIT - II
25.03.08 to 23.04.08	713:10	166:55	0:00	546:15	713:10
23.04.08 to 23.05.08	720:00	0:00	0:00	720:00	720:00
23.05.08 to 24.06.08	768:00	0:00	0:00	768:00	768:00
24.06.08 to 23.07.08	696:00	0:00	0:00	696:00	696:00
23.07.08 to 23.08.08	744:30	130:00	135:15	614:30	609:15
23.08.08 to 23.09.08	743:20	711:05	713:40	32:15	29:40
23.09.08 to 23.10.08	720:40	600:20	675:45	120:20	44:55
23.10.08 to 24.11.08	768:10	225:10	748:20	543:00	19:50
24.11.08 to 23.12.08	695:20	59:05	684:55	636:15	10:25
23.12.08 to 24.01.09	766:50	0:00	750:05	766:50	16:45
24.01.09 to 21.02.09	671:45	13:55	643:25	657:50	28:20
21.02.09 to 23.03.09	719:10	0:00	659:20	719:10	59:50
Total	8726:55	1906:30	5010:45	6820:25	3716:10

Table 4: Madhavaram Power House - Details of Running & Non-Running Hours during Monitored period – Unit wise

Monitored Period	Total Available Hours (HH:MM)	Running Hours (HH:MM)		Non-Running Hours (HH:MM)	
		UNIT - I	UNIT - II	UNIT - I	UNIT - II
25.03.08 to 23.04.08	719:00	0:00	176:20	719:00	542:40
23.04.08 to 23.05.08	720:00	0:00	0:00	720:00	720:00
23.05.08 to 24.06.08	768:00	0:00	0:00	768:00	768:00
24.06.08 to 23.07.08	696:00	0:00	0:00	696:00	696:00
23.07.08 to 23.08.08	742:30	130:15	142:35	612:15	599:55
23.08.08 to 23.09.08	743:30	698:40	713:05	44:50	30:25
23.09.08 to 23.10.08	721:00	606:30	674:35	114:30	46:25
23.10.08 to 24.11.08	768:15	205:35	746:30	562:40	21:45
24.11.08 to 23.12.08	698:10	59:40	678:10	638:30	20:00
23.12.08 to 24.01.09	766:45	7:15	729:50	759:30	36:55
24.01.09 to 21.02.09	671:50	0:00	645:35	671:50	26:15
21.02.09 to 23.03.09	719:10	0:00	660:35	719:10	58:35
Total	8734:10	1707:55	5167:15	7026:15	3566:55

Details of plant shut downs and reasons for the monitored period has been furnished to DOE for verification.

4. Parameters being monitored according to Monitoring Plan

The following parameters were monitored on continuous basis.

a) Gross Electricity Generation (in kWh) and Aux. Electricity Consumption (in kWh):

Gross electricity generation from the plant and auxiliary consumption in the plant are measured continuously using the energy meters installed in the control room of the respective plant. The daily readings were aggregated to monthly readings.

b) Electricity Export and Import (in kWh):

Electronic energy meters were installed for the energy exported to the State grid and the energy imported from the State grid. Monthly energy meter readings have recorded and jointly certified by the representatives of APTRANSCO & KMPL. These energy meters have been calibrated regularly and the test reports & relevant records have been furnished to DOE for verification.

c) Weighted average Emission factor for Southern region grid (tCO₂/GWh)

As mentioned under sec. B.2 of registered PDD, the project has been considered the ex-post emission factor for the weighted average emissions of the current generation mix (incl. imports) of Southern regional grid. The project has reviewed the emission factors were mentioned in the registered PDD and also the Carbon Dioxide Baseline Data base, Version 4, September 2008 published by Government of India, Ministry of Power Central Electricity Authority¹, Government of India

Though the registered PDD contains projected emission factor for 2008-09 as 739.14 tCO₂/GWh as a conservative approach, authentic data from Table B of CO₂ data base of CEA is 722.28 tCO₂/GWh for the year 2007-08 has been used. Since electricity generation data for Southern grid for the year 2008-09 is not available on the CO₂ data base of official website of Central Electricity Authority of India, which is the only authentic and reliable source, the emission factor taken as the weighted average of the current generation mix for the most recent year (2007-08) available has been considered based on the clarification given on approved methodologies (AM_CLA_0038).

¹ <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

Data being collected in order to monitor the GHG reduction is mentioned in the Table under sec D.3 of registered PDD:

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comments
D.3.1	Power	Gross Generation	kWh	m	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Readings are being recorded from energy meter which was installed in the plant control room
D.3.2	Power	Auxiliary Consumption	kWh	m	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Readings are being recorded from energy meter which was installed in the plant control room
D.3.3	Power	Power Import	kWh	m	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Readings are being recorded from Trivector meters which were installed in the Sub-Station
D.3.4	Power	Power Export	kWh	m	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Readings are being recorded from energy meter which was installed at project site.
D.3.5	Emission factor	Grid Emission Factor (EF)	tCO ₂ /GWh	c	Yearly	100%	Electronic and Paper	Crediting period plus 2 years	Taken latest information of CEA this data item is required for estimating the baseline emission and emission reduction

Information Used for Emission Reduction Calculations

Sr. No.	Key information/data used for baseline	Source of data/information
1.	Electricity Exported to grid	Monthly Meter Readings recorded and certified by APTRANSCO & plant personnel.
2.	Baseline Emission Factor	As mentioned under sec. B.2 of registered PDD, the project has considered the ex-post emission factor for the weighted average emissions of the current generation mix (incl. imports) of Southern regional grid from CEA's published CO2 Baseline data base Ver,4, Sept 2008.

Methods of data transfer and archiving policy

The data have been recorded both at the project site as well as at the grid sub-station, which is under the control of APTRANSCO for the respective power houses. The electricity export / import readings have been measured using calibrated tri-vector meters and recorded manually by the representatives of APTRANSCO and KMPL as a proof of export and import of electricity by the project activities. These readings are also considered for emission estimations. Sales bills / receipts would be used as an alternative proof of the electricity exported to the grid. And the data will be stored for a period of 2 years after the crediting period.

Technical details of monitoring instruments like make, accuracy class, Date of calibration, etc.

Project	Description	Main Meter		Check Meter	
Guntakandala	Period	Up to 12.11.08	12.11.08 to 23.03.09	Up to 12.11.08	12.11.08 to 23.03.09
	Serial No.	7033700	1988435	7033710	1988436
	Date of calibration	19.09.2007	20.10.2008	19.09.2007	20.10.2008
	Make	L & T	L & T	L & T	L & T
	Accuracy class	0.2s	0.2s	0.2s	0.2s
Velpanur	Period	Up to 23.12.08	23.12.08 to 23.03.09	Up to 23.12.08	23.12.08 to 23.03.09
	Serial No.	1988399	7033700	6607932	7033710
	Date of calibration	08.10.2007	18.11.2008	05.02.2008	18.11.2008
	Make	L & T	L & T	L & T	L & T
	Accuracy class	0.2s	0.2s	0.2s	0.2s
Madhavaram	Period	Up to 29.07.08	29.07.08 to 23.03.09	Up to 29.07.08	29.07.08 to 23.03.09
	Serial No.	1988435	1988419	1988436	1988431
	Date of calibration	20.04.2007	15.04.2008	20.04.2007	15.04.2008
	Make	L & T	L & T	L & T	L & T
	Accuracy class	0.2s	0.2s	0.2s	0.2s

As per the billing data, the Month wise data on electricity generation, auxiliary consumption, net electricity export for three projects is presented in the tables given below:

Table -5: Guntakandala Power House – Details of power generation, Aux. Power Consumption and Electricity exported to grid, Electricity imported from grid and Net electricity exported to Grid as per billing 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	Monitored at Proj. Site [See Note-1]	As per Calc. [See Note-2]	KWh	KWh	KWh
			G		G+I-E	E	I	
25.03.08 to 23.04.08	0	156450	156450	2034	5550	153500	2600	150900
23.04.08 to 23.05.08	0	0	0	0	100	0	100	-100
23.05.08 to 24.06.08	0	0	0	0	100	0	100	-100
24.06.08 to 23.07.08	0	0	0	0	200	0	200	-200
23.07.08 to 23.08.08	248980	253160	502140	1591	11140	491800	800	491000
23.08.08 to 23.09.08	1433350	1486750	2920100	9577	65400	2854900	200	2854700
23.09.08 to 23.10.08	1242470	1492060	2734530	9256	61330	2673500	300	2673200
23.10.08 to 24.11.08	440230	1169670	1609900	7628	30300	1579700	100	1579600
24.11.08 to 23.12.08	682150	65250	747400	5589	16200	731300	100	731200
23.12.08 to 24.01.09	794830	0	794830	5128	15230	779800	200	779600
24.01.09 to 21.02.09	1090430	28800	1119230	5146	20930	1098600	300	1098300
21.02.09 to 23.03.09	707090	203570	910660	5772	20260	891000	600	890400
Sub-Total	6639530	4855710	11495240	51721	246740	11254100	5600	11248500

Table -6: Velpanur Power House – Details of power generation, Aux. Power Consumption and Electricity exported to grid, Electricity imported from grid and Net electricity exported to Grid as per billing 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	Monitored at Proj. Site [See Note-1]	As per Calc. [See Note-2]	KWh	KWh	KWh

25.03.08 to 23.04.08	140580	0	140580	2456	6180	135900	1500	134400
23.04.08 to 23.05.08	0	0	0	1051	1200	0	1200	-1200
23.05.08 to 24.06.08	0	0	0	1263	1600	0	1600	-1600
24.06.08 to 23.07.08	0	0	0	690	1100	0	1100	-1100
23.07.08 to 23.08.08	177860	181200	359060	2335	9060	351600	1600	350000
23.08.08 to 23.09.08	860040	909800	1769840	7789	36540	1733500	200	1733300
23.09.08 to 23.10.08	555360	617950	1173310	8400	24310	1149500	500	1149000
23.10.08 to 24.11.08	342170	1003950	1346120	6255	24820	1321400	100	1321300
24.11.08 to 23.12.08	89410	642240	731650	4797	15450	716300	100	716200
23.12.08 to 24.01.09	0	728030	728030	4795	14130	714000	100	713900
24.01.09 to 21.02.09	20560	949630	970190	4502	16390	953900	100	953800
21.02.09 to 23.03.09	0	779690	779690	5110	15290	764600	200	764400
Sub-Total	2185980	5812490	7998470	49443	166070	7840700	8300	7832400

Table -7: Madhavaram Power House – Details of power generation, Aux. Power Consumption and Electricity exported to grid, Electricity imported from grid and Net electricity exported to Grid as per billing 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	Monitored at Proj. Site [See Note-1]	As per Calc. [See Note-2]	KWh	KWh	KWh
25.03.08 to 23.04.08	0	205290	205290	2609	8490	198500	1700	196800
23.04.08 to 23.05.08	0	0	0	1200	1500	0	1500	-1500
23.05.08 to 24.06.08	0	0	0	1500	1900	0	1900	-1900
24.06.08 to 23.07.08	0	0	0	501	900	0	900	-900
23.07.08 to 23.08.08	187366	216500	403866	2781	12466	393000	1600	391400
23.08.08 to 23.09.08	885149	1068118	1953267	9029	56267	1897200	200	1897000
23.09.08 to 23.10.08	709479	970168	1679647	7938	45947	1633800	100	1633700
23.10.08 to 24.11.08	343746	1141750	1485496	6257	37096	1448500	100	1448400
24.11.08 to 23.12.08	85580	731924	817504	4517	20004	797600	100	797500
23.12.08 to 24.01.09	8325	763130	771455	4509	19055	752600	200	752400
24.01.09 to 21.02.09	0	1040285	1040285	3912	24885	1015600	200	1015400
21.02.09 to 23.03.09	0	859725	859725	3988	21425	838600	300	838300
Sub-Total	2219645	6996890	9216535	48741	249935	8975400	8800	8966600

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 line are not included in the measured aux. consumption.

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.

5. Formulae Used

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_y is baseline emissions in a given year
 PE_y is project emissions in a given year
 L_y is leakage in a given year

Baseline Emissions

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 (tCO₂/GWh)

Leakage

The energy generating equipment is not transferred from another activity. Hence, the leakage emissions are considered zero.

Since the project emissions (PE_y) as well as the leakage (L_y) are zero, the emission reductions are equal to baseline emissions.

Using the above formulas, the Emission reductions from the project activity are shown below.

6. Net Emission Reductions – Project wise

The emission reductions for the chosen monitored period i.e. from 25th March 2008 to 23rd March 2009 are as given below:

Table - 8: Guntakandala Power House – Net Emission Reductions

Monitored Period	Net Electricity Exported to Grid		Baseline Emission Factor	Baseline Emissions	Project Emissions	Net Emission Reductions
	KWh	GWh	tCO ₂ /GWh	tCO ₂ e	tCO ₂ e	tCO ₂ e
25.03.08 to 23.04.08	150900	0.151	722.28	109	0	109
23.04.08 to 23.05.08	-100	0.000	722.28	0	0	0
23.05.08 to 24.06.08	-100	0.000	722.28	0	0	0
24.06.08 to 23.07.08	-200	0.000	722.28	0	0	0
23.07.08 to 23.08.08	491000	0.491	722.28	355	0	355
23.08.08 to 23.09.08	2854700	2.855	722.28	2062	0	2062
23.09.08 to 23.10.08	2673200	2.673	722.28	1931	0	1931
23.10.08 to 24.11.08	1579600	1.580	722.28	1141	0	1141
24.11.08 to 23.12.08	731200	0.731	722.28	528	0	528
23.12.08 to 23.01.09	779600	0.780	722.28	563	0	563
23.01.09 to 23.02.09	1098300	1.098	722.28	793	0	793
23.02.09 to 24.03.09	890400	0.890	722.28	643	0	643
Total	11248500	11.249		8125	0	8125

Table – 9: Velpanur Power House – Net Emission Reductions

Monitored Period	Net Electricity Exported to Grid		Baseline Emission Factor	Baseline Emissions	Project Emissions	Net Emission Reductions
	KWh	GWh	tCO ₂ /GWh	tCO ₂ e	tCO ₂ e	tCO ₂ e
25.03.08 to 23.04.08	134400	0.134	722.28	97	0	97
23.04.08 to 23.05.08	-1200	-0.001	722.28	-1	0	-1
23.05.08 to 24.06.08	-1600	-0.002	722.28	-1	0	-1
24.06.08 to 23.07.08	-1100	-0.001	722.28	-1	0	-1
23.07.08 to 23.08.08	350000	0.350	722.28	253	0	253
23.08.08 to 23.09.08	1733300	1.733	722.28	1252	0	1252
23.09.08 to 23.10.08	1149000	1.149	722.28	830	0	830
23.10.08 to 24.11.08	1321300	1.321	722.28	954	0	954
24.11.08 to 23.12.08	716200	0.716	722.28	517	0	517
23.12.08 to 23.01.09	713900	0.714	722.28	516	0	516
23.01.09 to 23.02.09	953800	0.954	722.28	689	0	689
23.02.09 to 24.03.09	764400	0.764	722.28	552	0	552

Total	7832400	7.832		5657	0	5657
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Table - 10: Madhavaram Power House – Net Emission Reductions

Monitored Period	Net Electricity Exported to Grid		Baseline Emission Factor	Baseline Emissions	Project Emissions	Net Emission Reductions
	KWh	GWh	tCO ₂ /GWh	tCO ₂ e	tCO ₂ e	tCO ₂ e
25.03.08 to 23.04.08	196800	0.197	722.28	142	0	142
23.04.08 to 23.05.08	-1500	-0.002	722.28	-1	0	-1
23.05.08 to 24.06.08	-1900	-0.002	722.28	-1	0	-1
24.06.08 to 23.07.08	-900	-0.001	722.28	-1	0	-1
23.07.08 to 23.08.08	391400	0.391	722.28	283	0	283
23.08.08 to 23.09.08	1897000	1.897	722.28	1370	0	1370
23.09.08 to 23.10.08	1633700	1.634	722.28	1180	0	1180
23.10.08 to 24.11.08	1448400	1.448	722.28	1046	0	1046
24.11.08 to 23.12.08	797500	0.798	722.28	576	0	576
23.12.08 to 24.01.09	752400	0.752	722.28	543	0	543
23.01.09 to 23.02.09	1015400	1.015	722.28	733	0	733
23.02.09 to 24.03.09	838300	0.838	722.28	605	0	605
Total	8966600	8.967		6475	0	6475

Table - 11: Summary of Net Emission Reductions for the Monitored Period

Parameter	Unit	Guntakandala	Velpanuru	Madhavaram	Total
Electricity Exported to Grid	kWh	11254100	7840700	8975400	28070200
Electricity Imported from Grid	KWh	5600	8300	8800	22700
Net Electricity Exported to Grid	kWh	11248500	7832400	8966600	28047500
	GWh	11.249	7.832	8.967	28.048
Emission Factor	t CO ₂ /GWh	722.28	722.28	722.28	722.28
Baseline Emissions	t CO ₂ e	8125	5657	6475	20257
Project Emissions	t CO ₂ e	0	0	0	0
Net Emission Reductions	t CO₂e	8125	5657	6475	20257

The details of calculation of emission reductions month wise is presented as Annexure (Excel Sheet)

7. Measures to ensure the results / uncertainty analysis

The energy exported by each projects of K.M. Power (P) Ltd. is recorded from independent main meter installed at the interconnecting point i.e. Sub-station of the respective project. In the event, the main meter is not in operation, and the reading from check meter is used for billing.

Since all Main meters & Check meters are under the control of Transmission Corporation of Andhra Pradesh Limited (APTRANSCO) who is the buyer of electricity from the project activity, the periodic calibration is carried out by the ETDC, Ministry of Communication & Information Technology, Govt. of India as per the Power Purchase Agreement (PPA). The accuracy clause of these meters is 0.2.

8. Details of Monitoring team and Responsibilities

A CDM team has been formed in KMPL for monitoring and verification of all the monitoring parameters as per the guidelines formulated by the management of KMPL. Qualified and trained people monitor the parameters and emission reduction calculations. In the complete implementation and monitoring Plan, KMPL is the sole agency responsible for implementation and monitoring.

Table 12 - Monitoring Team

Project	Shift Incharge	Plant Incharge	Executive Director	Managing Director
Guntakandala	Raghavendra	A.Venkateswara Reddy	Mr.Y Thimmaiah	Mr.G. Ramanarayan Reddy
Velpanur	J.Sivaiah	K.Madan Mohan Reddy	Mr.Y Thimmaiah	Mr.G. Ramanarayan Reddy
Madhavaram	Ravindra Babu	K.Madan Mohan Reddy	Mr.Y Thimmaiah	Mr.G. Ramanarayan Reddy

Annexure - 1

BASELINE INFORMATION

From Carbon Dioxide Baseline Data base, Version 4, Sept 2008 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>)

Fuel Emission Factors (EF) (Source: Coal/Lignite - Initial National Communication, Gas/Oil/Diesel/Naphtha - IPCC 2006, Corex - own assumption)

	Unit	Coal	Lignite	Gas	Oil	Diesel	Naphtha	Corex
EF based on NCV	gCO ₂ /MJ	95.8	106.2	54.3	75.5	72.6	69.3	0.0
Delta GCV NCV	%	3.6%	3.6%	10%	5%	5%	5%	n/a
EF based on GCV	gCO ₂ /MJ	92.5	102.5	49.4	71.9	69.1	66.0	0.0
Oxidation Factor	-	0.98	0.98	1.00	1.00	1.00	1.00	n/a
Fuel Emission Factor	gCO ₂ /MJ	90.6	100.5	49.4	71.9	69.1	66.0	0.0

n/a = not applicable (i.e. no assumptions were needed)

Assumptions at Station Level (only where data was not provided by station)

	Unit	Coal	Lignite	Gas-CC	Gas-CC	Oil	Diesel-Eng	Diesel-CC	Naphtha	Hydro	Nuclear
Auxiliary Power Consumption	%	8.0	10.0	3.0	1.0	3.5	3.5	1.0	3.5	0.5	10.5
Gross Heat Rate	kcal /KWh (gross)	2,500	2,713	2,013	3150	2,117	1,975	3,213	2,117	n/a	n/a
Net Heat Rate	kcal /KWh (net)	2,717	3,014	2,075	3,182	2,193	2,047	3,330	2,193	n/a	n/a
Specific Oil Consumption	ml /KWh (gross)	2.0	3.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GCV	kcal /kg (or m3)	3,755	n/a	8,800	n/a	10,100	10,500	10,500	11,300	n/a	n/a
Density	t /1,000 lt	n/a	n/a	n/a	n/a	0.95	0.83	0.83	0.70	n/a	n/a
Specific CO ₂ emissions	tCO ₂ /MW/h	1.04	1.28	0.43	0.66	0.66	0.59	0.96	0.61	n/a	n/a

n/a = not applicable (i.e. no assumptions were needed)

Assumptions at Unit Level (by capacity; only for units in the BM, where data was not provided by station)

Coal	Unit	67.5 MW	120 MW	200-250 MW	500 MW
Gross Heat Rate	kcal /KWh	2,750	2,500	2,500	2,425
Auxiliary Power Consumption	%	12.0	9.0	9.0	7.5
Net Heat Rate	kcal /KWh	3,125	2,747	2,747	2,622
Net Efficiency	%	28%	31%	31%	33%
Specific Oil Consumption	ml /KWh	2.0	2.0	2.0	2.0
Specific CO ₂ Emissions	tCO ₂ /MW/h	1.19	1.05	1.05	1.00
Lignite	Unit	75 MW	125 MW	210/250 MW	
Gross Heat Rate	kcal /KWh	2,750	2,560	2,713	
Auxiliary Power Consumption	%	12.0	12.0	10.0	
Net Heat Rate	kcal /KWh	3,125	2,909	3,014	
Net Efficiency	%	28%	30%	29%	
Specific Oil Consumption	ml /KWh	3.0	3.0	3.0	
Specific CO ₂ Emissions	tCO ₂ /MW/h	1.32	1.23	1.28	
Gas	Unit	0-49.9 MW	50-99.9 MW	>100 MW	
Gross Heat Rate	kcal /KWh	1,950	1,910	1,970	
Auxiliary Power Consumption	%	3.0	3.0	3.0	
Net Heat Rate	kcal /KWh	2,010	1,969	2,031	
Net Efficiency	%	43%	44%	42%	
Specific CO ₂ Emissions	tCO ₂ /MW/h	0.42	0.41	0.42	
Diesel	Unit	0.1-1 MW	1-3 MW	3-10 MW	>10 MW
Gross Heat Rate	kcal /KWh	2,350	2,250	2,100	1,975
Auxiliary Power Consumption	%	3.5	3.5	3.5	3.5
Net Heat Rate	kcal /KWh	2,435	2,332	2,176	2,047
Specific CO ₂ Emissions	tCO ₂ /MW/h	0.70	0.67	0.63	0.59
Naphtha	Unit	All sizes			
Increment to Gas Heat Rate	%	2%			
Gross Heat Rate	kcal /KWh	2,117			
Auxiliary Power Consumption	%	3.5			
Net Heat Rate	kcal /KWh	2,193			
Specific CO ₂ Emissions	tCO ₂ /MW/h	0.61			

Combined Margin	Unit	
Weight CM	%	50%
Weight BM	%	50%

Conversion Factors	Unit	
Energy	kJ /kcal	4.1868
	MJ /KWh	3.6

Oil		
Specific Emission	gCO ₂ /ml	2.89

Appendix B Grid Emission Factors

Table A: Values for all regional grids for FY 2005-06 until FY 2007-08, 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 ₂ /MWh) (excl. Imports)			
	2005-06	2006-07	2007-08
NEWNE	0.8407	0.8287	0.8196
South	0.7341	0.7163	0.72228
India	0.8151	0.8010	0.7961

Simple Operating Margin (tCO ₂ /MWh) (excl. Imports)			
	2005-06	2006-07	2007-08
NEWNE	1.0246	1.0163	1.0123
South	1.0057	0.9991	0.9906
India	1.0205	1.0124	1.0074

Build Margin (tCO ₂ /MWh) (excl. Imports)			
	2005-06	2006-07	2007-08
NEWNE	0.6725	0.6313	0.5977
South	0.7067	0.7013	0.7133
India	0.6809	0.6485	0.6253

Combined Margin (tCO ₂ /MWh) (excl. Imports)			
	2005-06	2006-07	2007-08
NEWNE	0.8486	0.8238	0.8050
South	0.8562	0.8502	0.8520
India	0.8506	0.8305	0.8164

Table B: Values for all regional grids for FY 2005-06 until FY 2007-08, including inter-regional and cross-border electricity transfers.

Weighted Average Emission Rate (tCO ₂ /MWh) (Incl. Imports)			
	2005-06	2006-07	2007-08
NEWNE	0.8386	0.8243	0.8121
South	0.7341	0.7163	0.7228
India	0.8126	0.7972	0.7898

Simple Operating Margin (tCO ₂ /MWh) (Incl. Imports)			
	2005-06	2006-07	2007-08
NEWNE	1.01949	1.00835	0.99917
South	1.00567	0.99912	0.99062
India	1.0166	1.0063	0.9973

Build Margin (tCO ₂ /MWh) (not adjusted for Imports)			
	2005-06	2006-07	2007-08
NEWNE	0.6725	0.6313	0.59771
South	0.7067	0.7013	0.71332
India	0.6808	0.6485	0.6253

Combined Margin In (tCO ₂ /MWh) (Incl. Imports)			
	2005-06	2006-07	2007-08
NEWNE	0.8460	0.8198	0.7984
South	0.8562	0.8502	0.8520
India	0.8487	0.8274	0.8113

Annexure -2

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	
25.03.08 to 16.08.08	3395:10			Off -season
20.10.08 to 02.11.08			314:50	Low discharge of water
3.11.08			20:00	Supply Failed at sub -station
6.11.08 to 8.11.08			20:25	Low discharge of water
10.11.08 to 13.11.08			64:05	
21.02.09 to 24.02.09			86:10	
3.03.09 to 4.04.09			33:10	
7.03.09 to 9.03.09			29:55	
* short interruption			241:50	
Total	3395:10	0:00	816:50	

* 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	
25.03.08 to 16.08.08	3395:10			Off -season
17.08.08 to 20.08.08			25:45	Off -season
7.11.08			6:50	Gear Box checking
16.11.08 to 21.02.09			2276:25	Off -season
26.02.09 to 23.03.09			609:15	Low discharge of water
*short interruption			79:35	
Total	3395:10	00:00	2997:50	

Velpanur Power House- Unit I :

Period	Type of Shut down (Hr:Mn)			Reason
	Others	Planned	Forced	
25.03.08 to 13.04.08			318:15	Low discharge of water
14.04.08 to 16.08.08	2998:50			Off-season

17.08.08			17:40	Low discharge of water
12.09.08			6:00	Main supply failure due to L.C maintenance
5.10.08 to 6.10.08			34:15	Low discharge of water
14:10:08			19:25	
20.10.08			31:55	canal Banking works
23.10.08 to 3.11.08			244:35	Low discharge of water
6.11.08 to 8.11.08			27:15	
10.11.08 to 14.11.08			65:50	
16:11:08 to 23.03.09			2972:25	
*short interruptions			84:00	
Total	2998:50	0:00	3821:35	

Velpanur Power House- Unit II :

Period	Type of Shut down (Hr:Mn)			Reason
	Others	Planned	Forced	
25.03.08 to 13.04.08			485:10	Low discharge of water
14.04.08 to 16.08.08	2998:50			Off-season
17.08.08			14:40	Low discharge of water
12.09.08			6:05	Main supply failure due to L.C maintenance
5.10.08 to 6.10.08			6:35	Low discharge of water
14:10:08				
20.10.08			21:10	canal banking works
3.02.09 to 4.02.09			19:35	Low discharge of water
3.03.09 to 4.03.09			24:05	
08.03.09 to 09.03.09			26:30	
*short interruptions			113:30	
Total	2998:50	0:00	717:20	

Madhavaram Power House- Unit I :

Period	Type of Shut down (Hr:Mn)			Reason
	Others	Planned	Forced	
25.03.08 to 12.04.08			467:00	Low discharge of water
13.04.08 to 16.08.08	3000:00			Off-season
18.08.08 to 23.08.08			7:25	Grid failure & trash cleaning

05.09.08			11:50	Supply failed due to earth fault
18.09.08		11:00		Plant maintenance
05.10.08			12:50	Transmission line maintenance
19.10.09			11:35	Line break down due to failure of pin insulator
20.10.08 to 03.11.08			331:35	Low discharge of water
16.11.08 to 23.03.09			2982:00	
*Short Interruption			191:00	
Total	3000:00	11:00	4015:15	

Madhavaram Power House- Unit II :

Period	Type of Shut down (Hr:Mn)			Reason
	Others	Planned	Forced	
25.03.08 to 12.04.08			293:05	Low discharge of water
13.04.08 to 16.08.08	2993:00			Off-season
18.08.08 to 23.08.08			5:30	Grid failure & trash cleaning
05.09.08			11:45	Supply failed due to earth fault
05.10.08			12:45	Transmission line maintenance
19.10.09			11:40	Line break down due to failure of pin insulator
10.12.08			6:10	Supply Failed due to L.C maintenance purpose
20.12.08			5:30	Excitation panels fixing
11.01.09			6:15	Transmission line maintenance
13.01.09			15:55	Hub body cone fell down in to water
22.01.09			9:20	Low discharge of water
03.02.09 to 04.02.09			18:45	
03.03.09 to 04.03.09			23:05	
08.03.09 to 09.03.09			29:10	
*Short Interruption			125:00	
Total	2993:00	00:00	573:55	