

MONITORING REPORT

AUGUST - 2006

PERPETUAL 7.5 MW NON- CONVENTIONAL RENEWABLE SOURCES BIOMASS POWR PROJECT

Biomass Power Plant in Andhra Pradesh

Reference No. UNFCCC 390

PERPETUAL ENERGY SYSTEMS LTD

Plant Address

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CURRENT STATUS OF THE PROJECT

PERPETUAL 7.5 MW Non-Conventional Renewable Sources Biomass power Project is located at Appayyapeta Village, Seethanagaram Mandal, Vizianagaram District of Andhra Pradesh, India.

Project has been commissioned on 23rd March 2003 and, since then the plant is in operation.

First Synchronization of the Project with 33 KV Sub-station at Seethangaram (AP TRANSCO grid) was performed on **23rd March 2003** after trial operations and after obtaining permission for commercial production. Plant exported 12,01,402 MW to APTRANSCO grid and consumed 2,03,082 MT of biomass and 5070 MT of coal since beginning of the operations till 31.03.2006.

The list of vendors who supplied major equipments in the Plant is given below :

<u>S.No</u>	<u>Equipment</u>	<u>Supplied by</u>
1	Boiler	ISGEC JHON THOMPSON (IJT)
2	Turbo-Generator Set	TRIVENI ENGG.& INDUSTRIES LTD
3	Electrical Distribution	ALSTOM LIMITED
4	Distributed Control Systems	ABB LIMITED
5	Cooling Tower	SRI RAM TOWER TECH
6	R.O.Plant	DOSHI ION EXCHANGE & CHEMICAL INDUSTRIES LIMITED.
7	Air Compressor	CHICAGO PNEUMATIC
8	Fuel Handling System	HYQUIP PROJECTS PVT.LIMITED

Plant obtained term loan from financial institutions namely

- 1) POWER FINANCE CORPORATION LIMITED
- 2) STATE BANK OF INDIA

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).

Plant is in operation continuously (with outages, forced & planned shutdowns) since **23rd March'2003**.

Statement showing the outages, forced & planned shutdown particulars

Total Number of available working days	1,105 days
Number of planned shutdowns	195 days
Number of forced shutdowns	45 days
Total shutdown days	240 days

Major Shutdown days

S.No	Period	Days	Reason for shutdown
1.	From 01.04.03 to 7.04.03	6 days	Dismantling of ESP Damaged Parts
2.	From 23.07.03 to 11.08.03	19 days	Re-erection of Damaged ESP parts
3.	From 27.09.04 to 03.10.04	6 Days	Damaged Traveling grate Bars – Replacement Work
4.	From 06.10.04 to 15.10.04	9 days	Damaged alternator Terminal Bushes Replacement work
5.	From 23.07.05 to 27.07.05	4 Days	Damaged ESP Collecting Electrodes – Replacement Work
6.	From 23.08.05 to 31.08.05	5 days	VCB Damaged interrupter Replacement work

Plant is using Biomass fuels like Rice Husk, Juliflora, and other Agri. Waste Residues (like Stalks of Cotton, Bagasse, Ground Nut Shell etc.) of biomass fuels and supplementary fuel like coal (less than the permitted quantity). In addition to that, plant also uses small quantity of diesel very occasionally for operating the D.G set for safety of equipment during Grid Power failure time.

Monitoring Period

The Monitoring period is chosen from

24th March'2003 to 31st March'2006
(both days included)

Sustainability – Economic and Social well being

The Company has spent around INR **20,81,35,624** (US\$ 4.52 millions @ US\$ = Rs.46/-) During the monitoring period towards fuel usage in the Plant. Procurement of biomass fuel from local farmers and biomass suppliers has generated additional income and improved economic conditions of the community.

This has also resulted in local employment generation. Plant has generated employment opportunities directly / indirectly to more than 650 people.

As a part of social responsibility, Plant has been contributing to social infrastructure by way of employing local people for the Plant operations and also paying significant amount as tax for the local panchayat etc., PESL is also generating additional income to the farmers by way of purchase of agricultural waste residues (Jute sticks & cotton sticks etc), which were otherwise burnt in the fields. PESL is also paying significant amount of as tax for the local panchayats.

Parameters being monitored according to Monitoring Plan

- 1 **Power Generation:** Power generated in the plant is measured using the energy meter installed in the plant on continuous basis and the same is being compared with the electricity exported every month. This is done to compare the auxiliary consumption in the plant with the energy meters installed to measure auxiliary consumption.

- 2 **Power Export and Import:** Power exported to the grid and imported from the grid is monitored from energy meters installed at APTRANSCO sub-station on **23rd day** of every month. Representatives of APTRANSCO and PESL are being recording meter readings jointly for the energy exported to the Grid. Both the parties will jointly sign the recorded readings as a proof of export of Power to the grid from PESL plant and import of Power from APTRANSCO grid by the power plant. These meter readings are the basis for the invoices raised by **Perpetual Energy Systems Limited**.

- 3 **Biomass Fuel:** On receipt of Biomass fuel to the Plant, the vehicles will be weighed on 40T Electronic Weigh Bridge installed at the entrance of the Plant and these will unloaded in the fuel storage yards. The biomass fuel after necessary preparation is fed to the Boiler through Belt Conveyor as per the requirement and consumption will be recorded on daily basis.

- 4 **Calorific value of the Biomass fuel:** The calorific value of the Biomass fuel being used is measured in the in-house laboratory on daily basis as per the arrivals and average value will be considered on monthly basis.

- 5 **Coal/Diesel:** On receipt of Coal, the vehicles will be unloaded in Coal Yard and the same will be fed to the Boiler as and when required and consumption will be recorded accordingly. Diesel consumption will be monitored on regular basis using dip stick method.

- 6 **Carbon content in Coal:** Carbon content and CV in the coal received is measured in the in-house & External laboratories as per the standard formula.

Power Generation, Export & Fuel Consumption

Month-wise data on Power Generation, export, import, fuel consumption and diesel consumption is given below for the monitoring period:

Period		Electricity Generated (Million Units)	Electricity Exported (Million Units)	Electricity imported (Million Units)	Bio-mass used(Mts)	Coal Used (mts)	Diesel Used (Ltrs)
From	To						
24/03/2003	31/03/2003	0.634	0.550	0.008	1030		14
01/04/2003	23/04/2003	1.425	1.246	0.037	2325		97
23/04/2003	23/05/2003	2.387	2.075	0.047	3800		122
23/05/2003	23/06/2003	2.520	2.223	0.043	4000		55
23/06/2003	23/07/2003	2.169	1.925	0.031	3400		109.
23/07/2003	23/08/2003	1.626	1.419	0.054	2600		10
23/08/2003	23/09/2003	4.489	4.005	0.021	6800		48
23/09/2003	23/10/2003	4.378	3.910	0.011	6580		33
23/10/2003	23/11/2003	4.461	4.102	0.008	6785		7
23/11/2003	23/12/2003	4.415	3.971	0.015	5196	1325	7
23/12/2003	23/01/2004	4.643	4.150	0.005	5481	1525	5
23/01/2004	23/02/2004	4.513	4.051	0.014	5815	590	31
23/02/2004	23/03/2004	4.243	3.840	0.011	6525	240	36
23/03/2004	31/03/2004	1.253	1.124	0.004	1840	75	1
01/04/2004	23/04/2004	3.335	3.005	0.009	4565	125	59
23/04/2004	23/05/2004	4.316	3.894	0.011	6040	60	141
23/05/2004	23/06/2004	4.226	3.810	0.020	5816	85	74.
23/06/2004	23/07/2004	3.250	2.870	0.026	4570	150	11
23/07/2004	23/08/2004	4.540	4.052	0.006	6150	150	57
23/08/2004	23/09/2004	4.500	4.050	0.013	6015	275	13
23/09/2004	23/10/2004	2.090	1.879	0.037	3300		24
23/10/2004	23/11/2004	3.985	3.582	0.009	5650		4
23/11/2004	23/12/2004	3.896	3.466	0.010	5475		3
23/12/2004	23/01/2005	4.028	3.572	0.007	5525		4
23/01/2005	23/02/2005	3.095	2.746	0.014	4450		25
23/02/2005	23/03/2005	3.040	2.701	0.008	4543		6
23/03/2005	31/03/2005	1.351	1.211	0.001	2003		5.
01/04/2005	23/04/2005	2.663	2.392	0.008	4285		3
23/04/2005	23/05/2005	3.875	3.457	0.008	5275		95
23/05/2005	23/06/2005	3.737	3.329	0.015	6189		54
23/06/2005	23/07/2005	4.043	3.602	0.010	6855		6
23/07/2005	23/08/2005	4.200	3.735	0.009	6870		9
23/08/2005	23/09/2005	3.061	2.720	0.010	4686	40	362
23/09/2005	23/10/2005	4.258	3.755	0.007	6693	5	11
23/10/2005	23/11/2005	4.475	3.951	0.005	7380		24
23/11/2005	23/12/2005	3.880	3.408	0.007	6441	85	11
23/12/2005	23/01/2006	3.934	3.486	0.010	6852	240	3
23/01/2006	23/02/2006	4.209	3.755	0.009	8181	100	54
23/02/2006	23/03/2006	2.280	2.014	0.016	4555		3
23/03/2006	31/03/2006	1.253	1.111	0.000	2540		1
Total		134.676	120.140	0.594	203082	5070	1637

Note : The above values area taken from 23rd to 23rd of every billing month basis and shown Indian Financial year wise breakup. A bio-mass qty. of 128 Mts used for trial runs during Mar'2003 excluded from the above statement.

Emission reductions :

Billing period wise emission reductions are given below :

Emission reductions are calculated based on the power exported to the grid, power imported from the grid during shut down and start up, coal and diesel consumed in the plant from 23rd March'2003 to 31st March'2006 as per validation report.

Period		Electricity Generated (Million Units)	Electricity Exported (Million Units)	Electricity imported (Million Units)	Bio-mass used(Mts)	Coal Used (mts)	Diesel Used (Ltrs)	Net Emission reductions/CERS
From	To							
24/03/2003	31/03/2003	0.634	0.550	0.008	1030		14	450
Total -1		0.634	0.550	0.008	1030	0	14	450
01/04/2003	23/04/2003	1.425	1.246	0.037	2325		97	1004
23/04/2003	23/05/2003	2.387	2.075	0.047	3800		122	1683
23/05/2003	23/06/2003	2.520	2.223	0.043	4000		55	1809
23/06/2003	23/07/2003	2.169	1.925	0.031	3400		109	1572
23/07/2003	23/08/2003	1.626	1.419	0.054	2600		10	1132
23/08/2003	23/09/2003	4.489	4.005	0.021	6800		48	3307
23/09/2003	23/10/2003	4.378	3.910	0.011	6580		33	3236
23/10/2003	23/11/2003	4.461	4.102	0.008	6785		7	3398
23/11/2003	23/12/2003	4.415	3.971	0.015	5196	1325	7	1735
23/12/2003	23/01/2004	4.643	4.150	0.005	5481	1525	5	1659
23/01/2004	23/02/2004	4.513	4.051	0.014	5815	590	31	2589
23/02/2004	23/03/2004	4.243	3.840	0.011	6525	240	36	2869
23/03/2004	31/03/2004	1.253	1.124	0.004	1840	75	1	830
Total - 2		42.521	38.041	0.300	61147	3755	561	26823
01/04/2004	23/04/2004	3.335	3.005	0.009	4565	125	59	2320
23/04/2004	23/05/2004	4.316	3.894	0.011	6040	60	141	3143
23/05/2004	23/06/2004	4.226	3.810	0.020	5816	85	74	3031
23/06/2004	23/07/2004	3.250	2.870	0.026	4570	150	11	2163
23/07/2004	23/08/2004	4.540	4.052	0.006	6150	150	57	3160
23/08/2004	23/09/2004	4.500	4.050	0.013	6015	275	13	2989
23/09/2004	23/10/2004	2.090	1.879	0.037	3300		24	1528
23/10/2004	23/11/2004	3.985	3.582	0.009	5650		4	2965
23/11/2004	23/12/2004	3.896	3.466	0.010	5475		3	2868
23/12/2004	23/01/2005	4.028	3.572	0.007	5525		4	2959
23/01/2005	23/02/2005	3.095	2.746	0.014	4450		25	2267
23/02/2005	23/03/2005	3.040	2.701	0.008	4543		6	2235
23/03/2005	31/03/2005	1.351	1.211	0.001	2003		5	1004
Total - 3		45.652	40.836	0.172	64103	845	426	32632
01/04/2005	23/04/2005	2.663	2.392	0.008	4285		3	1978
23/04/2005	23/05/2005	3.875	3.457	0.008	5275		95	2862
23/05/2005	23/06/2005	3.737	3.329	0.015	6189		54	2750
23/06/2005	23/07/2005	4.043	3.602	0.010	6855		6	2981

23/07/2005	23/08/2005	4.200	3.735	0.009	6870		9	3093
23/08/2005	23/09/2005	3.061	2.720	0.010	4686	40	362	2196
23/09/2005	23/10/2005	4.258	3.755	0.007	6693	5	11	3104
23/10/2005	23/11/2005	4.475	3.951	0.005	7380		24	3275
23/11/2005	23/12/2005	3.880	3.408	0.007	6441	85	11	2725
23/12/2005	23/01/2006	3.934	3.486	0.010	6852	240	3	2608
23/01/2006	23/02/2006	4.209	3.755	0.009	8181	100	54	2996
23/02/2006	23/03/2006	2.280	2.014	0.016	4555		3	1658
23/03/2006	31/03/2006	1.253	1.111	0.000	2540		1	921
Total - 4		45.870	40.713	0.114	76802	470	636	33148
Total - all		134.676	120.140	0.594	203082	5070	1637	93053

Initial generation meter reading taken on 24.3.2003 (one day after of actual starting of production i.e on 23.03.2003)

Emissions due to usage of diesel are calculated considering IPCC's oxidation factor of diesel as 0.99 tCO₂/TJ.

Emissions due to usage of coal are calculated as per the formula given below:

Emissions due to coal = (Coal used in Mt X (Carbon content in % / 100)) x 44/12

Yearly Summary

Sl. No	Particular	Year 1	Year 2	Year 3	Year 4
1	CEF, kgCO ₂ /kWh	0.830	0.830	0.830	0.830
2	Power export to the grid, Million Units (MU)	0.550	38.041	40.836	40.713
3	Emission Reductions, tons of CO ₂	450	26823	32632	33148
	Grand Total	93,053			

Measures to ensure the Results / uncertainty analysis

As per the Power Purchase Agreement (PPA), the energy exported to the AP Grid is recorded from two independent meters viz., Main Meter and Check Meter and reading of main meter is used for billing. In the event of main meter not in operation / fails, the reading of the check meter shall be used for Billing.

The calibration of monitoring equipment is being maintained as per the requirement of APTRANSCO and the same is being done regularly. Power Generation, Export & Auxiliary Consumption, fuel consumption are being recorded daily and the same is being verified by Plant Manager (O&M) and approved by Plant Manager, PESL

Roles & Responsibilities

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

Members of the CDM Team :

1. Mr. M Rambabu, Plant Manager
2. Mr. Y.V.Subba Rao, Manager Operations
3. Mr. V.S.Prasada Rao, Sr.Manager (Finance & Accounts)
4. Mr. K.S. Koteswara Rao, Accountant