



Shalivahana Non-Conventional Renewable Sources Biomass Power Project

UNFCCC Project Activity Ref. No: **0591**

THIRD MONITORING REPORT

Ver. 01, 23rd March 2009

[The Monitoring period: 25th Jan 2008 to 24th Jan 2009]

Net Emission Reductions: 22559 tCO₂

Registered Office	Project Site
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1. Current Status of the Project

The name of the authorized participant of the project “ Shalivahana Non – conventional Renewable Sources Biomass Power Project”, Shalivahana Projects Limited (SPL) has been changed to Shalivahana Green Energy Limited (SGEL) with effective from 28th September 2007 as per the certificate issued by Government of India, Ministry of Corporate Affairs, Registrar Of Companies, Andhra Pradesh. The same has been informed to host country, and has been approved by host country, Ministry Of Environment & Forestry (MOEF), Government of India on 27th August 2008. This same has also been informed to UNFCCC by e-mail dated 19th March 2009.

Shalivahana Green Energy Limited (SGEL, formerly, Shalivahana Projects Limited) established Non-Conventional Renewable Biomass Power Project of 6.0 MW at Mancherial Village, Adilabad Dist., Andhra Pradesh, India, has been commissioned and is in operation since 7th December 2002. The project activity is generation of electricity for the APTRANSCO grid system by utilizing the surplus biomass residues such as rice husk, saw dust, maize cobs, red gram stalks, cotton stalks, & coconut waste, etc.,

The purpose of this Monitoring Report is to calculate the Greenhouse Gas emission reductions achieved by the 6.0 MW grid connected project.

The project was registered as CDM activity with the Executive Board on 13th February 2007 and the crediting period commenced from 8th December 2002.

For the 1st Monitoring Period i.e. from 8th Dec 2002 to 24th Jan 2007, the project has exported 17.422 GWh of electricity to APTRANSCO grid and issued 113984 CERs for this vintage. For the 2nd monitoring period i.e., from 25th Jan 2007 to 24th Jan 2008, the project has exported 38.492 GWh of electricity to APTRANSCO grid and issued 19394 CERs.

2. Monitoring Period

The present monitoring period covers the project activity from 25th Jan 2008 to 24th Jan 2009. The project exported 37.927 GWh of net electricity to APTRANSCO grid and consumed 59651 MT of biomass fuels and 6999 MT of coal for the reported period.

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

The details of major equipments of the plant and suppliers are presented in Table-1.

Table – 1: Details of Plant Major Equipments and Suppliers

S.No	Equipment Details	Suppliers
1	Boiler Type: Multifuel fired Traveling Grate. Capacity: 35 TPH, Pressure 66 Kg/cm ² (g), 485 ± 5 Deg. C ESP outlet dust concentration <115 mg/Ncu.m	Thermax Babcock & Wilcox Ltd (TBW), Pune.
2	Turbine Capacity: 7500 KW, Steam Inlet Pressure 64 Kg/cm ² Temp. 480 Deg. C, Exhaust Pressure: 0.1 ata,	Alstom Power (I) Limited
3	Alternator Make: TDPS, Capacity: 9.375 MVA, Speed 1500 rpm, Generation Level: 11 kV / 3 Phase / 0.8 pf / 50 Hz	Alstom Power (I) Limited



	Excitations: Brush less	
4	Cooling Tower Type: RCC Induced draft type, Capacity: 2400 cu.m /hr, Hot water temp. 41Deg.C, Cold water temp. 33 Deg. C, Wet bulb temp. 30 Deg.C	Shriram Tower Tech Limited, Chennai.
5	D.M. Plant Capacity: 10cu.m/hr	Doshi Ion Exchange & Chemical Industries Ltd.

The details of forced shut down periods, planned shut down periods and reasons for shut downs are detailed below.

Table – 2.a: Details of Plant Shut downs for the Monitored period

Monitoring Period Hrs	Total available, Hrs	Type of shut down		Operating Hours Hrs
		Planned	Forced	
25.01.2008 to 24.01.2009	8760	1395.00	61.00	7304

Table – 2.b: Details of Major Shut down days and reasons – Forced & Planned for the monitored period

S.No.	Period	Type of shut-down, hrs		Reasons
		Planned	Forced	
1	23-Apr'08 to 27-Apr'08	102.00	--	Preventive maintenance Fuel belt conveyors , Traveling grate and Mechanical Spreaders
2	14-May'08 to 18-May'08	91.00	--	Preventive maintenance Coal impactor, ACW and compressor
3	07-Jun'08 to 09-Jun'08	34.00	--	Preventive maintenance of SMBC and ash bucket elevator
4	04-Jul'08 to 08-Jul'08	91.00	--	Preventive maintenance of Coal feeder, Drag chain, spreaders and CEP pumps
5	06-Aug'08 to 11-Aug-08	116.00	--	Preventive maintenance of Traveling grate and furnace trajectory plates
6	12-Aug'08 to 13-Aug'08	--	21.00	Due to MCC, ACB problem
7	20-Aug'08 to 21-Aug'08	--	40.00	Due to vaccum problem, exhaust bellow flange leakage
8	24-Aug'08 to 06-Sept'08	288.00	--	Annual Maintenance - Turbine Overhauling work
9	30-Sept'08 to 10-Oct'08	219.00	--	Preventive Maintenance ESP (GD and CE rapping system alignment job work)



10	25-Oct'08 to 03-Nov'08	206.00	--	Preventive Maintenance of SMBC, Impactor, Fuel feeding systems.
11	12-Nov'08 to 16-Nov'08	94.00	--	Shutdown taken for Boiler Inspection
12	24-Nov'08 to 25-Nov'08	38.00	--	33 KV Line Jumper work
13	24-Dec'08 to 29-Dec'08	116.00	--	Preventive Maintenance of 33 /11 KV transformer oil filtration, calibration of relays and meters
T o t a l		1395.00	61.00	

4. Parameters being monitored according to monitoring plan

The following parameters were monitored on continuous basis

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

Electricity generation from the plant is measured continuously using the energy meter installed in the control room of the plant. Aggregated daily auxiliary electricity consumption computed based on the gross power generation recorded in the plant and electricity exported to the grid values. The daily readings were aggregated to monthly readings.

Electricity Export and import (in kWh):

Electronic energy meters were installed at 132/33 kV Sub-station, Mancherial for the measurement of electricity exported to the State grid and the electricity imported from the State grid. Monthly energy meter readings have been recorded and jointly certified by the representatives of APTRANSCO & SGEL on 24th day of every month during day time.

Biomass Fuels (of all types in MT):

The rice husk is being used as a main fuel. Other biomass fuels such as cotton stalks, ground nut shells, bagasse, discarded seeds and saw dust were also used during the reported period. The fuel on receipt in the plant premises is weighed at the Electronic weighbridge installed at the plant main gate, unloaded in the fuel yard and stacked properly. The type of fuel, quantities, vehicle No., etc are recorded by weighbridge staff and the same was certified by the fuel yard staff and security personnel. The biomass fuels after necessary preparation is fed to the Boiler as per the requirement and consumption is being recorded on daily basis.

Calorific value of the Biomass fuels (in kcal/kg):

The calorific value of the Biomass fuel of all types used is being carried out periodically by independent third party laboratory.



Coal/Diesel (in MT/Ltrs.):

The project is also consumed coal as supporting fuel during the reported period. Coal on receipt is weighed at the Electronic weighbridge installed at the plant main gate, unloaded in the fuel yard and stacked properly. The quantities, vehicle No., etc are recorded by weighbridge staff and the same was certified by the fuel yard staff and security personnel. Coal is fed to the boiler as and when required and consumption will be recorded accordingly. The project is also used diesel in DG set for plant lighting and handling of biomass residues within the premises of the power plant and the same is being monitored on regular basis using level gauge/measurement on store issues.

Calorific value (in kcal/kg) and % of Carbon content in Coal:

The analysis of coal for % of carbon content and calorific value is being carried out periodically by independent third party laboratory and also reviewed the information provided by the coal suppliers. The project has taken the % of Carbon values from test reports for estimation of project emissions due to usage of coal.



Data being collected in order to monitor the GHG reduction is given in the Table 3 as mentioned in section D.3 in the registered PDD:

Table – 3: Data being monitored as per section D.3 in PDD

ID No.	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	Electricity Generated	KWh	Measured	Daily	100%	Electronic and Paper	Crediting period plus 2 years	From the energy meter in the plant control room
D.3.2	Power	Auxiliary Consumption	KWh	Calculated	Daily	100%	Electronic and Paper	Crediting period plus 2 years	Based on difference Between units Generated and units exported
D.3.3	Power	Export	KWh	Measured	Daily	100%	Electronic and Paper	Crediting period plus 2 years	Measured from the trivector meter in the sub-station
D.3.4	Fuel	Biomass used	MT	Measured	Daily Measurement & Monthly Recording	100%	Electronic and Paper	Crediting period plus 2 years	
D.3.5	Fuel	Avg. calorific value of Biomass used	Kcal/Kg	Measured	Quarterly/ Half Yearly	100%	Electronic and Paper	Crediting period plus 2 years	Tested quarterly/half yearly only if the source of fuel is different.
D.3.6	Fuel	Coal Used	MT	Measured	Every batch	100%	Electronic and Paper	Crediting period plus 2 years	Tested every batch only if the source of fuel is different.
D.3.7	Fuel	Calorific value of coal used	Kcal/Kg	Measured	Every batch	100%	Electronic and Paper	Crediting period plus 2 years	Tested every batch only if the source of fuel is different.
D.3.8	Fuel	%carbon	%	Measured	Every batch	100%	Electronic and Paper	Crediting period plus 2 years	Tested every batch only if the source of fuel is different.



As per the billing period, the data on electricity generation, auxiliary electricity consumption, electricity exported to grid and electricity imported from grid and fuels consumption for the plant is presented in the tables given below:

Table – 4.a: Details of Gross electricity generation, auxiliary consumption, electricity exported to grid, electricity imported from grid and net electricity displaced for Billing period

Month Period	Generated	Aux- Consm	Exported	Imported
	Units	Units	Units	Units
25.01.2008 to 24.02.2008	4656500	623800	4032700	1300
25.02.2008 to 24.03.2008	4232300	571600	3660700	10600
25.03.2008 to 24.04.2008	4153400	599500	3553900	9400
25.04.2008 to 24.05.2008	3152300	460900	2691400	22200
25.05.2008 to 24.06.2008	4049000	581600	3467400	7400
25.06.2008 to 24.07.2008	3656800	504500	3152300	12500
25.07.2008 to 24.08.2008	3311200	457800	2853400	28200
25.08.2008 to 24.09.2008	2778400	349000	2429400	31100
25.09.2008 to 24.10.2008	3036100	396100	2640000	15700
25.10.2008 to 24.11.2008	2454900	333900	2121000	30000
25.11.2008 to 24.12.2008	3881500	529700	3351800	6600
25.12.2008 to 24.01.2009	4493200	520400	3972800	13300
Total	43855600	5928800	37926800	188300



Table – 4.b: Details of Biomass & other fossil fuels consumption in line with Billing Period

Month Period	Biomass Consumption, MTs											Coal Consumption		Diesel Consumption Ltrs.
	Rice Husk	Saw dust	Coconut Waste	Cotton Stalk	Bagasse	Julie flora	Tobacco stalk	Groundnut shell	Discarded seeds	Soybean husk	Total	MTs	% of Carbon	
25.01.2008 to 24.02.2008	4957	0	68	610	560	0	0	0	0	0	6195	333	33.13	2208
25.02.2008 to 24.03.2008	3890	0	0	39	1490	0	0	0	0	0	5419	637	33.13	2659
25.03.2008 to 24.04.2008	5067	0	0	65	700	0	0	0	0	0	5832	490	31.30	2819
25.04.2008 to 24.05.2008	4026	0	0	31	455	5	0	35	0	0	4552	438	31.30	2602
25.05.2008 to 24.06.2008	4947	0	455	21	317	0	43	50	0	0	5833	378	31.30	2827
25.06.2008 to 24.07.2008	4918	0	0	0	0	6	0	8	0	0	4932	597	31.30	2206
25.07.2008 to 24.08.2008	4561	115	0	0	0	0	0	0	0	0	4676	510	34.04	1836
25.08.2008 to 24.09.2008	3456	203	0	0	0	0	0	7	0	0	3666	608	34.04	1694
25.09.2008 to 24.10.2008	3303	159	0	0	0	10	0	0	543	0	4015	708	36.79	1299
25.10.2008 to 24.11.2008	2641	302	335	0	0	4	0	0	106	6	3394	790	36.79	1310
25.11.2008 to 24.12.2008	5071	278	200	0	0	6	0	10	45	0	5610	725	37.74	1460
25.12.2008 to 24.01.2009	4551	296	4	0	0	0	0	0	676	0	5527	785	37.74	1900
Total	51388	1353	1062	766	3522	31	43	110	1370	6	59651	6999		24820



5. Biomass Assessment in the Project Region

The company has been carried out an assessment on availability of biomass in the region (50 km radius from the project site). The potential biomass generated in the region are crop residues such as cotton stalks, red gram stalks,, soyabean husk, pulse stalks and chilly stalks, maize cobs generated at field level from agriculture activity, agro industrial waste such as rice husk, saw dust and woody biomass in the form of twigs and branches of Prosopis Juliflora tree species grown in wastelands. The details of biomass generation, consumption and surplus available in the region are presented in the Table-5.

Table – 5: Biomass Generation & Consumption in the Project Region for the Year 2008

S. No.	Description	Generation, MT	Consumption in the region, MT		
			Others	SGEL	Total
A.	Field level residues				
1	Cotton stalks	4072240	119486	766	120252
2	Maize cobs	10258	2050	0	2050
3	Soyabean husk	12429	0	6	6
4	Red gram stalks	18786	538	0	538
Sub-total for A		4113713	122074	772	122846
B.	Agro-Industrial residues				
5	Rice husk	293680	23660	51388	75048
6	Saw dust	2090	700	1353	2053
7	Groundnut shells	1011	250	110	360
Sub-total for B		296781	24610	52851	77461
C.	Others				
8	Juliflora twigs	14300	3530	31	3561
9	Coconut waste	2460	0	1062	1062
Sub-total for C		16760	3530	1093	4623
Total (A+B+C)		4427254	150214	54716	204930
Surplus Quantity, MT					4222324
% surplus quantity on total generation in the region					95.37%



6. GHG Calculations-Formulae Used

Project type: **Type I - Renewable Energy Projects**

Approved Baseline methodology: **AMS I.D / Version 8**

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

$$ER_y = BE_y - PE_y - Ly$$

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

Ly is leakage in a given year

Baseline Emissions (BE_y)

The baseline emissions are calculated as follows:

$$\text{Baseline Emissions} = \text{Electricity Exported to Grid (kWh)} \times \text{Baseline emission factor (kg CO}_2\text{/kWh)}$$

The baseline emission factor of the Southern grid, which is fixed ex-ante for the crediting period, the project has been taken the baseline emission factor 0.8345 kg CO₂/kWh as mentioned in the registered PDD.

Project Emissions (PE_y)

The emissions occurred due to use of coal and diesel is considered as project emissions in estimations.

Project emission due to usage of Coal:

$$CE_C = C * Q * (44 / 12)$$

Where

CE_C = Stoichiometric Carbon-dioxide emission due to coal burning at project, t CO₂

C = Carbon percentage in coal, %

Q = Quantity of coal burned, MT

Project emission due to usage of diesel in DG Set and other purpose:

$$PE_{\text{diesel},y} = F_{d,y} * D * NCV_{\text{Diesel}} * EF_{\text{CO}_2} * \text{OXID} / 10^6$$



Where

PE diesel,y	= The emissions due to usage of diesel by the project activity during year y(tCO ₂)
Fd,y	= The quantity of diesel used during the year (Ltrs)
D	= Density of diesel (0.82 kg/Ltr.)
NCV _{Diesel}	= The calorific value of diesel (43 TJ/Gg as per IPCC 2006 default value)
EF _{CO2}	= The CO ₂ emission factor of Diesel (74.1 t CO ₂ /TJ as per IPCC 2006 default value)
OXID	= The oxidation factor of the Diesel (1 as per IPCC 2006 default value)

Leakage

During the reported period the project has procured available biomass fuels within the project region, which is 50 km radius from the project. The biomass assessment study (refer Table – 5 of Section 5) shows that the quantity of available biomass in the region is 95.37% of the total generation, even after the biomass fuels that is being consumed in the project region including the project activity.

As per attachment C of Appendix.B ‘General guidance on leakage in biomass project activities’ and the section E.1.2.2 of registered PDD, the leakage can be neglected if the quantity of available biomass in the region is more than 25% of the quantity of biomass that is utilized in the project region including the project activity.

Biomass leakages, Ly = 0.

Using the above formulas, the Emission reductions from the project activity are shown in table-6.



7. Net Emission Reductions for the Monitored Period

Emission reductions are calculated based on grid electricity displaced by the project activity for the chosen monitoring period

Table – 6: Emission Reductions for the Monitored Period

S.No.	Monitoring Period	Net Electricity Displaced	Coal Consumption		Diesel Consumption	Baseline Emission Factor	Baseline Emissions	Project Emissions tCO ₂		Leakage Emissions	Net Emission Reductions
		kWh	MTs	% of Carbon	Ltrs.	kgCO ₂ / kWh	tCO ₂	Coal	Diesel	tCO ₂	tCO ₂
1	25.01.2008 to 24.02.2008	4031400	333.00	33.13	2208	0.8345	3364	405	6	0	2953
2	25.02.2008 to 24.03.2008	3650100	637.00	33.13	2659	0.8345	3046	774	7	0	2265
3	25.03.2008 to 24.04.2008	3544500	490.00	31.30	2819	0.8345	2958	562	7	0	2389
4	25.04.2008 to 24.05.2008	2669200	438.00	31.30	2602	0.8345	2227	503	7	0	1717
5	25.05.2008 to 24.06.2008	3460000	378.00	31.30	2827	0.8345	2887	434	7	0	2446
6	25.06.2008 to 24.07.2008	3139800	597.00	31.30	2206	0.8345	2620	685	6	0	1929
7	25.07.2008 to 24.08.2008	2825200	510.00	34.04	1836	0.8345	2358	637	5	0	1716
8	25.08.2008 to 24.09.2008	2398300	608.00	34.04	1694	0.8345	2001	759	4	0	1238
9	25.09.2008 to 24.10.2008	2624300	708.00	36.79	1299	0.8345	2190	955	3	0	1232
10	25.10.2008 to 24.11.2008	2091000	790.00	36.79	1310	0.8345	1745	1066	3	0	676
11	25.11.2008 to 24.12.2008	3345200	725.00	37.74	1460	0.8345	2792	1003	4	0	1785
12	25.12.2008 to 24.01.2009	3959500	785.00	37.74	1900	0.8345	3304	1086	5	0	2213
	Total	37738500	6999.00		24820		31492	8869	64	0	22559



8. Measures to ensure the results/uncertainty analysis

As per the Power Purchase Agreement (PPA), the energy exported by SGEL is being recorded from independent energy meters i.e. Main meter & Check meter were installed at 132/33 KV Sub-Station, Mancherial of APTRANSCO. In the event, the Main meter is not in operation, and the reading from Check meter is used for billing.

The calibration of monitoring meters is being maintained as per the requirement of APTRANSCO and the same is being done regularly. Electricity export to grid and electricity import is being recorded daily and the same is being verified by the respective officials. Both meters are of same specifications & frequency and approved by APTRANSCO. The accuracy clause of these meters is 0.2.

9. Details of Monitoring team

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

Table – 7: Monitoring Team

S. No.	Name of the Person	Designation
1	Mr. M. Komaraiah	Chairman & Managing Director
2	Mr. I. Raja Babu	Director
3	Mr. K. Joga Rao	General Manager - Finance
4	Mr. N. Janardhan	Manager
5	Mr. S. Krishna	Plant Manager
6	Mr. A. Shyam Sundar	Manager -Biomass
7	Mr. A. Mallesham	Shift In charge