

Perpetual 7.5 MW Non-Conventional Renewable Sources Biomass Power Project

Project Reference Number: 0390

MONITORING REPORT

VERSION - 01, DATED – 27th April 2010

Fourth Periodic Verification under the Clean Development Mechanism (CDM)

FOR THE MONITORING PERIOD

1st APRIL 2009 (00:00 Hrs) to 23rd March 2010 (24:00 Hrs) (both days are included)

Net Emission Reductions: 28338tCO₂

<u>Plant Address</u>	<u>Registered Office</u>
PERPETUAL ENERGY SYSTEMS LTD Appayyapeta Village, Seethanagaram mandal, Vizianagaram Dist. Andhra Pradesh – 535 546 Ph : 08944 – 250997 Fax : 08944 - 250985 e-mail: nslpesl@gmail.com	PERPETUAL ENERGY SYSTEMS LTD #8-2-684/2/A, Flat No.1 to 4, NSL Icon 4 th Floor, Road No. 12, Banjara Hills, Hyderabad – 500 034 Andhra Pradesh. Ph : 040 – 23327949 Fax : 040 - 23327919 e-mail: nslpesl@gmail.com

Current Status of the Project

Perpetual 7.5 MW Non-Conventional Renewable Sources Biomass Power Project is located at Appayyapeta (Village), Seethanagaram Mandal, Vizianagaram (Dist) of Andhra Pradesh, India. Project is commissioned on 23rd March 2003, since then the plant is in Operation. The project is registered with UNFCCC in 2006 and received three issuances of CERs in 2007, 2008 and 2010 as shown below.

Registration of the project with UNFCCC	16th June 2006
Monitoring period: 24 th February 2003 to 31 st March 2006	93053 CERs issued on 8 th January 2007
Monitoring period 1 st April 2006 to 31 st March 2007	35203 CERs issued on 28 th February 2008
Monitoring period 1 st April 2007 to 31 st March 2009	58357 CERs issued on 26 th March 2010

The project proponent has chosen a renewal crediting period of 7 years for this project activity. The first crediting period for this project activity is 24th March 2003 to 23rd March 2010. The monitoring period for the fourth verification is from 1st April 2009 (00:00 Hrs) to 23rd of March 2010 (24:00 Hrs) (till the end of the first crediting period). The project is currently under validation for renewal of crediting period.

Type of the project activity

As per Clause 2 of Type I.D of Appendix B of Simplified **modalities and procedures for small-scale CDM project activities**, in case of unit which co-fires renewable biomass and fossil fuel the capacity of the entire unit shall not exceed the limit of 15 MW, for the project to qualify as a small –scale CDM project. Therefore, the project activity can be defined under:

Main Category: Type I – Renewable Energy Project (Small Scale)

Sub Category: “D”, Renewable Electricity Generation for a Grid (Version.7)

Host Party: India

References

Baseline Methodology: The project applies the baseline methodology AMS-I.D, Version 07

Registered PDD, dated 16th June 2006:

<http://cdm.unfccc.int/UserManagement/FileStorage/9R2V3K5QD8DR8L2K78C2QZRAF83KN4>

Validation Report:

<http://cdm.unfccc.int/UserManagement/FileStorage/NLB6MI7E00XSBWT58P6XNDQZ3WVQZO>

Monitoring methodology applied: AMS-I.D is considered as basis for monitoring methodology for the activity, Version 07

Revised Monitoring plan:

<http://cdm.unfccc.int/UserManagement/FileStorage/OCTYDXVM7UB9S3Z5A8016JFPK4NWQE>

Date of registration: 16 June 2006

UNFCCC link for project activity (Reference No.: 0390):

<http://cdm.unfccc.int/Projects/DB/DNV-CUK1146049461.92/view>

Monitoring Period

The present monitoring period covers the project activity from 1st April 2009 (00:00 Hrs) to 23rd March 2010 (24: 00 Hrs), both days inclusive.

During the period from 1st April 2009 (00:00 Hrs) to 23rd March 2010 (24; 00 Hrs) for commercial operations, plant exported 34358MWh of electricity to APTRANSCO grid and consumed 68583 MT of renewable biomass fuels.

Statement showing details of outages forced and planned shutdown period

Plant is in operation continuously (with outages, forced and planned shutdowns) from 1st April 2009 (00:00 Hrs) to 23rd March 2010 (24:00 Hrs). The details of outages, forced and planned shutdown periods are as below:

Period	1 st April 2009 to 23 rd March 2010
Total Number of available working days	358 days 00 hours 00 minutes
Number of planned shutdowns including Shutdown days after completion of monthly target	35 days 16 hour 49minutes
Number of forced shutdowns	36 days 13 hour 51 minutes
Total Shut down for the monitoring period	72 days 6 hour 40 minutes

Planned and Forced Shutdown days for the period 1 st April 2009 to 23 rd March 2010										
PERIOD		SHUTDOWN DAYS								
From	To	Planned			Forced			Total		
		Days	Hours	Minutes	Days	Hours	Minutes	Days	Hours	Minutes
01-Apr-09	23-Apr-09	0	0	0	0	6	1	0	6	1
23-Apr-09	23-May-09	0	0	0	4	8	0	4	8	0
23-May-09	23-Jun-09	0	0	0	1	19	26	1	19	26
23-Jun-09	23-Jul-09	0	0	0	4	19	57	4	19	57
23-Jul-09	23-Aug-09	0	0	0	1	10	56	1	10	56
23-Aug-09	23-Sep-09	22	9	33	2	12	52	24	22	25
23-Sep-09	23-Oct-09	0	16	39	2	2	56	2	19	35
23-Oct-09	23-Nov-09	3	18	1	1	13	24	5	7	34
23-Nov-09	23-Dec-09	3	17	30	5	19	49	9	13	19
23-Dec-09	23-Jan-10	0	0	0	6	8	51	6	8	51
23-Jan-10	23-Feb-10	0	17	18	4	22	13	5	15	31
23-Feb-10	23-Mar-10	4	9	48	0	13	26	4	23	14
Total		35	16	49	36	13	51	72	6	40

Parameters being monitored in accordance with the approved Revised Monitoring Plan

In accordance with the approved revised monitoring plan, following parameters are being monitored for the project activity:

Sl. No	Parameter	Procedure
1	<i>Electricity Generation (in kWh)</i>	Power generated in the plant is measured using the energy meter installed in the plant on continuous basis. The total generated power is also used to compare the auxiliary consumption of the plant after deducting the power exported to the grid from total generation.
2	<i>Auxiliary consumption (in kWh)</i>	Power consumed by auxiliaries at the plant is measured as the difference between total electricity generated and electricity exported to the grid.
3	<i>Power Export (in kWh)</i>	Power exported to the grid is monitored from energy meters installed at APTRANSCO sub-station on 23rd day of every month. Representatives of APTRANSCO and PESL will record the 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 plant. These meter readings are the basis for the invoices raised by <i>Perpetual Energy Systems Limited.</i>
4	<i>Power Import in kWh</i>	Power 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 recording meter readings jointly for the energy imported from the Grid. Both the parties will jointly sign the recorded readings as a proof of import of Power from APTRANSCO grid by the power plant. These meter readings are the basis for the invoices raised by <i>Perpetual Energy Systems Limited.</i>
5	<i>Biomass Fuel (of all kinds) in MT</i>	On receipt of Biomass fuel to the Plant, the vehicles are weighed on 40T Electronic Weigh Bridge installed at the entrance of the Plant and these will unloaded the biomass 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. During the monitoring period, Plant used Rice Husk, Red gram Stalk and other Agricultural Waste Residues (like Bengal gram, Black gram and Trashes of Soya been, Ground Nut Shell etc.,) for the purpose of electricity generation..
6	<i>Calorific value of the Biomass fuel (of all kinds) in kCal/Kg</i>	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.

Sl. No	Parameter	Procedure
7	<i>Diesel in Liters</i>	Diesel consumption will be monitored on daily basis using dip stick method. Default values of other diesel parameters included in the revised monitoring plan like Net Calorific Value in TJ/Gg, Density in t/1000 Lit, Emission Factor in tCO ₂ /TJ and Oxidation Factor will be monitored annually.
8	<i>Average Calorific value of Diesel</i>	IPCC default value of 43.0 TJ/Gg considered for estimation of emission reductions. Source: 2006 IPCC Guidelines for National Greenhouse Gases Inventories (Volume 2, Table 1.2, Page 1.18), http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html
9	<i>Density of Diesel</i>	National Default Value of 0.83t/1000 Lit is considered. Source: CEA CDM database, Version -5, http://www.cea.nic.in/planning/c%20and%20e/database_publishing_ver5.zip
10	<i>Oxidation Factor of Diesel</i>	A default value of 1.0 is applied. Source: 2006 IPCC Guidelines for National Greenhouse Gases Inventories
11	<i>Coal in MT</i>	Coal will be fed to the boiler as and when required and consumption will be recorded accordingly. As of now, no coal is being used in the plant for the purpose of electricity generation.
12	<i>Carbon content in coal</i>	No coal is used for the monitoring period. Hence, no analysis of coal was conducted for estimating carbon content in coal.
13	<i>Calorific Value of Coal</i>	No coal is used for the monitoring period. Hence, no analysis of coal was conducted for estimating calorific value of the coal.

Power Generation, Export, Import & Fuel Consumption

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

Period		Electricity Generated, kWh	Electricity Exported, kWh	Electricity Imported, kWh	Total Biomass used, MT	Diesel consumption, lit
From	To					
1 st April 2009 to 23 rd March 2010						
01-April-09	23-Apr-09	2821000	2441500	900	3905	19
23-Apr-09	23-May-09	3611000	3139300	29900	5348	18
23-May-09	23-Jun-09	4236000	3678100	5100	6375	24
23-Jun-09	23-Jul- 09	3382700	2929500	23200	5330	30
23-Jul- 09	23-Aug-09	3906700	3369000	13400	6430	20
23-Aug-09	23-Sep-09	850100	736400	53700	1425	6
23-Sep-09	23-Oct-09	4013900	3533700	13200	7650	10
23-Oct-09	23-Nov-09	3069300	2628900	16900	6100	12
23-Nov-09	23-Dec-09	2676200	2310300	18300	5265	2
23-Dec-09	23-Jan-10	3705900	3255700	15600	7525	3
23-Jan-10	23-Feb-10	3998200	3540700	14100	7340	6
23-Feb-10	23-March-10	3194600	2795100	12400	5890	3
Total for 2009-2010		39465600	34358200	216700	68583	153

Monthly break up of total biomass consumption and average monthly NCVs of each type of biomass is enclosed in **Annexure-II** of the monitoring report.

Emission Reductions

Emission reductions are calculated based on the power exported to the grid, power imported from the grid during shut down and start-up, and diesel consumed in the plant from 01st April 2009 to 23rd March 2010. Baseline and project emissions are calculated as per the formulas and default values as mentioned in approved Revised Monitoring Plan. The same is given below:

Emissions	Formula used
Baseline emission	= Electricity exported to the grid (kWh) x grid emission factor (tCO ₂ /kWh)
Project emissions	
Due to coal consumption	= Actual Coal consumed in MT x % carbon in coal x (44/12)
Due to diesel consumption	= [(Diesel consumed in liters x calorific value (TJ/kg) x density of fuel (kg/l))] x IPCC emission factor (tCO ₂ /TJ) x oxidation factor
Due to import of power from Grid	= Electricity imported from grid (kWh) x grid emission factor (tCO ₂ /kWh)

Grid Emission Factor (Ex-ante value as per registered PDD)	= 0.830 tCO₂/MWh
Net Calorific Value of Diesel (Default value as per revised Monitoring Plan)	= 43.0 TJ/Gg
Density of Diesel (Default Value as per Revised monitoring plan)	= 0.83 t/1000 Lit
IPCC Emission factor	= 74.1 tCO₂/TJ
Oxidation Factor of Diesel	= 1

The detailed calculation of certified emission reduction are given in **Annexure – I** of the monitoring report.

4 Comparison of emission reductions claimed in the monitoring report with those in approved Revised Monitoring Plan

1st April 2009 to 23rd March 2010			
	Baseline Emissions (tonnes of CO₂)	Project Emissions (tonnes of CO₂)	Emission Reductions (tonnes of CO₂)
Emission reductions in Approved Revised Monitoring Plan (Same as those in registered PDD)	36180	15848	20332
Emission reductions claimed in the monitoring report	28517	180	28338
<p>Explanation: Baseline Emissions reductions claimed in the monitoring report are lower than those estimated in the registered PDD. The difference is due to lesser number of operating days for the project during the period 1st April 2009 to 23rd March 2010 (286 days as against 330 days used to arrive at electricity generation estimation in registered PDD).</p> <p>Project emissions as estimated in registered PDD were based on the assumption that 30% of total generation would be contributed by coal. During the implementation of the project for the period 2003 to 2009, coal was used for electricity generation and the same was reported in the previous Monitoring Reports¹. However, Perpetual Energy Systems Limited phased out coal consumption in the project and no coal was used in the project activity for generation of electricity for the period 2009 to 2010. Detailed breakup of emission reduction calculations are provided in sheet for the period 2009 to 2010. Hence, emission reductions claimed in the monitoring report are higher than those in the registered PDD.</p>			

Measures to Ensure the Results / Uncertainty Analysis

The energy generated by the plant is recorded from the generation meter located in the control room of the plant. The main generation meter is calibrated once a year. As per the Power Purchase Agreement (PPA), the energy exported to the AP Grid is recorded by two independent meters viz., Main Meter and Check Meter and main meter reading is used for billing. In the event of failure/ non operation of the main meter,

¹Monitoring report for the period 24th March 2003 to 31st March 2006:

<http://cdm.unfccc.int/UserManagement/FileStorage/PGWCMPPK4FDZUCXC5JVR10CTZK6Z0JF>

Monitoring report for the period 1st April 2006 to 31st March 2007:

<http://cdm.unfccc.int/UserManagement/FileStorage/JQ7QAC8PF26WE7ACGIUG9HYXFPWC2O>

Monitoring report for the period 1st April 2007 to 31st March 2009:

<http://cdm.unfccc.int/UserManagement/FileStorage/ZJSA02E1GMC53UVO84K7QRT96HXIN>

the check meter reading shall be used for billing. The calibration of monitoring equipment is being maintained as per the requirement of APTRANSCO. Details of calibration of energy meters and weighbridge are as follows.

Sl No	Type	Make	Serial Number of the meter	Accuracy/Uncertainty Level	Date of calibration	Validity
1	Generation Meter	ALSTOM	8057829	$\pm 1.0\%$	09/07/2008	One year
					24/08/2009	One year
2	Export & Import Meter (Main Meter)	Secure	GEC05458	$\pm 0.2\%$	23/03/ 2009	Under the purview of APTRANSCO
					25/02/2010	
3	Export & Import Meter (Check Meter)	Secure	GEC05459	$\pm 0.2\%$	23/03/2009	Under the purview of APTRANSCO
					25/02/2010	
4	Weighbridge	Statweigh India Private Limited	90	± 5 kgs	20/01/2009	One year (valid upto 19/01/2010)
					5/03/2010	One year (valid upto 04/03/2011)

Power Generation, Export & Auxiliary Consumption, fuel consumption are being recorded daily and the same is being verified by General Manager and it will be approved by Plant Manager. Internal audits are carried out by CDM team members in order to ensure that monitoring of the parameters is done as per the PDD and revised monitoring plan. Experts and consultants of Perpetual Energy Systems Limited also assist CDM team in monitoring of the parameters as per monitoring plan.

Roles & Responsibilities

A CDM team has been formed in Perpetual Energy Systems Limited for monitoring and verification of all the monitoring parameters as per the guidelines formulated by the management of Perpetual Energy Systems Limited. Qualified and trained people monitor the parameters and emission reduction calculations.

In the complete implementation and monitoring Plan, Perpetual Energy Systems Limited is the sole agency responsible for implementation and monitoring.

Members of CDM Team

- a) V Manohar, Plant Manager (From 1st April 2009)
- b) K Madhava Rao (O&M).
- c) K.S.KoteswaraRao(Accountant)

Annexure – I:
CER Calculations

PERPETUAL ENERGY SYSTEMS LIMITED																
EMISSION REDUCTION CALCULATIONS - 01.04.2009 TO 23.03.2010.																
Period From	Period To	Electricity Generated, kWh	Electricity Exported, kWh	Electricity Imported, kWh	Auxiliary Consumption, kWh	Total Biomass - MTs.	Raw Material Total, MT	% Carbon in Coal	Emission Factor, kgCO ₂ / kWh	Baseline Emissions, tCo ₂ e	Diesel consumption , lit	CO ₂ emissions from diesel considering IPCC's oxidation factor of diesel as 1.0 tCO ₂ /TJ	Project Emissions, tCO ₂ e			NETT EMISSION REDUCTIONS, tCo ₂ e
													Due to consumption of Diesel	Due to import of Power	Total	
1-Apr-09	23-Apr-09	2821000	2441500	900	379500	3905	3905	0	0.83	2026	19	74.1	0.050	0.747	0.797	2026
23-Apr-09	23-May-09	3611000	3139300	29900	471700	5348	5348	0	0.83	2606	18	74.1	0.048	24.817	24.865	2581
23-May-09	23-Jun-09	4236000	3678100	5100	557900	6375	6375	0	0.83	3053	24	74.1	0.063	4.233	4.296	3049
23-Jun-09	23-Jul-09	3382700	2929500	23200	453200	5330	5330	0	0.83	2431	30	74.1	0.079	19.256	19.335	2412
23-Jul-09	23-Aug-09	3906700	3369000	13400	537700	6430	6430	0	0.83	2796	20	74.1	0.053	11.122	11.175	2785
23-Aug-09	23-Sep-09	850100	736400	53700	113700	1425	1425	0	0.83	611	6	74.1	0.016	44.571	44.587	567
23-Sep-09	23-Oct-09	4013900	3533700	13200	480200	7650	7650	0	0.83	2933	10	74.1	0.026	10.956	10.982	2922
23-Oct-09	23-Nov-09	3069300	2628900	16900	440400	6100	6100	0	0.83	2182	12	74.1	0.032	14.027	14.059	2168
23-Nov-09	23-Dec-09	2676200	2310300	18300	365900	5265	5265	0	0.83	1918	2	74.1	0.005	15.189	15.194	1902
23-Dec-09	23-Jan-10	3705900	3255700	15600	450200	7525	7525	0	0.83	2702	3	74.1	0.008	12.948	12.956	2689
23-Jan-10	23-Feb-10	3998200	3540700	14100	457500	7340	7340	0	0.83	2939	6	74.1	0.016	11.703	11.719	2927
23-Feb-10	23-Mar-10	3194600	2795100	12400	399500	5890	5890	0	0.83	2,320	3	74.1	0.008	10.292	10.300	2,310
TOTAL		39,465,600	34,358,200	216,700	5,107,400	68,583	68,583	0		28,517	153		0.40	179.86	180.266	28,338

Annexure – II

Monthly break up of total biomass consumption and average monthly NCVs of each type of biomass for the period 1st April 2009 to 23rd March 2010

Period		Husk		Juliflora		GNShell		Bagasse		A.Waste		Total
From	To	Qty (MT)	NCV (kCal/kg)	Qty (MT)	NCV (kCal/kg)	Qty (MT)	NCV (kCal/kg)	Qty (MT)	NCV (kCal/kg)	Qty (MT)	NCV (kCal/kg)	Qty (MT)
1-Apr-09	23-Apr-09	1495	2869	1885	2906	115	3015	29.53	1796	380	1944	3904.53
23-Apr-09	23-May-09	1510	2925	3640	2892	12.81	3030	0		185	1968	5347.81
23-May-09	23-Jun-09	2165	2708	4200	2815	0		0		10	1992	6375
23-Jun-09	23-Jul-09	2220	2716	3100	2875	0		0		10	1926	5330
23-Jul-09	23-Aug-09	2500	2721	3910	2895	0		0		20	1936	6430
23-Aug-09	23-Sep-09	515	2704	910	2885	0		0		0		1425
23-Sep-09	23-Oct-09	3150	2721	4500	2929	0		0		0		7650
23-Oct-09	23-Nov-09	2270	2774	3200	2916	60	2976	0		570	1702	6100
23-Nov-09	23-Dec-09	1215	2766	3275	2927	335	2986	0		440	1744	5265
23-Dec-09	23-Jan-10	2010	2782	4865	2918	200	2992	0		450.43	1768	7525.43
23-Jan-10	23-Feb-10	3060	2795	3730	2921	177.63	2986	0		372.86	1809	7340.49
23-Feb-10	23-Mar-10	2430	2814	2910	2909	0		50	1786	500	1827	5890
Total Consumption		24540		40125		900.44		79.53		2938.3		68583