

MONITORING REPORT

Monitoring period
08.12.2002 to 24.01.2007
(both days included).

**Project 0591 : Shalivahana Non-Conventional Renewable
Sources Biomass Power Project**

Project Site:
Mancherial village, Adilabad district
Andhra Pradesh, India

Shalivahana Projects Limited
Minerva complex,
S D Road
Hyderabad
Andhra Pradesh, India.
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Current Status of the Project

Project 0591: [Shalivahana Non-Conventional Renewable Sources Biomass Power Project](#) Plant at Mancherial Village, Adilabad Dist., Andhra Pradesh, India, has been commissioned and is operational since 07.12.2002.

This project activity has been synchronized to 33 KV sub station at Mancherial which is located very close to the plant (AP TRANSCO grid). The trial runs were started on 01.12.2002 after obtaining permission for commercial operations and started exporting to the grid from 07.12.2002 and the crediting period for the project is considered from 08.12.2002. Plant exported **174228631 kWh** to AP TRANSCO grid and consumed **256143 MT** of biomass fuel and **23545 MT** of coal since beginning of the operations till 24th January 2007.

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

<u>S.No</u>	<u>Equipment</u>	<u>Supplier</u>
1	Boiler	Thermax Babcock & Wilcox Ltd (TBW)
2	Turbo-Generator Set	Alstom Power (I) Ltd.
3	Plant Auxiliaries	
	DM Plant	Doshi Ion Exchange & Chemical Industries Ltd. Shriram Tower Tech Ltd.
	Cooling Tower	(ABB) TBW.
	ID,SA &FD Fans	(Andrew Yule & Co Ltd) TBW.
	ESP	
	Electrical Panels	R.K. Electricals Ltd.
4	Fuel Handling System	Hyquip Projects Pvt Ltd.

Plant obtained term loan from financial institutions namely Indian Renewable Energy Development Agency Limited, New Delhi. and Promoters Equity.

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 Plant is in operation continuously (with outages – forced & planned) from commencement. The Plant is using renewable Biomass fuels like Paddy husk, Ground nut shell, Sunflower waste, Jowar husk, Castor shell, Bengal gram husk, Cotton and Chilly stack and supplementary fuel like coal (less than the permitted quantity). In addition to the above mentioned fuels, plant also uses diesel for power generation using DG set to meet emergency power requirement during complete black out and also for internal vehicles transportation..

The Plant had suffered major outages as detailed below:

Year	Running Hrs	Planned Outages		Forced Outages	
		Hrs	Weeks	Hrs	Weeks
2002-03	2333	90	0.535	328	1.95
2003-04	7694	676	4.02	414	2.46
2004-05	7534	1100	6.54	126	0.75
2005-06	7151	1343	7.82	176	1.04
2006-07(Jan)	5854	1314	7.82	176	1.04

Monitoring Period

The Monitoring period is chosen from 08.12.2002 to 24.01.2007 (both days included).

Sustainability – Economic and Social well being

The Company has spent around **Rs.228.28 Million on Bio-Mass Fuel** and **Rs.28.01 Million on Coal** during the monitoring period towards fuel usage in the Plant. Procurement of biomass fuel from local farmers and biomass suppliers has not only generated additional income to the farmers but also improved the economic status of the local community.

This has also resulted in local employment generation. Plant has generated whopping employment opportunities directly / indirectly more than 300 people.

As a part of social responsibility, Plant has been contributing to social infrastructure by means of providing employment opportunities to the local people for the Plant operations and also paying significant amount as tax, water charges and to the local Panchayat etc.

Parameters being monitored according to Monitoring Plan

For the Project, the following parameters are being monitored on continuous basis:

- 1 ***Power Generation (in kWh):*** Power generation from the plant is measured continuously using the generation meter installed in the control room of the plant. The total generated power is also being used to compare the auxiliary consumption of the plant after deducting power exported to the grid.

- 2 ***Power Export and import (in kWh):*** Power exported to the grid and imported from the grid is monitored from energy meters installed at APTRANSCO sub station on 23rd or 24th day of every month. Meter reading for the energy exported to the Grid are being recorded & signed mutually by the representatives of APTRANSCO & Company as a proof of export & import of Power by the power plant from the Grid. Those meter readings are the basis for the invoices raised by **Shalivahana**.

- 3 ***Biomass Fuel (of all types in MT):*** The Biomass fuel of all types on receipt in the Plant is weighed in the Electronic Weigh Bridge installed at the entry of the Plant and unloaded in the fuel storage yard. The biomass fuel after necessary preparation is fed to the Boiler as per the requirement and consumption is being recorded on daily basis.

- 4 ***Calorific value of the Biomass fuel (of all types in kcal/kg):*** The calorific value of the Biomass fuel of all types used is being measured in the out side Govt. approved laboratory at regular intervals, as per the arrivals and average value will be considered on monthly basis.

- 5 ***Coal/Diesel (in MT/litres):*** Coal on receipt in the Plant is weighed in the Electronic Weigh Bridge installed in the Plant and unloaded in the fuel storage yard. Coal is fed to the Boiler as and when required and consumption will be recorded accordingly. Diesel consumption is being monitored on regular basis using level gauge/measurement on store issues.

- 6 ***Carbon content in Coal (in %):*** Carbon content in the coal received is being considered as per the analysis reports of government-approved laboratory, which are being obtained at regular intervals.

- 7 ***Calorific value (CV) of coal (in kcal/kg):*** CV of coal is being analysed at government approved outside laboratory at regular intervals.

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:

Billing Month	Year	Electricity Generated, kWh	Electricity Exported, kWh	Electricity Imported, kWh	Total Biomass, MT	Coal Used, MT	Total Fuel used, MT	Diesel consumption, lit
December (From 8 th Dec)	2002	1876546	1626851	21903	2663	20	2683	2138
January	2003	4229246	3724980	22400	6434	0	6434	2672
February	2003	3081300	2720200	39000	4297	0	4297	2667
March	2003	4118363	3636100	18600	5507	0	5507	2442
Total		13305455	11708131	101903	18901	20	18921	9919
April	2003	4299691	3773000	40800	5884	85	5969	3396
May	2003	4413237	3841900	31000	5510	304	5814	3610
June	2003	3970767	3475800	46200	4770	267	5037	3285
July	2003	4553441	4005600	24300	4704	759	5463	3060
Aug	2003	4477070	3943800	26400	4917	341	5258	2658
Sept	2003	4066731	3590800	45200	4634	545	5179	2720
Oct	2003	4484200	3928400	26100	5109	827	5936	2650
Nov	2003	4667800	4134800	16300	5220	815	6035	3737
Dec	2003	4517325	4005400	29900	5101	901	6002	2454
Jan	2004	4651280	4127700	24000	5596	653	6249	2820
February	2004	4635395	4121400	24000	5212	905	6117	3211
March	2004	4353794	3868300	15600	4927	908	5835	2505
Total		53090731	46816900	349800	61584	7310	68894	36106
April	2004	4711445	4121800	13600	5320	1231	6551	2823
May	2004	4530766	3989600	28400	5138	1085	6223	3559
June	2004	4633995	4070900	24600	5614	283	5897	2885
July	2004	2728500	2364200	32400	3585	0	3585	2995
Aug	2004	4631000	4072300	12400	6133	183	6316	3108
Sept	2004	4597700	4032200	15800	5489	701	6190	3362
Oct	2004	4021350	3487300	9800	5370	184	5554	2796
Nov	2004	4646297	4059800	8200	5863	516	6379	2717
Dec	2004	4122413	3628900	16600	5334	440	5774	3222
Jan	2005	4099940	3616800	13600	5085	703	5788	2499

Billing Month	Year	Electricity Generated, kWh	Electricity Exported, kWh	Electricity Imported, kWh	Total Biomass, MT	Coal Used, MT	Total Fuel used, MT	Diesel consumption, lit
February	2005	4069800	3570400	17500	5710	0	5710	3257
March	2005	3664600	3227300	15200	4720	427	5147	1981
Total		50457806	44241500	208100	63361	5753	69114	35204
April	2005	3840400	3356400	28100	4476	888	5364	2124
May	2005	3669300	3160100	23200	4663	535	5198	2002
June	2005	3754700	3254700	29300	5408	0	5408	1901
July	2005	3626000	3150700	25300	4728	627	5355	2695
Aug	2005	3789500	3282200	19200	10067	566	10633	2730
Sep	2005	3781500	3254800	12000	6657	254	6911	2450
Oct	2005	3644500	3149200	25500	6232	494	6726	2134
Nov	2005	3742844	3249700	17500	6294	0	6294	2164
Dec	2005	2688656	2356700	18200	3535	193	3728	1785
Jan	2006	4613600	4058800	12300	5688	105	5793	2951
Feb	2006	4543550	3999500	20300	5960	262	6222	2306
Mar	2006	4098009	3599400	10600	5173	210	5383	2023
Total		45792559	39872200	241500	68881	4134	73015	27265
Apr	2006	4051841	3562200	12300	4437	951	5388	2694
May	2006	4260564	3748500	9400	4394	912	5306	2275
Jun	2006	4038804	3527500	11600	3712	1080	4792	2079
Jul	2006	4233912	3643200	6000	5872	200	6072	2016
Aug	2006	3189600	2752000	14500	4429	630	5059	1881
Sep	2006	3517050	3043100	9100	4450	665	5115	1802
Oct	2006	2933250	2543800	11200	3999	425	4424	1602
Nov	2006	2939100	2548300	13800	3989	105	4094	1688
Dec	2006	2645400	2305600	18200	3060	570	3630	1714
Jan	2007	4481300	3915700	8300	5074	790	5864	1748
Total		36290821	31589900	114400	43416	6328	49744	19499
GRAND TOTAL		198937372	174228631	1015703	256143	23545	279688	127993

Emission Reductions

The emission reductions per year during the chosen monitoring period are as 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 [start date **08.12.2002**] to [end of monitoring period date **24.01.2007**].

Month	Year	Electricity Generated, kWh	Electricity Exported, kWh	Electricity Imported, kWh	Total Biomass, MT	Coal Used, MT	Total Fuel used, MT	Net Emission Reductions, tCO ₂ e
December (from 8 th December)	2002	1876546	1626851	21903	2663	20	2683	1308
January	2003	4229246	3724980	22400	6434	0	6434	3083
February	2003	3081300	2720200	39000	4297	0	4297	2230
March	2003	4118363	3636100	18600	5507	0	5507	3012
Total		13305455	11708131	101903	18901	20	18921	9633
April	2003	4299691	3773000	40800	5884	85	5969	2996
May	2003	4413237	3841900	31000	5510	304	5814	2780
June	2003	3970767	3475800	46200	4770	267	5037	2510
July	2003	4553441	4005600	24300	4704	759	5463	2340
Aug	2003	4477070	3943800	26400	4917	341	5258	2824
Sept	2003	4066731	3590800	45200	4634	545	5179	2252
Oct	2003	4484200	3928400	26100	5109	827	5936	2188
Nov	2003	4667800	4134800	16300	5220	815	6035	2381
Dec	2003	4517325	4005400	29900	5101	901	6002	2155
Jan	2004	4651280	4127700	24000	5596	653	6249	2579
February	2004	4635395	4121400	24000	5212	905	6117	2249
March	2004	4353794	3868300	15600	4927	908	5835	2043
Total		53090731	46816900	349800	61584	7310	68894	29298
April	2004	4711445	4121800	13600	5320	1231	6551	1841
May	2004	4530766	3989600	28400	5138	1085	6223	1904
June	2004	4633995	4070900	24600	5614	283	5897	3006
July	2004	2728500	2364200	32400	3585	0	3585	1938
Aug	2004	4631000	4072300	12400	6133	183	6316	3145
Sept	2004	4597700	4032200	15800	5489	701	6190	2443
Oct	2004	4021350	3487300	9800	5370	184	5554	2658

Month	Year	Electricity Generated, kWh	Electricity Exported, kWh	Electricity Imported, kWh	Total Biomass, MT	Coal Used, MT	Total Fuel used, MT	Net Emission Reductions, tCO ₂ e
Nov	2004	4646297	4059800	8200	5863	516	6379	2712
Dec	2004	4122413	3628900	16600	5334	440	5774	2441
Jan	2005	4099940	3616800	13600	5085	703	5788	2098
February	2005	4069800	3570400	17500	5710	0	5710	2956
March	2005	3664600	3227300	15200	4720	427	5147	2127
Total		50457806	44241500	208100	63361	5753	69114	29268
April	2005	3840400	3356400	28100	4476	888	5364	1632
May	2005	3669300	3160100	23200	4663	535	5198	1926
June	2005	3754700	3254700	29300	5408	0	5408	2686
July	2005	3626000	3150700	25300	4728	627	5355	1796
Aug	2005	3789500	3282200	19200	10067	566	10633	1989
Sep	2005	3781500	3254800	12000	6657	254	6911	2374
Oct	2005	3644500	3149200	25500	6232	494	6726	1967
Nov	2005	3742844	3249700	17500	6294	0	6294	2691
Dec	2005	2688656	2356700	18200	3535	193	3728	1699
Jan	2006	4613600	4058800	12300	5688	105	5793	3234
Feb	2006	4543550	3999500	20300	5960	262	6222	2978
Mar	2006	4098009	3599400	10600	5173	210	5383	2720
Total		45792559	39872200	241500	68881	4134	73015	27693
Apr	2006	4051841	3562200	12300	4437	951	5388	1735
May	2006	4260564	3748500	9400	4394	912	5306	1944
Jun	2006	4038804	3527500	11600	3712	1080	4792	1542
Jul	2006	4233912	3643200	6000	5872	200	6072	2773
Aug	2006	3189600	2752000	14500	4429	630	5059	1471
Sep	2006	3517050	3043100	9100	4450	665	5115	1674
Oct	2006	2933250	2543800	11200	3999	425	4424	1564
Nov	2006	2939100	2548300	13800	3989	105	4094	1976
Dec	2006	2645400	2305600	18200	3060	570	3630	1173
Jan	2007	4481300	3915700	8300	5074	790	5864	2242
Total		36290821	31589900	114400	43416	6328	49744	18093
GRAND TOTAL		198937372	174228631	1015703	256143	23545	279688	113984

Baseline and project emissions are calculated as per the formulae mentioned in Section E of the PDD.

- Baseline emissions are calculated as per the formula given below:
Baseline emissions = Electricity exported to the grid (kWh) x Grid emission factor (tCO₂/kWh)
- Project 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
- Project Emissions due to electricity import and usage of diesel in the plant for emergency purpose and for fuel handling vehicles are included as per the verifier suggestions.

Yearly Summary

Sl. No	Particular	Dec' 02 Mar'03	Apr'03 – Mar'04	Apr'04 – Mar'05	Apr'05 – Mar'06	Apr'06 Jan'07
1	CEF, kgCO ₂ /kWh	0.8345	0.8345	0.8345	0.8345	0.8345
2	Power export to the grid in kWh	11708131	46816900	44241500	39872200	31589900
3	Emission Reductions, tons of CO ₂	9633	29298	29268	27693	18093
Total Emission reductions		113984				

The detailed calculations are enclosed in Annexure – I.

Measures to ensure the Results / uncertainty analysis

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

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

Roles & Responsibilities

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

CDM team member names :

1. Mr. Komaraiah, Chairman & Managing Director
2. Mr. Raj Babu, Director – Admin.,
3. Mr. Joga Rao, General Manager - Finance
4. Mr. Janardhan –Manager – accounts

Annexure – I

CER Calculation Sheet

Billing Month	Year	Electricity Generated, kWh	Electricity Exported, kWh	Electricity Imported, kWh	Total Biomass, MT	Coal Used, MT	Total Fuel used, MT	% Carbon in Coal	Baseline Emissions, tCO ₂ e	Diesel consumption, lit	Project Emissions, tCO ₂ e				Net Emission Reductions, tCO ₂ e
											Due to Diesel consumption	Due to Electricity Imports	Due to Coal used	Total	
December (from 8 th Dec)	2002	1876546	1626851	21903	2663	20	2683	35	1358	2138	6	18	25.7	50	1308
January	2003	4229246	3724980	22400	6434		6434	35	3108	2672	7	19	0.0	26	3083
February	2003	3081300	2720200	39000	4297		4297	35	2270	2667	7	33	0.0	40	2230
March	2003	4118363	3636100	18600	5507		5507	35	3034	2442	7	16	0.0	22	3012
Total	2003	13305455	11708131	101903	18901	20	18921		9770	9919	27	85	26	138	9633
April	2003	4299691	3773000	40800	5884	85	5969	35	3149	3396	9	34	109.1	152	2996
May	2003	4413237	3841900	31000	5510	304	5814	35	3206	3610	10	26	390.1	426	2780
June	2003	3970767	3475800	46200	4770	267	5037	35	2901	3285	9	39	342.7	390	2510
July	2003	4553441	4005600	24300	4704	759	5463	35	3343	3060	8	20	974.1	1003	2340
Aug	2003	4477070	3943800	26400	4917	341	5258	35	3291	2658	7	22	437.6	467	2824
Sept	2003	4066731	3590800	45200	4634	545	5179	35	2997	2720	7	38	699.4	745	2252
Oct	2003	4484200	3928400	26100	5109	827	5936	35	3278	2650	7	22	1061.3	1090	2188
Nov	2003	4667800	4134800	16300	5220	815	6035	35	3450	3737	10	14	1045.9	1070	2381
Dec	2003	4517325	4005400	29900	5101	901	6002	35	3343	2454	7	25	1156.3	1188	2155
Jan	2004	4651280	4127700	24000	5596	653	6249	35	3445	2820	8	20	838.0	866	2579
February	2004	4635395	4121400	24000	5212	905	6117	35	3439	3211	9	20	1161.4	1190	2249
March	2004	4353794	3868300	15600	4927	908	5835	35	3228	2505	7	13	1165.3	1185	2043
Total		53090731	46816900	349800	61584	7310	68894		39069	36106	98	292	9381	9771	29298
April	2004	4711445	4121800	13600	5320	1231	6551	35	3440	2823	8	11	1579.8	1599	1841
May	2004	4530766	3989600	28400	5138	1085	6223	35	3329	3559	10	24	1392.4	1426	1904
June	2004	4633995	4070900	24600	5614	283	5897	35	3397	2885	8	21	363.2	392	3006
July	2004	2728500	2364200	32400	3585	0	3585	35	1973	2995	8	27	0.0	35	1938
Aug	2004	4631000	4072300	12400	6133	183	6316	35	3398	3108	8	10	234.9	254	3145
Sept	2004	4597700	4032200	15800	5489	701	6190	35	3365	3362	9	13	899.6	922	2443
Oct	2004	4021350	3487300	9800	5370	184	5554	35	2910	2796	8	8	236.1	252	2658
Nov	2004	4646297	4059800	8200	5863	516	6379	35	3388	2717	7	7	662.2	676	2712
Dec	2004	4122413	3628900	16600	5334	440	5774	35	3028	3222	9	14	564.7	587	2441
Jan	2005	4099940	3616800	13600	5085	703	5788	35	3018	2499	7	11	902.2	920	2098
February	2005	4069800	3570400	17500	5710	0	5710	35	2979	3257	9	15	0.0	23	2956
March	2005	3664600	3227300	15200	4720	427	5147	35	2693	1981	5	13	548.0	566	2127
Total		50457806	44241500	208100	63361	5753	69114		36920	35204	95	174	7383	7652	29268
April	2005	3840400	3356400	28100	4476	888	5364	35	2801	2124	6	23	1139.6	1169	1632
May	2005	3669300	3160100	23200	4663	535	5198	35	2637	2002	5	19	686.6	711	1926
June	2005	3754700	3254700	29300	5408	0	5408	35	2716	1901	5	24	0.0	30	2686
July	2005	3626000	3150700	25300	4728	627	5355	35	2629	2695	7	21	804.7	833	1796
Aug	2005	3789500	3282200	19200	10067	566	10633	35	2739	2730	7	16	726.4	750	1989

Billing Month	Year	Electricity Generated, kWh	Electricity Exported, kWh	Electricity Imported, kWh	Total Biomass, MT	Coal Used, MT	Total Fuel used, MT	% Carbon in Coal	Baseline Emissions, tCO2e	Diesel consumption, lit	Project Emissions, tCO2e				Net Emission Reductions, tCO2e
											Due to Diesel consumption	Due to Electricity Imports	Due to Coal used	Total	
Sep	2005	3781500	3254800	12000	6657	254	6911	35	2716	2450	7	10	326.0	343	2374
Oct	2005	3644500	3149200	25500	6232	494	6726	35	2628	2134	6	21	634.0	661	1967
Nov	2005	3742844	3249700	17500	6294	0	6294	35	2712	2164	6	15	0.0	20	2691
Dec	2005	2688656	2356700	18200	3535	193	3728	35	1967	1785	5	15	247.7	268	1699
Jan	2006	4613600	4058800	12300	5688	105	5793	35	3387	2951	8	10	134.8	153	3234
Feb	2006	4543550	3999500	20300	5960	262	6222	35	3338	2306	6	17	336.2	359	2978
Mar	2006	4098009	3599400	10600	5173	210	5383	35	3004	2023	5	9	269.5	284	2720
Total		45792559	39872200	241500	68881	4134	73015		33273	27265	74	202	5305	5581	27693
Apr	2006	4051841	3562200	12300	4437	951	5388	35	2973	2694	7	10	1220.5	1238	1735
May	2006	4260564	3748500	9400	4394	912	5306	35	3128	2275	6	8	1170.4	1184	1944
Jun	2006	4038804	3527500	11600	3712	1080	4792	35	2944	2079	6	10	1386.0	1401	1542
Jul	2006	4233912	3643200	6000	5872	200	6072	35	3040	2016	5	5	256.7	267	2773
Aug	2006	3189600	2752000	14500	4429	630	5059	35	2297	1881	5	12	808.5	826	1471
Sep	2006	3517050	3043100	9100	4450	665	5115	35	2539	1802	5	8	853.4	866	1674
Oct	2006	2933250	2543800	11200	3999	425	4424	35	2123	1602	4	9	545.4	559	1564
Nov	2006	2939100	2548300	13800	3989	105	4094	35	2127	1688	5	12	134.8	151	1976
Dec	2006	2645400	2305600	18200	3060	570	3630	35	1924	1714	5	15	731.5	751	1173
Jan	2007	4481300	3915700	8300	5074	790	5864	35	3268	1748	5	7	1013.8	1025	2242
Total		36290821	31589900	114400	43416	6328	49744		26362	19499	53	95	8121	8269	18093
GRAND TOTAL		198937372	174228631	1015703	256143	23545	279688		145394	127993	347	848	30216	31410	113984