MONITORING REPORT

Ver. 03, 13.01. 2009

[The Monitoring period is chosen from 30th March 2004 to 22nd September 2007 both days included]

UNFCCC Reference No: 1**045**

4.5 MW Industrial Waste based Grid-connected Power Project

Net Emission Reductions: 53107 tCO_2e

Registered Office	Project Site
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1. Introduction

The purpose of this Monitoring Report (MR) is to calculate the Green House Gas (GHG) emission reductions occurred for the electricity generation by utilizing the industrial wastes mainly palm oil industry waste such as empty palm bunches, fibers, shells etc. and also other agro wastes available in the project region at Sai Renewable Power Pvt. Limited (SRPPL) Kamavarapukota, West Godavari District, Andhra Pradesh State, India

First synchronization of the project with 132/33 kV Sub-station at Kamavarapukota of APTRASCO was performed on 30.03.2004.

2. Reference

Project Ref.No 1045: 4.5 MW Industrial Waste based Grid-connected Power Project

The project has registered with UNFCCC on 22nd June 2007. For details on the project, please refer to the following link on the UNFCCC web site
http://cdm.unfccc.int/Projects/DB/DNV-CUK1175162900.54/view

3. Monitoring Period

The Monitoring period is chosen from 30.03.2004 to 22.09.2007.

4. Statement to what extent the Project has been implemented as planned

The Project has been completed as planned and the monitoring equipments are installed to monitor the parameters as described in the registered Project Design Document (PDD).

The Plant has been commissioned and is in operation continuously (with outages – forced & planned) since 30.03.2004.

During the reported period, the plant net exported 71.442 GWh electricity to the grid and consumed 187779 MT of Palm oil industry waste and other agro wastes like rice husk, corn cobs, coconut waste, juliflora trimmings, etc.

5. 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 below.

Table 1 – Details of plant major equipments and suppliers

S.No	Equipment Details	Suppliers
1	Boiler Type: Travelling grate stoker fired boiler, Natural circulation, Bottom supported and Balanced draught boiler. Capacity: 20 TPH, Pressure 66 ata, 485± 5^{o} C ESP Outlet gas dust concentration: 100 mg/Ncu.m	Walchandnagar Industries Limited, Pune.
2	Turbine Type: Multi-stage, Impulse type, geared, extraction cum condensing. Capacity: 4500 KW, Steam Inlet Pressure –63 ata Temp. - 480^{o} C, Exhaust Pressure: 0.1 ata,	Kessels Engineering Works Pvt. Ltd., New Delhi
3	Alternator Make : BHEL , Capacity - 6 MVA, Speed 1500 rpm, Generation Level : 11 kV / 3 Phase / 0.8 pf / 50 Hz Excitations : Brush less Type of Cooling: Closed air and water cooled.	Kessels Engineering Works Pvt. Ltd., New Delhi
4	Cooling Tower Type: RCC Induced draft type, Capacity: 3x750 m^{3} /hr, Hot water temp. 42^{o} C, Cold water temp. 32^{o} C, Wet bulb temp. 27^{o}. C.	Southern Cooling Towers Pvt. Ltd., Kolkata
5	D.M. Plant Capacity: 4 m^{3}/hr with 12 hours service cycle	Ion Exchange India Ltd., Hyderabad.

The summary of forced shut down, planned shut down and other shut down hours are presented below.

Table 2 – Details of Plant Shut downs – Year wise for the monitored period.

S.No.	Monitored Period	Total No. of hours available	Planned shut down hours	Forced shut down hours	Others, hours	Total shut down hours	Operating hours
1	30.03.2004 to 22.03.2005	8592	692	1385	397	2474	6118
2	23.03.2005 to 22.03.2006	8760	439	791	467	1697	7063
3	23.03.2006 to 22.03.2007	8760	1113	1791	299	3203	5557
4	23.03.2007 to 22.09.2007	4416	637	285	230	1152	3264
	T o t a l	30528	2977	4252	1393	8622	21906

For the details and reasons of the planned, forced and other shut downs are furnished as enclosure – II in this report.

6. 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 project 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 stabilized the local grid and helped in providing uninterrupted power for farmers.

- The project activity reduced the migration of the rural populace to urban areas, as the project activity generated employment opportunities and has been implemented in rural area.

- The project only uses Agro Industrial Waste & Biomass fuels for power generation thereby avoiding decomposition and release of greenhouse gases. Hence by reducing the impact of global warming it contributes to mitigation of climate change helped in bringing down greenhouse gases concentration in the atmosphere reducing and mitigating climate change.

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7. Parameters being monitored according to monitoring plan

The monitoring methodology proposed is as per indicative simplified baseline and monitoring methodologies for selected small scale CDM project category ID Renewable energy generation for a grid as per the Appendix B. It has been referred from the list of approved methodologies for CDM project activities in the UNFCCC CDM website (http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html)

The following parameters were monitored on continuous basis

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

Gross electricity generation from the plant and auxiliary consumption in the plant are measured continuously using the energy meters installed in the control room of the plant. The daily readings were aggregated to monthly readings.

b) Electricity Export and Import (in kWh):

Electronic energy meters were installed at 132/33 kV Sub-station, Kamavarapukota 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 & SRPPL.

c) Palm oil industry waste used (in MT):

Palm oil industry waste such as empty palm bunches; fibers, shells, etc. are being used as main fuels. The fuels on receipt in the plant premises are weighed at the Electronic weighbridge installed with in plant premises, 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. The palm waste after necessary preparation is fed to the boiler as per the requirement and consumption is being recorded on daily basis.

d) Other agro wastes used (of all types in MT):

Other agro wastes like rice husk, corn cobs, coconut waste, and juliflora trimmings were also used during the reported period. The fuel on receipt in the plant premises is weighed at the Electronic weighbridge installed with in plant premises, 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. The coconut waste, corn cobs and juliflora after necessary preparation is fed to the boiler as per the requirement and consumption is being recorded on daily basis.

e) NCV of fuels used (in kcal/kg)

In the absence of supplier data on calorific value is not available, the project has been carried out the batch-wise tests for NCV at reputed laboratories.

f) Weighted average Emission factor for southern region grid (tCO_2/GWh)

As mentioned under sec. B.2 of registered PDD, the project has been considered the ex-post emission factor for the weighted average emissions of the current generation mix (incl. imports) of Southern regional grid. The project has reviewed the emission factors were mentioned in the registered PDD and also the Carbon Dioxide Baseline Data base, Version 3, 15th December 2007 published by Government of India, Ministry of Power Central Electricity Authority[1], Government of India. The details of Baseline emissions for the respective years are furnished below:

tCO_2/GWh

Year	As per Regd. PDD,	As per Latest Official data published by CEA
2004 - 05	795.04	785.02
2005 - 06	739.14	735.95
2006 - 07	739.14	721.94
April 2007 to Sept 2007	739.14	721.94

In order to make the estimated emission reductions to be conservative, the pp has applied lower baseline emission factors, which are available as of December 2007 in CEA web site. Since electricity generation data for Southern grid for the year 2007-08 is not available on the CO_2 data base of official website of Central Electricity Authority of India, which is the only authentic and reliable source, the emission factor taken as the weighted average of the current generation mix for the most recent year (2006-07) available has been considered based on the clarification given on approved methodologies (AM_CLA_0038).

[1] http://www.cea.nic.in/planning/c%20and%20e /Government%20of%20India%20website.htm

g) Palm oil industry waste availability (MTs)

In the absence of publicly available data, the assessment of surplus availability of palm oil industry waste such as empty palm bunches fibers, shells, etc in the project region, SRPPL has hired the third party services (M.C. Jain & Associates) to carry out the assessment for the availability of palm oil industry waste in the region (50 km radius from the project site) based on the official statistics, scientific approaches and standard practices. SRPPL has reviewed and considered the annual assessment for the availability of palm oil industry waste in the project region for evaluation of fuel leakage. The details of palm oil industry waste generation, consumption and % of surplus waste generation on consumption in the region are furnished in section 8.1 of this report.

h) Surplus biomass/ other agro industry waste availability (MTs)

In the absence of publicly available data, the assessment of surplus availability of other agro wastes in the project region, SRPPL has hired the third party services (M.C. Jain & Associates) to carry out the assessment for the availability of other agro wastes in the region (50 km radius from the project site) based on the official statistics, scientific approaches and standard practices. SRPPL has reviewed and considered the annual assessment for the availability of other agro wastes in the project region for evaluation of fuel leakage. The details of other agro wastes generation, consumption and % of surplus waste generation on consumption in the region are furnished in section 8.2 of this report.

Data being collected in order to monitor the GHG reduction is mentioned in the Table under Sec D.3 of regd. PDD:

ID number	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	Gross Generation	kWh	m	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Readings are bein recorded from energy meter whic is installed in the plant control room
D.3.2	Power	Auxiliary Consumption	kWh	m	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Readings are bein recorded from energy meter whic is installed in the plant control room
D.3.3	Power	Power Import	kWh	m	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Readings are bein recorded from Trivector meter which is installed i the Sub-Station
D.3.4	Power	Power Export	kWh	M	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Readings are bein recorded from Trivector meter which is installed i the Sub-Station
D.3.5	Fuel 1	Palm industry waste used	MT	M	Daily	100%	Electronic and Paper	Crediting period plus 2 years	Waste deliveries a weighed and build

D.3.10.	Fuel (industrial waste)	Palm oil industrial waste	MT	E	Yearly	100%	MT	Crediting period plus 2 years	The data item is used to estimate the
D.3.6.	Fuel 2	Type of Biomass fuel used	MT	M	Daily	100%	Electronic and Paper	Crediting period plus 2 years	Biomass deliveries are weighed and build upon receipt at the plant
D.3.7.	Grid Emission factor	Weighted average emission factor of the Southern grid	tCO_2/GWh	C	Yearly	100%	Electronic and Paper	Crediting period plus 2 years	The data item is a calculated value derived from the information of CEA independent assessment of pal
D.3.8.	Calorific Values	NCV of fuels used in the plant	kcal/kg	E	batch-wise	100%	Electronic and Paper	Crediting period plus 2 years	If suppliers data on calorific value is available, then the same would be considered without testing the sample
D.3.9.	Fuel (renewable biomass)	Surplus biomass availability (for estimation of leakage)	MT	E	Yearly	100%	Electronic and Paper	Crediting period plus 2 years	The data item is used to estimate the leakage affect due the implementation of the project activ in the project regio The data item is a calculated value derived from the biomass assessm study carried out during each year o the crediting perio

As per the monthly billing period, the data on gross electricity generation, auxiliary power consumption, electricity exported to grid and electricity imported from grid, fuels (Palm oil industry waste and other agro waste) consumed in the plant during reported period is presented in the tables given below:

Table 3.1 Details of Gross electricity generation, auxiliary power consumption, electricity exported to grid, electricity imported from grid and Net electricity displaced for the monthly billing period

S.No.	Monitored Period	Gross Electricity Generated	Auxiliary Consumption, KWh		Electricity Exported to Grid	Electricity Imported from Grid	Net Electricity Displaced	
		kWh	Measured at Proj. Site (See Note-1)	Calculated (See Note-2)	kWh	kWh	kWh	GWh
1	30/03/2004 to 22/04/2004	808400	124323	157400	651000	33500	617500	0.618
2	May'04	2175700	287473	300100	1875600	31600	1844000	1.844
3	June"04	2246000	280809	292900	1953100	33700	1919400	1.919
4	July'04	2513900	355058	368700	2145200	14100	2131100	2.131
5	August'04	1734300	337999	350200	1384100	26100	1358000	1.358
6	September'04	1693900	282198	291300	1402600	29000	1373600	1.374
7	October'04	1292700	246683	256000	1036700	35500	1001200	1.001
8	November'04	1972200	311449	322000	1650200	32300	1617900	1.618
9	December'04	1404800	211514	218800	1186000	50500	1135500	1.136
10	January'05	2267800	347149	359200	1908600	17500	1891100	1.891
11	February'05	1939300	279676	289100	1650200	21500	1628700	1.629
12	March'05	2891800	379612	391900	2499900	6800	2493100	2.493
	Total	22940800	3443943	3597600	19343200	332100	19011100	19.011
13	April'05	2818400	398770	411800	2406600	11600	2395000	2.395
14	May'05	2102500	299475	308600	1793900	28100	1765800	1.766
15	June"05	2689800	391446	404200	2285600	16300	2269300	2.269
16	July'05	2327200	362002	373800	1953400	14800	1938600	1.939
17	August'05	2302100	367585	378800	1923300	23700	1899600	1.900
18	September'05	2036400	330118	341400	1695000	33200	1661800	1.662
19	October'05	2622200	384453	396100	2226100	20500	2205600	2.206
20	November'05	2730900	415637	428600	2302300	8900	2293400	2.293
21	December'05	1732500	232315	240400	1492100	23900	1468200	1.468
22	January'06	2423800	353787	365700	2058100	18300	2039800	2.040
23	February'06	2335000	332398	343700	1991300	14400	1976900	1.977
24	March'06	2169000	343606	354600	1814400	13100	1801300	1.801
	Total	28289800	4211592	4347700	23942100	226800	23715300	23.715

25	April'06	2307300	323568	338600	1968700	14000	1954700	1.955
26	May'06	2348700	303076	317200	2031500	25900	2005600	2.006
27	June''06	1575600	233845	246700	1328900	39000	1289900	1.290
28	July'06	1974000	303869	316800	1657200	29200	1628000	1.628
29	August'06	1800700	291964	304800	1495900	38100	1457800	1.458
30	September'06	2153000	320389	334500	1818500	23200	1795300	1.795
31	October'06	1022400	189675	199300	823100	32700	790400	0.790
32	November'06	958000	162010	170900	787100	23200	763900	0.764
33	December'06	1721900	244781	255200	1466700	20900	1445800	1.446
34	January'07	1579100	222908	233900	1345200	21200	1324000	1.324
35	February'07	1736000	243591	256500	1479500	23800	1455700	1.456
36	March'07	2133500	280104	295400	1838100	15800	1822300	1.822
	Total	21310200	3119780	3269800	18040400	307000	17733400	17.733
37	April' 07	2080000	275268	289300	1790700	28300	1762400	1.762
38	May' 07	2279900	288971	304200	1975700	15100	1960600	1.961
39	June' 07	2502700	328263	344700	2158000	20600	2137400	2.137
40	July' 07	1830600	262068	274400	1556200	20900	1535300	1.535
41	August' 07	2137800	314002	329200	1808600	27100	1781500	1.782
42	Till 22nd Sept 07	2167300	325856	340000	1827300	22800	1804500	1.805
	Total	12998300	1794428	1881800	11116500	134800	10981700	10.982
	Grand Total	85539100	12569743	13096900	72442200	1000700	71441500	71.442

Note-1: Measured aux. consumption includes part of electricity generated by the project activity and electricity imported from grid taken through energy meter located on LT panel at project site. The losses on account of power transformer & transmission line are not included in the measured aux. consumption.

Note-2: Computed based on the gross electricity generation recorded in the plant and energy exported to the grid readings certified by APTRANSCO & SRPPL. Aux. consumption due to usage of electricity imported from grid is not considered.

Table 3.2 Details of Palm oil industry waste and other agro wastes consumption for the monthly billing period

S.No.	Monitored Period	Palm oil industry waste & Other agro wastes consumption, MTs					
		Palm waste	Rice Husk	Coconut waste	Corn cobs	Juliflora trimmings	Total
1	30/03/2004 to	1437	273	0	0	63	1773

	22/04/2004						
2	May'04	3964	632	0	0	313	4909
3	June''04	4045	640	0	0	416	5101
4	July'04	4726	699	0	0	385	5810
5	August'04	3335	517	0	0	171	4023
6	September'04	3212	460	0	0	208	3880
7	October'04	2477	412	0	0	102	2991
8	November'04	3618	595	0	0	375	4588
9	December'04	2814	261	0	0	205	3280
10	January'05	4349	557	0	0	363	5269
11	February'05	3526	896	0	0	36	4458
12	March'05	5207	1400	0	0	0	6607
	Total for 2004-05	42710	7342	0	0	2637	52689
13	April'05	4960	1258	0	0	0	6218
14	May'05	3316	1024	0	0	0	4340
15	June''05	4306	1276	0	0	0	5582
16	July'05	3698	1057	0	0	0	4755
17	August'05	3777	892	82	0	0	4751
18	September'05	3541	337	289	0	0	4167
19	October'05	4686	373	378	0	0	5437
20	November'05	4898	579	196	0	0	5673
21	December'05	3161	376	64	0	0	3601
22	January'06	4419	458	207	0	0	5084
23	February'06	3878	551	415	0	0	4844
24	March'06	3565	437	424	0	0.5	4427
	Total for 2005-06	48205	8618	2055	0	1	58879
25	April'06	4147	236	142	497	0.15	5022
26	May'06	4525	271	121	443	0	5360
27	June''06	2788	568	78	151	0	3585
28	July'06	2807	1533	6	78	0	4424
29	August'06	3028	770	25	157	0	3980
30	September'06	2697	1615	94	474	0	4880

31	October'06	1112	663	56	335	0	2166
32	November'06	1631	305	44	346	0	2326
33	December'06	3177	185	37	428	0	3827
34	January'07	3019	199	86	363	0	3667
35	February'07	3195	229	37	317	0	3778
36	March'07	3823	251	79	441	0	4594
	Total for 2006-07	35949	6825	805	4030	0.15	47609
37	April'07	4006	285	383	263	0	4937
38	May'07	3878	391	215	344	0	4828
39	June"07	4488	203	173	693	0	5557
40	July'07	3131	293	277	209	0	3910
41	August'07	3706	357	295	262	0	4620
42	Till 22nd Sept '07	3841	370	273	267	0	4751
	S u b T o t a l	23050	1899	1616	2038	0	28603
	G r a n d T o t a l	149914	24684	4476	6068	2638	187779

The details of the fuel mix and plant achieved PLF during the reported period are shown below:

Table 3.3: Annual Fuel Mix & PLF Achieved during the Reported Period

S.No.	Monitored Period	Annual Fuel Mix, %		PLF in %	
		Palm oil industry waste	Other agro wastes	As per Regd. PDD	Plant Achieved
1	30.03.2004 to 22.03.2005	81.1	18.9	60	59.3
2	23.03.2005 to 22.03.2006	81.9	18.1	70	71.8
3	23.03.2006 to 22.03.2007	75.5	24.5	80	54.1
4	23.03.2007 to 22.09.2007	80.6	19.4	80	65.4

The annual fuel consumption of the plant during the reported period was about 75.5 to 81.9% Palm oil industrial waste such as empty palm bunches fibers, shells, etc. and about 18.1 to 24.5% of other agro waste like rice husk, corn cobs & coconut waste and juliflora trimmings which are within range as mentioned under sec. A.2. of registered PDD (70% palm oil industry waste and 30% other agro wastes).

8. Palm Oil Industry Waste and Other Agro Wastes Assessment in the Region

8.1 Palm Oil Industry Waste Assessment in the Region

The potential palm oil industry wastes generated in the region are empty palm bunches fibers, shells, etc at local palm oil industries. The details of Palm oil industry waste generation, consumption and % of surplus residue generation on consumed in the project region (50 km radius from the project site) are presented in the Table - 4.1 & 4.2:

Table-4.1: Palm oil industry waste Generation and Consumption in the region for the Year 2005-06

1	Total available Palm oil industry waste in the region	230800
2	Total Palm oil industry waste consumed by others in the project region during the year	88500
3	Total Palm oil industry waste consumed by SRPPL during the year	45945 *
4	Total Palm oil industry waste consumption in the region incl. SRPPL	134445
5	Total surplus palm oil industry wastes available in the region	96355
6	Percentage of surplus wastes on total consumption in the region	71.7%

Table-4.2: Palm oil industry waste Generation and Consumption in the region for the Year 2006-07

1	Total available Palm oil industry waste in the region	238600
2	Total Palm oil industry waste consumed by others in the project region during the year	90800
3	Total Palm oil industry waste consumed by SRPPL during the year	34966 *
4	Total Palm oil industry waste consumption in the region incl. SRPPL	125766
5	Total surplus palm oil industry wastes available in the region	112834
6	Percentage of surplus wastes on total consumption in the region	89.7%

8.2 Biomass and Other Agro Industrial Wastes Assessment in the Region

The potential other agro wastes generated in the region are palm waste, rice husk, bagasse and other biomass residues such as corn cobs, coconut waste (fronds, husk & shells) generated at field level from agriculture activity and woody biomass in the form of branches of Prosopis Juliflora tree species grown in wastelands. The details of other agro industrial wastes generation, consumption and % of surplus waste generation on consumed in the project region are presented in the Table - 4.3 & 4.4:

Table-4.3: Biomass & Other Agro industrial waste Generation and Consumption in the region for the Year 2005-06

S.No.	Description	Generation in the Region	Consumption in the Region		
			SRPPL*	Others	Total
A.	Field level (Crop residues)				
1	Palmoil tree fronds (palm leaves)	55400	0	6250	6250
2	Coconut fronds	36900	2478	14200	28078
3	Coconut husk	36800		10800	
4	Coconut shells	14000		600	
5	Corn cobs	14700	0	6250	
	Sub-Total	157800	2478	38100	40578
B.	Agro-Industrial Residues				
1	Rice husk	211000	9347	117160	126507
2	Bagasse	145800	0	143600	143600
	Sub-Total	356800	9347	260760	270107
C	Woody biomass (Juliflora)	25200	0	17500	17500
	Total	539800	11825	316360	328185

Total available biomass & other agro industrial wastes in the region : 539800 MTs

Total biomass & other agro industrial wastes consumption in the region incl. SRPPL : 328185 MTs

Total surplus biomass & other agro industrial wastes available in the region : 211615 MTs

Percentage of surplus wastes on total consumption in the region : 64.5%

Table-4.4: Biomass & Other Agro industrial waste Generation and Consumption in the region for the Year 2006-07

S.No.	Description	Generation in the Region	Consumption in the Region		
			SRPPL*	Others	Total
A.	Field level (Crop residues)				
1	Palmoil tree fronds (palm leaves)	57800	0	6800	6800
2	Coconut fronds	39300	782	14300	25782
3	Coconut husk	38800		9300	
4	Coconut shells	14600		1400	
5	Corn cobs	18300	4285	9800	14085
	Sub-Total	168800	5067	41600	46667
B.	Agro-Industrial Residues				
1	Rice husk	218200	6430	123460	129890
2	Bagasse	225300		220800	220800
	Sub-Total	443500	6430	344260	350690
C	Woody biomass (Juliflora)	23300	0	11100	11100
	Total	635600	11497	396960	408457

Total available biomass & other agro industrial wastes in the region	: 635600 MTs
Total biomass & other agro industrial wastes consumption in the region incl. SRPPL	: 408457 MTs
Total surplus biomass & other agro industrial wastes available in the region	: 227143 MTs
Percentage of surplus wastes on total consumption in the region	: 55.6%

** The indicated figures are palm waste/residues procured by SRPPL and the actual palm waste/residues are consumed for the respective years are shown in the Table No. 3.2*

The indicated total quantities of surplus fuel type Palm oil industry waste and Biomass & other agro industrial wastes in the project region are above 25% of the total respective fuel type consumption in the project region incl. SRPPL during the respective year as mentioned in the Attachment C to appendix B of UNFCCC. Hence, the leakage emissions due to competing use of Palm oil industry waste and Biomass & other agro industrial wastes are neglected.

9. Formulae Used

The baseline of the project activity is GWh produced by the project multiplied by an emission co-efficient i.e. weighted average emissions in tCO_2 per GWh of the generation mix of respective years.

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

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
BE_y is baseline emissions in a given year
PE_y is project emissions in a given year
L_y is leakage in a given year

Baseline Emissions

The baseline emissions are calculated as follows:

$$BE_y = EG_y * EF_y$$

Where EG_y is the net electricity export to grid in a given year (GWh)
EF_y is the emission factor for a given year (tCO_2/GWh)

PP has taken the calculated auxiliary consumption, which is conservative for estimation of net electricity export to grid in a given year.

Project Emissions

The project activity does not consumed any fossil fuels during the reported period and hence the project emissions due to use of fossils are zero.

Leakage

Annual fuel availability survey has been carried out by third party agency to assess the surplus availability of Palm oil industry waste and Biomass & other agro industrial wastes in the project region i.e. 50 km radius from the project site, if it is found that the surplus in the project region is less than 25% of the total region consumption, the emissions due to leakage shall be estimated and deducted from the emission reductions by applying the following formulae.

$L_y = BF_{d,y} * EF_{CO2,L} * NCV_{avg,y}$

L_y = Leakage emissions during the year *y* (tCO_2/y)

$BF_{d,y}$ = The quantity of biomass / palm oil industrial waste i.e. in deficit during the year *y* (tonnes)
(In the above parameter, the quantity of biomass / palm oil industry waste in deficit refers to the corresponding quantity of biomass / palm oil industry waste in deficit from 25% surplus of the total consumption of the biomass / palm oil industry waste in the project region, including the project activity)

$EF_{CO2,L}$ = CO_2 emission factor of the most carbon intensive fuel used in the country ($t\ CO_2/TJ$)

$NCV_{avg,y}$ = Average net calorific value of the biomass residues / palm oil industrial waste combusted in the project activity during the year *y* (TJ/tonne)

Using the above formulas, the Emission reductions from the project activity are shown below.

10. Net Emission Reductions

Emission reductions are calculated based on grid electricity displaced by the project activity for the chosen monitoring period i.e. from 30.03.2004 to 22.09.2007

Table 5 – Billing Month wise Emission Reductions

S.No	Monitored Period	Net Electricity Displaced	Baseline Emission Factor	Baseline Emissions	Project Emissions	Net Emission Reductions
		GWh	tCO_2/GWh	tCO_2e	tCO_2e	tCO_2e
1	30th March to 22nd April ' 04	0.618	785.02	485	0	485
2	May'04	1.844	785.02	1448	0	1448
3	June'04	1.919	785.02	1507	0	1507
4	July'04	2.131	785.02	1673	0	1673
5	August'04	1.358	785.02	1066	0	1066
6	September'04	1.374	785.02	1078	0	1078
7	October'04	1.001	785.02	786	0	786
8	November'04	1.618	785.02	1270	0	1270
9	December'04	1.136	785.02	891	0	891
10	January'05	1.891	785.02	1485	0	1485
11	February'05	1.629	785.02	1279	0	1279
12	March'05	2.493	785.02	1957	0	1957
	Total	19.011		14924	0	14924
13	April'05	2.395	735.95	1763	0	1763
14	May'05	1.766	735.95	1300	0	1300
15	June''05	2.269	735.95	1670	0	1670
16	July'05	1.939	735.95	1427	0	1427
17	August'05	1.900	735.95	1398	0	1398
18	September'05	1.662	735.95	1223	0	1223
19	October'05	2.206	735.95	1623	0	1623
20	November'05	2.293	735.95	1688	0	1688
21	December'05	1.468	735.95	1081	0	1081
22	January'06	2.040	735.95	1501	0	1501

23	February'06	1.977	735.95	1455	0	1455
24	March'06	1.801	735.95	1326	0	1326
	Total	23.715		17453	0	17453
25	April'06	1.955	721.94	1411	0	1411
26	May'06	2.006	721.94	1448	0	1448
27	June"06	1.290	721.94	931	0	931
28	July'06	1.628	721.94	1175	0	1175
29	August'06	1.458	721.94	1052	0	1052
30	September'06	1.795	721.94	1296	0	1296
31	October'06	0.790	721.94	571	0	571
32	November'06	0.764	721.94	551	0	551
33	December'06	1.446	721.94	1044	0	1044
34	January'07	1.324	721.94	956	0	956
35	February'07	1.456	721.94	1051	0	1051
36	March'07	1.822	721.94	1316	0	1316
	Total	17.733		12802	0	12802
37	April'07	1.762	721.94	1272	0	1272
38	May'07	1.961	721.94	1415	0	1415
39	June"07	2.137	721.94	1543	0	1543
40	July'07	1.535	721.94	1108	0	1108
41	August'07	1.782	721.94	1286	0	1286
42	Upto 22nd Sept '07	1.805	721.94	1303	0	1303
	T o t a l	10.982		7928	0	7928
	Grand Total	71.442		53107	0	53107

Table 6 – Year wise summary of Emission reductions

S.No.	Period	Net Electricity Displaced	Baseline Emission Factor	Baseline Emissions	Project Emissions	Leakage	Net Emission Reductions
		GWh	tCO_2/GWh	tCO_2e	tCO_2e	tCO_2e	tCO_2e
1	2004-05	19.011	785.02	14924	0	0	14924
2	2005-06	23.715	735.95	17453	0	0	17453
3	2006-07	17.733	721.94	12802	0	0	12802
4	Till 22nd Sept 2007	10.982	721.94	7928	0	0	7928
Grand Total		71.442		53107	0	0	53107

11. Measures to ensure the results / uncertainty analysis

Sai Renewable Power (P) Limited is equipped with energy meters for monitoring and control purpose. There are two energy meters at APTRANSCO sub-station to measure the export/import power, namely main meter and check meter with 0.2 class accuracy. In the event, the main meter is not in operation, and the reading from check meter is used for billing.

The tests of meters shall be jointly conducted by authorized representatives of both the parties and the results and correction so arrived at mutually will be applicable and binding on both the parties. If any of the meters is found to be registered inaccurately, the affected meter will be immediately replaced. The meters will be checked in presence of both the parties on mutually agreed periods. If during the test checks both the meters are found beyond permissible limits of error, both the meters shall be immediately replaced and the correction applied to the consumption registered by the main meter to arrive at the correct energy exported for billing purposes for the period of one month up to the time of test check, computation of exported energy for the period thereafter till next monthly reading shall be as per the replaced meter.

The calibration of monitoring equipment is being maintained as per the requirement of APTRANSCO and the same is being done regularly. Power Generation, Import, Export & Auxiliary Consumption, fuel consumption are being recorded daily and the same is being verified and approved by General Manager of the plant. These records are being sent to Head Office for review by the Director and for corrective actions if necessary.

12. Details of Monitoring team and Responsibilities

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

Table 7 – CDM Monitoring Team

S.No.	Name of the Person	Designation
1	Mr. M. Chandra Sekhara Rao	Managing Director
2	Mr. V. Jankiram Reddy	General Manager
3	Mr. B. Vaman	Material Procurement Officer
4	Mr. G. Anand Rao	Shift Incharge
5	Mr. M. Laxman Rao	Shift Incharge
6	Mr. T. Surya Prakash	Shift Incharge

Roles and Responsibilities of Team

Managing Director:

Managing Director is responsible for the total monitoring plan. The Managing Director will examine the reports generated by the General Manger 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/ general manager 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

General Manager

The General Manager is assisting and reporting to Managing Director for completing the task discussed above. The General Manager is responsible for the electricity generations at their individual locations. He will verify the daily reports prepared by shift in-charges and report to Managing Director for any abnormality. The calibration of the meters installed will be taken care by him as per the monitoring plan/PPA.

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

Material Procurement Officer

Material Procurement Officer is responsible to assess the suppliers based on the key parameters and submits recommendation to General Manager for approval. He is also responsible to procure the fuels permitted by the Local statutory authorities and to meet the plant daily requirement without any shortage.

Shift Incharge

Shift Incharge is responsible for recording the electricity meter readings at project site on daily basis. He will also responsible to take note of gross power generation, auxiliary power consumption, and export power to grid. Import power from grid, plant shut down times, fuel consumption, if any etc. Based on the daily reports, the monthly reports will be generated and submitted to the General Manager for verification and emission reduction calculations.

Enclosure - I

BASELINE INFORMATION

From Carbon Dioxide Baseline Data base, Version 3, 15th December 2007 published by Government of India, Ministry of Power Central Electricity Authority, Government of India.
(http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm)

Appendix A Assumptions for CO_2 Emission Calculations

Fuel Emission Factors (EF) (Source: Coal/Lignite - Initial National Communication, Gas/Oil/Diesel/Naphta - IPCC 2006, Corex - own assumption)

	Unit	Coal	Lignite	Gas	Oil	Diesel	Naphta	Corex
EF based on NCV	gCO2 /MJ	95.8	106.2	56.1	77.4	74.1	73.3	0.0
Delta GCV NCV	%	3.6%	3.6%	10%	5%	5%	5%	n/a
EF based on GCV	gCO2 /MJ	92.5	102.5	51.0	73.7	70.6	69.8	0.0
Oxidation Factor	-	0.98	0.98	1.00	1.00	1.00	1.00	n/a
Fuel Emission Factor	gCO2 /MJ	90.6	100.5	51.0	73.7	70.6	69.8	0.0

n/a = not applicable (i.e. no assumptions were needed)

Assumptions at Station Level (only where data was not provided by station)

	Unit	Coal	Lignite	Gas-CC	Gas-OC	Oil	Diesel-Eng	Diesel-OC	Naphta	Hydro	Nuclear
Auxiliary Power Consumption	%	8.0	10.0	3.0	1.0	3.5	3.5	1.0	3.5	0.5	10.5
Gross Heat Rate	kcal /kWh (gross)	2,500	2,713	0	3150	0	1,975	3,213	0	n/a	n/a
Net Heat Rate	kcal /kWh (net)	2,717	3,014	0	3,182	0	2,047	3,330	0	n/a	n/a
Specific Oil Consumption	ml /kWh (gross)	2.0	3.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GCV	kcal /kg (or m3)	3,755	n/a	8,800	n/a	10,100	10,500	10,500	11,300	n/a	n/a
Density	t /1,000 lt	n/a	n/a	n/a	n/a	0.95	0.83	0.83	0.70	n/a	n/a
Specific CO2 emissions	tCO2 /MWh	1.04	1.28	0.00	0.68	0.00	0.60	0.98	0.64	n/a	n/a

n/a = not applicable (i.e. no assumptions were needed)

Assumptions at Unit Level (by capacity; only for units in the BM, where data was not provided by station)

Coal	Unit	67.5 MW	120 MW	0-250 MW	500 MW
Gross Heat Rate	kcal /kWh	2,750	2,500	2,500	2,425
Auxiliary Power Consumption	%	12.0	9.0	9.0	7.5
Net Heat Rate	kcal /kWh	3,125	2,747	2,747	2,622
Net Efficiency	%	28%	31%	31%	33%
Specific Oil Consumption	ml /kWh	2.0	2.0	2.0	2.0
Specific CO2 Emissions	tCO2 /MWh	1.19	1.05	1.05	1.00

Lignite	Unit	75 MW	125 MW	0/250 MW
Gross Heat Rate	kcal /kWh	2,750	2,560	2,713
Auxiliary Power Consumption	%	12.0	12.0	10.0
Net Heat Rate	kcal /kWh	3,125	2,909	3,014
Net Efficiency	%	28%	30%	29%
Specific Oil Consumption	ml /kWh	3.0	3.0	3.0
Specific CO2 Emissions	tCO2 /MWh	1.32	1.23	1.28

Gas	Unit	0-49.9 MW	0-99.9 MW	>100 MW
Gross Heat Rate	kcal /kWh	1,950	1,910	1,970
Auxiliary Power Consumption	%	3.0	3.0	3.0
Net Heat Rate	kcal /kWh	2,010	1,969	2,031
Net Efficiency	%	43%	44%	42%
Specific CO2 Emissions	tCO2 /MWh	0.43	0.42	0.43

Diesel	Unit	0.1-1 MW	1-3 MW	3-10 MW	>10 MW
Gross Heat Rate	kcal /kWh	2,350	2,250	2,100	1,975
Auxiliary Power Consumption	%	3.5	3.5	3.5	3.5
Net Heat Rate	kcal /kWh	2,435	2,332	2,176	2,047
Specific CO2 Emissions	tCO2 /MWh	0.72	0.69	0.64	0.60

Naphta	Unit	All sizes
Increment to Gas Heat Rate	%	2%
Gross Heat Rate	kcal /kWh	0
Auxiliary Power Consumption	%	3.5
Net Heat Rate	kcal /kWh	0
Specific CO2 Emissions	tCO2 /MWh	0.00

Combined Margin	Unit	
Weight OM	%	50%
Weight BM	%	50%

Conversion Factors	Unit	
Energy	kJ /kcal	4.1868
	MJ /kWh	3.6

Oil		
Specific Emission	gCO2 /ml	2.96

Appendix B Grid Emission Factors

Table A: Values for all regional grids for FY 2000-01 until FY 2006-07, excluding Inter regional and cross-border electricity transfers.
Note: Values are rounded off to two decimals See the web link given Above for additional decimal places(Database –Excel worksheet)

Weighted Average Emission Rate (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.72	0.73	0.74	0.71	0.71	0.71	0.72
East	1.09	1.06	1.11	1.10	1.08	1.08	1.03
South	0.73	0.75	0.82	0.84	0.78	0.74	0.72
West	0.90	0.92	0.90	0.90	0.92	0.87	0.85
North-East	0.42	0.41	0.40	0.43	0.32	0.33	0.39
India	0.82	0.83	0.85	0.85	0.84	0.82	0.80

Simple Operating Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.98	0.98	1.00	0.99	0.97	0.99	0.99
East	1.22	1.22	1.20	1.23	1.20	1.16	1.13
South	1.02	1.00	1.01	1.00	1.00	1.01	1.00
West	0.98	1.01	0.98	0.99	1.01	0.99	0.99
North-East	0.74	0.71	0.74	0.74	0.71	0.70	0.69
India	1.02	1.02	1.02	1.03	1.03	1.02	1.01

Build Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North					0.53	0.60	0.63
East					0.90	0.97	0.93
South					0.70	0.71	0.71
West					0.77	0.63	0.59
North-East					0.15	0.15	0.23
India					0.69	0.68	0.68

Combined Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.76	0.76	0.77	0.76	0.75	0.80	0.81
East	1.06	1.06	1.05	1.07	1.05	1.06	1.03
South	0.86	0.85	0.86	0.85	0.85	0.86	0.85
West	0.87	0.89	0.88	0.88	0.89	0.81	0.79
North-East	0.44	0.43	0.44	0.44	0.43	0.42	0.46
India	0.86	0.86	0.86	0.86	0.86	0.85	0.85

Table B: Values for all regional grids for FY 2000-01 until FY 2006-07, including inter-regional and cross-border electricity transfers.

Weighted Average Emission Rate (tCO2/MWh) (incl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.72	0.73	0.74	0.71	0.72	0.73	0.74
East	1.06	1.03	1.09	1.08	1.05	1.05	1.00
South	0.74	0.75	0.82	0.84	0.78502	0.73595	0.72194
West	0.90	0.92	0.90	0.90	0.92	0.89	0.86
North-East	0.42	0.41	0.40	0.43	0.52	0.33	0.40
India	0.82	0.83	0.85	0.85	0.84	0.81	0.80

Simple Operating Margin (tCO2/MWh) (incl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.98	0.98	1.00	0.99	0.98	1.00	1.00
East	1.22	1.19	1.17	1.20	1.17	1.13	1.09
South	1.02	1.00	1.01	1.00	1.00	1.01	1.00
West	0.98	1.01	0.99	0.99	1.01	1.00	0.99
North-East	0.74	0.71	0.74	0.74	0.90	0.70	0.70
India	1.01	1.02	1.02	1.02	1.02	1.02	1.01

Build Margin (tCO2/MWh) (not adjusted for imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North					0.53	0.60	0.63
East					0.90	0.97	0.93
South					0.70	0.71	0.70
West					0.77	0.63	0.59
North-East					0.15	0.15	0.23
India					0.69	0.68	0.68

Combined Margin in tCO2/MWh (incl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.76	0.76	0.77	0.76	0.76	0.80	0.81
East	1.06	1.05	1.04	1.05	1.04	1.05	1.01
South	0.86	0.85	0.86	0.85	0.85	0.86	0.85
West	0.87	0.89	0.88	0.88	0.89	0.82	0.79
North-East	0.44	0.43	0.44	0.44	0.52	0.42	0.46
India	0.85	0.86	0.86	0.86	0.86	0.85	0.84

Enclosure - II

Details of Major Shut down and reasons

Table 8.1 - Details of Major Shut down days and Reasons from 30.03.2004 to 22.03.2005

S.No.	Period	Type of shut down, hours			Reasons
		Planned	Forced	Others	
1	30.03.04 to 22.04.04		331		Governor Failed. Replaced on 12.04.2004
				32	TG breaker manually tripped due to plant trial operations
2	May'04	115			TG Breaker manually tripped due to Sub-station meter reading has been taken & shut down for maintenance
			80		Shut down maintenance& ID Fan motor problem.
				18	Grid supply failed, Vector surge relay acted
3	June'04	24			Shut down for maintenance
			36		Due to Mechanical Problem
				140	Earth fault relay acted,Travelling grate problem, Grid supply failed, Stoker problem, Screw feeder problem, Actuator problem
4	July'04	13			Shut down for maintenance
			37		Shut down
				13	Grid failed and Earth fault relay acted, Vector surge relay acted
5	August'04	24			Shut down for Maintenance
				82	ID fan Motor Tripped, grid failed, Home load 33kV breaker tripped, turbine throttle valves stocked, Vector surge relay acted, Boiler tubes leakage.
6	September'04	86			Shut down for Maintenance
			104		Boiler cleaning purpose. Turbine Manually tripped due to ESP checking purpose
				36	Boiler cleaning, Grid failed, Main steam line flange gasket replacement
7	October'04	87			Shut down for Maintenance
			188		Governor& Travelling grate problem,SA Fan bearing problem
				10	Boiler feeder problem, Grid failed& Vector Surge relay acted.
8	November'04	72			Shut down for Maintenance
			88		Boiler tubes leakage and ESP Internal s

					short circuited.
				4	Grid failed
9	December'04	106			Shut down for Maintenance
			315		Boiler tubes leakage and ESP Internal s short circuited.& Boiler fuel feeder chute deflecting plate replacement
				35	Generator PT failure,Travelling grate clinker formation, Grid failed, ID Fan problem, Control oil pressure problem
10	January'05	72			Shut down for Maintenance
			34		Boiler maintenance
				15	ID Fan impeller problem, Actuator problem, screw feeder problem
11	February'05	45			Shut down for Maintenance
			172		Turbine over run. Nozzles reconditioned, Bearings and Thrust pads changed
				5	Grid failed, Governor problem, Vector surge relay acted
12	March'05	48			Shut down for Maintenance
				7	Actuator problem, ESP got tripped due to under voltage, Grid failed.
	T o t a l	692	1385	397	

Table 8.2 - Details of Major Shut down days and Reasons from 23.03.2005 to 22.03.2006

S.No.	Period	Type of shut down, hours			Reasons
		Planned	Forced	Others	
1	April'05	48			Shut down for maintenance
				27	Stoker problem,SA Fan problem, Steam line flange gasket replacement, travelling grate problem, Screw feeder problem
2	May'05	19			Shut down for maintenance
			159		Boiler travelling grate jammed and Bent T-bars replaced
				39	Grid supply failed, Vector surge relay acted, Leakage of boiler tubes, Governor problem supply for boiler and turbine failed, Lubricant oil leakage of bearing gear
3	June'05	25			Shut down for maintenance
			46		Leakage of Boiler tubes
				44	TG breaker tripped due to Vector surge relay acted, grid failed, Generator fuse failed, Earth fault relay acted, Travelling grate problem
4	July'05	77			Shut down for maintenance

				27	Cooling tower panel board fuse failed,UPS tripped, actuator problem, sensor cable breakdown
5	August'05	99			Shut down for Maintenance
				64	Heavy grid fluctuations, Speed probe failed, Incoming supply Bhimdole failed, Electrical PT problem,Lubeoil leakage of barring gear
6	September'05	75			Shut down for Maintenance
			73		Travelling grate problem& Heavy rains
				58	Grid breaker tripped, boiler problem,Fedders jam, Nozzle chest gasket failed
7	October'05	24			Shut down for Maintenance
				74	Actuator pin problem, boiler stoker problem Generator fuse failed, Lube oil leakage, Grid supply and breaker failed, fedders jam
8	November'05	15			Shut down for Maintenance
				50	PT problem, control oil pressure problem,travelling grate problem
9	December'05		292		Furnace front wall, fuel inlet port arch both sides collapsed
				19	Boiler Economizer coil leakage
10	January'06	22			Shut down for Maintenance
			42		Boiler maintenance
				47	Grid breaker tripped, Earth fault relay acted, Sub-station maintenance work, conveyor belt problem, compressor work
11	February'06		153		Boiler pressure not developed. Complete overhauling of boiler tubes
				5	Air compressor problem, Grid breaker tripped, Earth fault relay acted
12	March'06	35			Shut down for Maintenance
			26		screw feeders jammed
				13	Cooling tower fuse failed, Actuator problem,hotwell level control valve not working Grid failed.
	Total	439	791	467	

Table 8.3 - Details of Major Shut down days and Reasons from 23.03.2006 to 22.03.2007

S.No.	Period	Type of shut down, hours			Reasons
		Planned	Forced	Others	
1	April'06	29			Shut down for maintenance
			108		Boiler inspection& travelling grate problem
				15	grid failure& Governor problem
2	May'06	72			Boiler inspection
			35		Turbine axial shaft problem
				78	Air compressor problem servo control piston steam broken, PT problem, sub-station maintenance' fan bearing problem, actuator pin problem,ID fan motor problem., Grid frequency and voltage variation.
3	June'06	73			Shut down for maintenance
			231		Turbine axial shaft problem, gearbox high speed coupling breakage., load overload input fail
				23	Feeders jam, grid failed,VCB tripped on ID fan cable shortage., Vector surge relay tripped
4	July'06	148			Superheater coils complete scrapping.
			28		Axial shaft increased
				17	Air compressor problem
5	August'06	174			Full overhauling of Boiler and turbine maintenance
			54		Boiler problem
				48	Class A relay and overload alarm acted. Actuator connecting rod replacement, Grid breaker tripped, vector surge relay acted
6	September'06	48			Shut down for Maintenance
			80		Boiler tubes leakage&BC-2 joint problem
				45	EB supply failed actuator to cylinder level bearing repaired by welding and repositioned, SA fan problem,,Aircompressor problem
7	October'06	100			Shut down for Maintenance
			268		Turbine problem,Furnance front wall, fuel inlet port arch had damaged, Screw feeder no:1 problem
				37	Grid breaker tripped , travelling grate problem,AVR problem, turbine tripped vector surge , generator fuse failed, Lube oil leakage
8	November'06	104			Shut down for Maintenance
			373		Abnormal axial shaft observed, turbine rotor reconditioning& boiler tube leakage

				1	Grid failed
9	December'06	161			Heavy chocking of boiler tubes. Boiler tubes full overhauling
			111		Heavy rains& Eluru screw feeder power cable melt
				9	Travelling grate problem, AVR problem
10	January'07	110			Shut down for Maintenance
			213		breaker manually opened due to dearerator problem, Economizer leak, turbine over speed, nozzles chambers reconditioned
				4	Due to O/C + E/F relay acted, overload, grid failed
11	February'07	44			Shut down for Maintenance
			197		Boiler water panel leakage& cleaning,SA Fan problem
				10	Screw feeder problem, Economizer leak, low vacuum
12	March'07	50			Shut down for Maintenance
			93		Boiler tube leakage, travelling grate problem,
				12	Grid supply failed, A fan problem, heavy fluctuations
	Total	1113	1791	299	

Table 8.4 - Details of Major Shut down days and Reasons from 23.03.2007 to 22.09.2007

S.No.	Period	Type of shut down, hours			Reasons
		Planned	Forced	Others	
1	April'07	59			Shut down for maintenance
			65		Turbine problem
				77	Actuator problem, Air compressor problem, ID fan problem, SA fan bearing problem, VCB problem
2	May'07	122			Boiler inspection
			32		Boiler problem
				16	Compressor problem
3	June'07	76			Shut down for maintenance
			40		Deaerator tank break down
				41	Grid breaker tripped, heavy fluctuations, Economizer tube leakage, air compressor problem
4	July'07	193			Full overhauling of boiler and turbine
				30	Turbine control valves problem, BC-2 motor problem, sub-station maintenance work, chipper motor problem

5	August'07	72			Shut down for maintenance
			85		Turbine control valves problem& boiler problem
				39	ID fan motor problem, Sub-station maintenance work, Aircompressor problem
6	September'07	115			Shut down for Maintenance
			63		Boiler problem & heavy rains
				27	ID fan cable problem screw feeders problem
	Total	637	285	230	