

MONITORING REPORT

11.3 MW Renewable Energy project for a grid system by K.M.Power (P) Ltd, A.P, INDIA

UNFCCC Reference No. 0750

(Monitoring period is from February 06, 2002 to March 24, 2006 - both days included)

Ver 01, January 2007

Project Locations

1. 4.0 MW Hydro Electric Project at Guntakandala Village,
District Kurnool, A.P, India.
2. 3.3MW Hydro Electric Project at Velpanuru Village,
District Kurnool, A.P, India.
3. 4MW Hydro Electric Project at Madhavaram Village
District Kurnool, A.P, India.

Registered Office

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1. Current Status of the Project

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

The project activity is generation of electricity utilizing the drop in the bed levels of the Nippulavagu, which is a carrier canal for Kurnool – Cuddapah Canal and the discharges for the ayacut requirements and export of power to APTRANSCO grid.

2. Statement to what extent the project has been implemented as planned

The project has been completed as planned and described in the Project Design Document (PDD)

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

Table 1 – Details of major equipment of the project and Suppliers

S.No	Location of plant	Equipment details	No's	Supplier
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	1	M/s Boving Fouress Ltd M/s Boving Fouress Ltd, Bangalore

S.No	Location of plant	Equipment details	No's	Supplier
2	Velpanuru small hydro plant	1650x2 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	1	M/s Boving Fouress Ltd 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	1	M/s Boving Fouress Ltd M/s Boving Fouress Ltd, Bangalore

Since, projects started its operations all the projects were running normally. The year wise details of forced shut down periods, planned shut down periods and reasons for shut down is detailed below.

Table 2 Details of Major Shutdown days (Forced) - Guntakandala Small Hydro Plant

S.No	Year	Unit	Period	No. of Days	Reason for shut down
1	2001 -02	--	----	----	----
2	2002-03	--	----	----	----
3	2003-04	-	----	----	----
4	2004-05	Unit 1	06.10.2004 to 08.10.2004	3 days	Gear box bearing problem and Replacement
5	2005-06	Unit 1	10.08.2005	0.3 days	due to flood water
		Unit 2	10.08.2005	0.3 days	due to flood water

Table 3 Planned Shut down period - Guntakandala Small Hydro Plant

S.No	Year	Starting Date	No. of days	Reasons
1	2001 -02	15.03.2002 to 31.03.2002	16	Due to Non availability of water
2	2002-03	01.04.2002 to 12.10.2002 & 08.01.2003 to 31.03.2003	279	Due to Non availability of water
3	2003-04	01.04.2003 to 21.09.2003 & 11.01.2004 to 31.03.2004	254	Due to Non availability of water
4	2004-05	01.04.2004 to 09.08.2004 & 21.02.2005 to 31.03.2005	200	Due to Non availability of water
5	2005-06	01.04.2005 to 21.07.2005	109	Due to Non availability of water

Table 4: Planned and Forced shut downs - Guntakandala Small Hydro Plant

Details	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2
Year	2001 -02	2001-02	2002-03	2002-03	2003 -04	2003-04
Total no. of working days	53	53	365	365	365	365
Planned shut downs days	16	16	279	279	254	254
Forced shut downs days	Nil	Nil	Nil	Nil	Nil	Nil
Total shut down days	16	16	279	279	254	254
Total no. of available days	37	37	86	86	111	111

Table 4: Planned and Forced shut downs - Guntakandala Small Hydro Plant

Details	Unit 1	Unit 2	Unit 1	Unit 2
Year	2004 -05	2004-05	2005-06	2005-06
Total no. of working days	365	365	365	365
Planned shut downs	200	200	109	109
Forced shut downs	3	Nil	0.3	0.3
Total shut down days	203	200	109.3	109.3
Total no. of available days	165	165	256	256

Table 5 Details of Major Shutdown days (Forced) - Velapanur Small Hydro Plant

S.No	Year	Unit	Period	No. of Days	Reason for shut down
1	2002-03	Unit 1	29.10.2002 to 02.11.2002	4	Vibration and heavy sound
		Unit 1	07.01.2003 to 13.01.2003	7	Turbine Bearings problem
		Unit 2	23.10.2002 to 25.10.2002	3	Vibration and heavy sound
		Unit 2	26.12.2002 to 07.01.2003	12	DE bearings problem
2	2003-04	Unit 2	17.12.2003 to 30.12.2003	14	DE bearings problem
3	2004-05	Unit 1	05.10.2004 to 10.10.2004	6	Due to flood water and men fell in water
		Unit 2	05.10.2004 to 10.10.2004	6	Due to flood water and men fell in water
		Unit 2	15.11.2004 to 15.12.2004	30	Generator bearing problem
4	2005-06	Unit 1	30.08.2005 to 31.08.2005	2	Bus CT failure
		Unit 2	30.08.2005 to 31.08.2005	2	Bus CT failure

Table 6 Planned Shut down Time - Velapanur Small Hydro Plant

S.No	Year	Starting Date	No.of Days	Forced ¹ Shut Downs (hours)
1	2002-03	14.01.2003 to 31.03.2004	18	Due to Non availability of water
2	2003-04	01.04.2003 to 22.09.2003	165	Due to Non availability of water
3	2004-05	11.04.2004 to 9.08.2004 22.02.2005 to 31.03.2005	179	Due to Non availability of water
4	2005-06	01.04.2005 to 22.07.2005	110	Due to Non availability of water

Table 7: Planned and Forced shut downs - Velapanuru Small Hydro Plant

Details	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1 & 2
Year	2002-03	2002-03	2003 - 04	2003-04	2004-05	2004-05	2005-06
Total no. of working days	102	102	365	365	365	365	365
Planned shut downs days	18	18	165	165	179	179	110
Forced shut downs days	11	15	Nil	14	6	36	2
Total shut down days	29	33	165	179	185	215	112
Total no. of available days	84	84	200	200	186	186	255

Table 8 Details of Major Shutdown days (Forced) - Madhavaram Small Hydro Plant

S.No	Year	Unit	Period	No. of Days	Reason for shut down
1	2003-04	Unit 2	12.11.2003 to 04.12.2003	22	Damage in transport
2	2004-05	Unit 1	10.01.2004 to 10.09.2004	29	Bearing problem and repair works
3		Unit 1	18.08.2004 to 18.09.2004	31	Bearing problem and repair works
4		Unit 1	04.10.2004 to 06.10.2004	3	Due to flood water
5		Unit 1	07.10.2004 to 08.10.2004	2	Line break down
6		Unit 2	04.10.2004 to 06.10.2004	3	Due to flood water
7		Unit 2	07.10.2004 to 08.10.2004	2	Line break down
8		Unit 2	12.10.2004	0.4 days	Line break down
9	2005-06	Unit 1	20.08.2005	0.1 days	Line break down
		Unit 2	20.08.2005	0.1 days	Line break down

Table 9 Planned Shut down Time - Madhavaram Small Hydro Plant

S.No	Year	Starting Date	No.of days	Forced Shut ¹ Downs (hours)
1	2003-04	09.01.2004 to 31.03.2004	82	Due to Non availability of water
2	2004-05	01.04.2004 to 09.08.2004 22.02.2005 to 31.03.2005	170	Due to Non availability of water
3	2005-06	01.04.2005 to 22.07.2005	109	Due to Non availability of water

Table 10 : Planned and Forced shut downs - Madhavaram Small Hydro Plant

Details	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2
Year	2003 -04	2003-04	2004-05	2004-05	2005-06	2005-06
Total no. of working days	131	131	365	365	365	365
Planned shut downs days	82	82	170	170	109	109
Forced shut downs days	Nil	22	65	5.4	0.1	0.1
Total shut down days	82	104	235	175.4	109.1	109.1
Total no. of available days	49	49	195	195	256	256

3. Monitoring Period

The Monitoring period is chosen from February 06, 2002 to March 24, 2006 (both days included)

4. Sustainability – Economic and Social Well Being

The project activity has resulted in sustainable development in the region as follows:

- Alleviation of poverty by generating direct and indirect employment in the area. The three projects generated indirect employment during the construction of the project activity and also permanent employment during operation of the project.
- The power generation from the project activity stabilised the local grid and helped in providing uninterrupted power for farmers.
- The project activity contributed to the development of infrastructure like roads, buildings and communication systems in the rural area
- The project activity reduced the migration of the rural populace to urban areas, as the project activity generated employment opportunities.
- The project activity helped in bringing down greenhouse gases concentration in the atmosphere reducing the impact of global warming and mitigating climate change.

5. Parameters being monitored according to monitoring plan

- Electronic energy meters were installed for measuring the power generation (export) at the grid interconnection point for the three hydro plants separately.
- Hourly data recording of the energy parameters and also the recording of total energy generated and auxiliary power consumption for every 8 hours shift.
- Daily readings were aggregated to monthly readings.
- Monthly reports stating the net energy exported were prepared by shift in charge and verified by plant managers.

- Monthly joint meter readings are taken at interconnection point and certified by representatives of KMPL and state electricity board.

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

Billing Period :

1. February 06, 2002 to January 2003 – billing period is from 22nd to 22nd of every month
2. February 2003 to January 2006 – billing period is from 23rd to 23rd of every month
3. February 2006 to March 2006 – billing period is from 24th to 24th of every month

Table 11 - Monthwise data on electricity generation for three plants – as per billing period

Month	Year	Electricity Generation (Guntakanadala) (kWh)	Electricity Generation (Velpanur) (kWh)	Electricity Generation (Madhavaram) (kWh)	Total (kWh)
February 06 to February 22	2002	632353	0	0	632353
March	2002	477070	0	0	477070
April	2002	0	0	0	0
May	2002	0	0	0	0
June	2002	0	0	0	0
July	2002	0	0	0	0
August	2002	0	0	0	0
September	2002	0	0	0	0
October	2002	264300	0	0	264300
November	2002	726262	328181	0	1054443
December	2002	963830	727435	0	1691265
January	2003	559403	177396	0	736799
February	2003	0	0	0	0
March	2003	0	0	0	0
April	2003	0	0	0	0
May	2003	0	0	0	0
June	2003	0	0	0	0
July	2003	0	0	0	0
August	2003	0	0	0	0
September	2003	2200	3500	0	5700
October	2003	657653	518631	0	1176284
November	2003	588473	458364	0	1046837

Month	Year	Electricity Generation (Guntakanadala) (kWh)	Electricity Generation (Velpanur) (kWh)	Electricity Generation (Madhavaram) (kWh)	Total (kWh)
December	2003	1210307	857391	1043554	3111252
January	2004	593163	458379	526436	1577978
February	2004	0	0	0	0
March	2004	0	0	0	0
April	2004	0	0	0	0
May	2004	0	0	0	0
June	2004	0	0	0	0
July	2004	0	0	0	0
August	2004	646012	432350	367431	1445793
September	2004	2712793	1583125	1144816	5440734
October	2004	2340860	1273100	1352045	4966005
November	2004	2868109	1522800	1692313	6083222
December	2004	2075261	881100	1394163	4350524
January	2005	887369	691609	713936	2292914
February	2005	377312	299435	307529	984276
March	2005	0	0	0	0
April	2005	0	0	0	0
May	2005	0	0	0	0
June	2005	0	0	0	0
July	2005	1500	1400	100	3000
August	2005	1937411	1154368	1392419	4484198
September	2005	2887138	1522888	1980341	6390367
October	2005	2839389	1710999	2042439	6592827
November	2005	2907840	1854377	2320382	7082599
December	2005	2541151	1674330	2046850	6262331
January	2006	1840335	1334753	1589493	4764581
February	2006	1383371	1036689	1222664	3642724
March	2006	1004980	747278	903350	2655608
TOTAL		35925845	21249878	22040261	79215984

Table 12 - Monthwise data on auxiliary consumption for three plants – as per billing period

Month	Year	Auxiliary consumption (Guntakanadala) (kWh)	Auxiliary consumption (Velpanur) (kWh)	Auxiliary consumption (Madhavaram) (kWh)	Total (kWh)
February 06 to February 22	2002	4653	0	0	4653
March	2002	3870	0	0	3870
April	2002	0	0	0	0
May	2002	0	0	0	0
June	2002	0	0	0	0
July	2002	0	0	0	0
August	2002	0	0	0	0
September	2002	0	0	0	0

Month	Year	Auxiliary consumption (Guntakanadala) (kWh)	Auxiliary consumption (Velpanur) (kWh)	Auxiliary consumption (Madhavaram) (kWh)	Total (kWh)
October	2002	2400	0	0	2400
November	2002	5262	5481	0	10743
December	2002	5130	5935	0	11065
January	2003	2303	2296	0	4599
February	2003	0	0	0	0
March	2003	0	0	0	0
April	2003	0	0	0	0
May	2003	0	0	0	0
June	2003	0	0	0	0
July	2003	0	0	0	0
August	2003	0	0	0	0
September	2003	0	0	0	0
October	2003	4053	5331	0	9384
November	2003	3473	4964	0	8437
December	2003	6207	5691	6654	18552
January	2004	2863	3079	2636	8578
February	2004	0	0	0	0
March	2004	0	0	0	0
April	2004	0	0	0	0
May	2004	0	0	0	0
June	2004	0	0	0	0
July	2004	0	0	0	0
August	2004	3112	3650	2431	9193
September	2004	9693	10725	7116	27534
October	2004	11460	9100	8445	29005
November	2004	12409	9200	9913	31522
December	2004	8761	5700	8463	22924
January	2005	5669	5609	5436	16714
February	2005	3512	4235	3329	11076
March	2005	0	0	0	0
April	2005	0	0	0	0
May	2005	0	0	0	0
June	2005	0	0	0	0
July	2005	0	0	0	0
August	2005	9511	9468	7919	26898
September	2005	11038	11088	10041	32167
October	2005	9589	10699	9839	30127
November	2005	8840	9877	8982	27699
December	2005	8051	8430	7550	24031
January	2006	7235	6953	6393	20581
February	2006	6671	6589	5164	18424
March	2006	6480	5678	4850	17008
TOTAL		162245	149778	115161	427184

Table 13 Month wise data on net energy exported – as per billing period

Month	Year	Net electricity exported from (Guntakanadala) Project (kWh)	Net electricity exported from (Velpanur) Project (kWh)	Net electricity exported from (Madhavaram) Project (kWh)	Net electricity exported (kWh)
February 06 to February 22	2002	627700	0	0	627700
March	2002	473200	0	0	473200
April	2002	0	0	0	0
May	2002	0	0	0	0
June	2002	0	0	0	0
July	2002	0	0	0	0
August	2002	0	0	0	0
September	2002	0	0	0	0
October	2002	261900	0	0	261900
November	2002	721000	322700	0	1043700
December	2002	958700	721500	0	1680200
January	2003	557100	175100	0	732200
February	2003	0	0	0	0
March	2003	0	0	0	0
April	2003	0	0	0	0
May	2003	0	0	0	0
June	2003	0	0	0	0
July	2003	0	0	0	0
August	2003	0	0	0	0
September	2003	2200	3500	0	5700
October	2003	653600	513300	0	1166900
November	2003	585000	453400	0	1038400
December	2003	1204100	851700	1036900	3092700
January	2004	590300	455300	523800	1569400
February	2004	0	0	0	0
March	2004	0	0	0	0
April	2004	0	0	0	0
May	2004	0	0	0	0
June	2004	0	0	0	0
July	2004	0	0	0	0
August	2004	642900	428700	365000	1436600
September	2004	2703100	1572400	1137700	5413200
October	2004	2329400	1264000	1343600	4937000
November	2004	2855700	1513600	1682400	6051700
December	2004	2066500	875400	1385700	4327600
January	2005	881700	686000	708500	2276200
February	2005	373800	295200	304200	973200
March	2005	0	0	0	0
April	2005	0	0	0	0
May	2005	0	0	0	0
June	2005	0	0	0	0
July	2005	1500	1400	100	3000
August	2005	1927900	1144900	1384500	4457300
September	2005	2876100	1511800	1970300	6358200

Month	Year	Net electricity exported from (Guntakanadala) Project (kWh)	Net electricity exported from (Velpanur) Project (kWh)	Net electricity exported from (Madhavaram) Project (kWh)	Net electricity exported (kWh)
October	2005	2829800	1700300	2032600	6562700
November	2005	2899000	1844500	2311400	7054900
December	2005	2533100	1665900	2039300	6238300
January	2006	1833100	1327800	1583100	4744000
February	2006	1376700	1030100	1217500	3624300
March	2006	998500	741600	898500	2638600
TOTAL		35763600	21100100	21925100	78788800

Note : In above tables the details are as per the billing period corresponds to as detailed below:

1. February 06, 2002 to January 2003 – billing period is from 22nd to 22nd of every month
2. February 2003 to January 2006 – billing period is from 23rd to 23rd of every month
3. February 2006 to March 2006 – billing period is from 24th to 24th of every month

6. Formulae Used

The baseline of the project activity is kWh produced by the hydroelectric project multiplied by an emission co-efficient i.e., weighted average emissions in tCO₂ per GWh of the generation mix of respective years.

The emission reductions for a given year are baseline emissions minus the project emissions and leakage.

$$ER_y = BE_y - PE_y - L_y$$

Where ER_y is emission reductions in a given year

Where BE_y is baseline emissions in a given year

Where PE_y is project emissions in a given year

Where L_y is leakage in a given year

Since the project emissions (PE_y) as well as the leakage (L_y) are zero, the emission reductions are equal to baseline emissions. These are calculated based on the monitored net amount of electricity supplied to the grid and baseline emission factor.

$$ER_y = BE_y = EF_y \times EG_y$$

Where EF_y is the emission factor for a given year EG_y is the electricity generation in a given year. Using above formulae, the Emissions reductions from the project activity for is presented below:

7. Emission Reductions

The emission reductions per year during 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 are as given below:

Table 14 Details of Emission Reduction Calculations:

Year (FY)	Net Electricity exported (GWh)	Emission Factor as per the baseline adopted (tons of CO₂ per GWh)	Base Line Emissions (tons of CO₂)	Project Emissions (tons of CO₂)	Emission Reductions (tons of CO₂)
2001-02 (Feb 06, 2002 to March,02)	1.1009	742.52	817	Nil	817
2002-03	3.7180	819.04	3045	Nil	3045
2003-04	6.8731	841.16	5781	Nil	5781
2004-05	25.4155	795.04	20206	Nil	20206
2005-06	41.6813	739.14	30808	Nil	30808
Total	78.7888	-----	60659	Nil	60659

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

8. Measures to ensure the results/uncertainty analysis

The energy exported by each projects of KM Power Ltd is recorded from independent main meter installed at the switch yard area of the respective project. In the event, the main meter is not in operation, and the reading from check meter is used for billing.

The calibration of monitoring equipment is being maintained as per the requirement of Electricity Board and the same is being done regularly. Power generation, export and energy import are being recorded daily and the same is being verified by the respective plant managers.

9. 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 15 - Monitoring Team

Project	Shift Incharge	Plant Incharge	Executive Director	Managing Director
Guntakandala	Mr.Prabhakar Reddy	Mr.Madan Mohan	Mr.Y Thimmaya	Mr.G Ramanarayan Reddy
Velpanuru	Mr.Dhanunjaya	Mr.Madan Mohan	Mr.Y Thimmaya	Mr.G Ramanarayan Reddy
Madhavaram	Mr.Madan Mohan	Mr.Madan Mohan	Mr.Y Thimmaya	Mr.G Ramanarayan Reddy

10. Roles and Responsibilities – Monitoring Plan

Executive Director:

Executive Director is responsible for the total monitoring plan. The executive director will examine the reports generated by plant Incharges w.r.t, the monthly electricity generated, exported and annual emission reduction calculations as per the monitoring plan. He also examines the internal audit reports prepared by internal auditor/plant Incharges and will in particular take note of any deviations in data over the norms and monitor that the corrective actions have resulted in adherence to standards

Plant Incharge

Plant Incharge is assisting to executive director for completing the task discussed above. The plant managers are responsible for the electricity generations at their individual locations. They will cross check and sign the log book regularly and report to executive director for any abnormality. The calibration of the meters installed will be taken care by him as per the monitoring plan.

The responsibility of storage and archiving of information in good condition also lies with the plant Incharge. He also generate internal audit reports as per the monitoring plan and when ever necessary, and will be submitted to Executive Director.

Shift in Charge

Shift Incharge is responsible for recording the electricity meter readings in the electricity board meter and check meter on daily basis. He will also responsible to take note of auxiliary consumption, power import, plant shut down times, etc. The monthly reports will be generated and submitted to plant Incharge for verification and emission reduction calculations.