

2X250 MW DAHANU THERMAL POWER STATION

RELIANCE ENERGY LTD., INDIA

1.0 UNIT PROFILE

Reliance Energy Limited, incorporated in 1929, is a fully integrated utility engaged in the generation, transmission and distribution of electricity. It ranks among India's top listed private companies on all major financial parameters, including assets, sales, profits and market capitalization.

With a vision to be amongst the most admired and most trusted integrated utility companies in the world, the company is committed to be world class utility company benchmarked to the international standards of quality, operational performance, efficiency and customer care.

2 x 250 MW Dahanu Thermal Power Station (DTPS) is one of company's generating facilities at Dahanu near Mumbai, India. Power generated from DTPS is transmitted to Mumbai, the business capital of India and is further distributed to more than 2.5 million retails consumers (2 out of 3 homes) in Mumbai Suburbs. DTPS units are the first 250 MW sets in the country supplied by BHEL, India and are in operation since 1995. Over the years DTPS has established best practices in all its Operation and Maintenance areas, which resulted in continuous improvement in its performance.

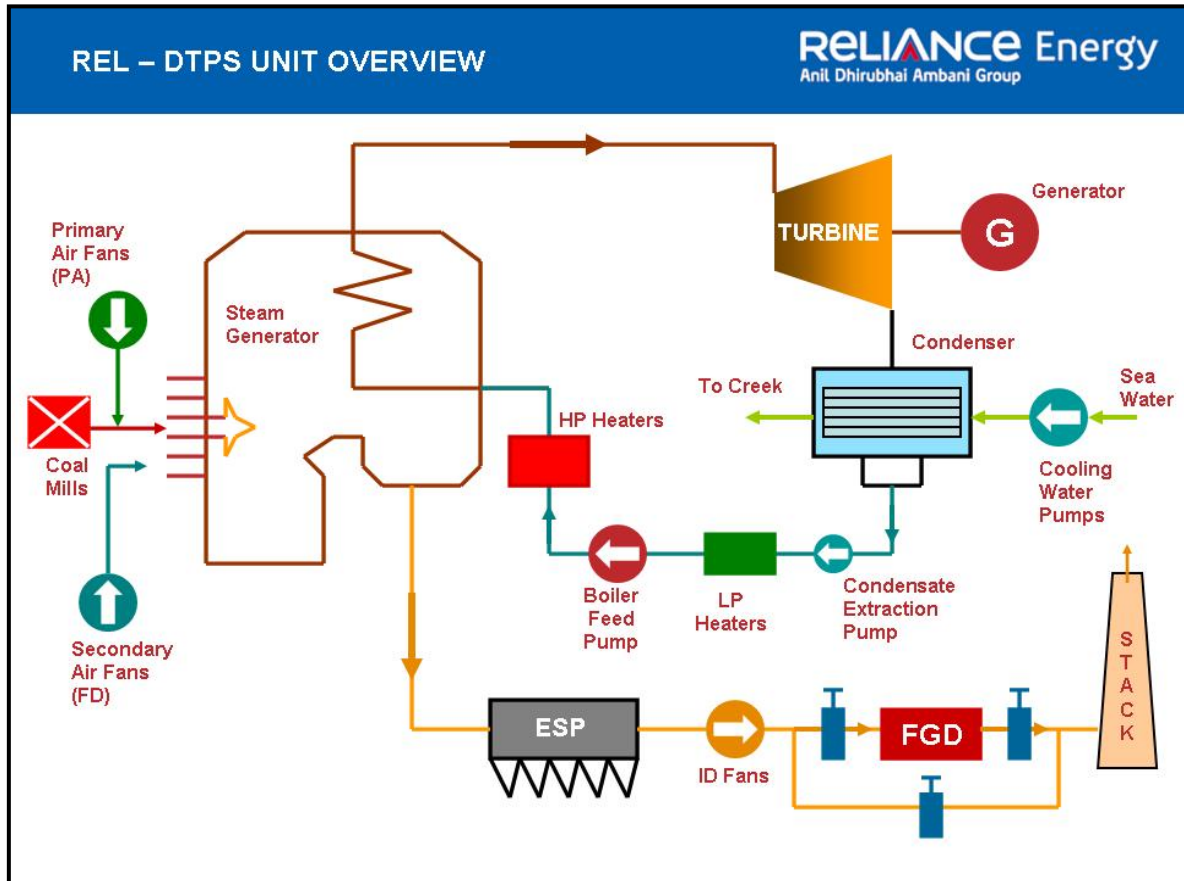
DTPS is the first utility in power sector to be certified as ISO 9001 for its Quality Management System and ISO 14001 for its Environment Management System. The plant is also accredited with OHSAS - 18001 certification for its Occupational Health and Safety management and SA – 8000

Since five years DTPS enjoyed the top slot amongst the best performing Indian Coal based Power stations. Its performance is recognized by national as well as by international forums, recently accolade by **International Diamond Globe for Quality award-2007 - by International star for Leadership, Moscow & International Quality Crown-2006 Award in Gold Category – by Business Initiative Directions BID, London UK** . In 2004 recognised as Top Power Plant by Platts Power magazine.

At National level the efforts are recognised by various forums like CEA, MEDA, Government of India, and CII, recently accolade by prestigious **Infraline Energy Excellence Award 2007 by Government of India**. DTPS is not complacent about these achievements and in line with Reliance's ambition; the quest for excellence is on, forever.

Due to Commitment to preservation and promotion of environment in all business activities DTPS has commissioned Flue Gas De-Suplhurisation plant with Ducon Sea Water Technology, first to be commissioned in India. Due to this Sox in the flue gas reduce by 90%. That is 6 MT/ day against the limit of 80.4 T/day (PG test in progress)

UNIT OVERVIEW



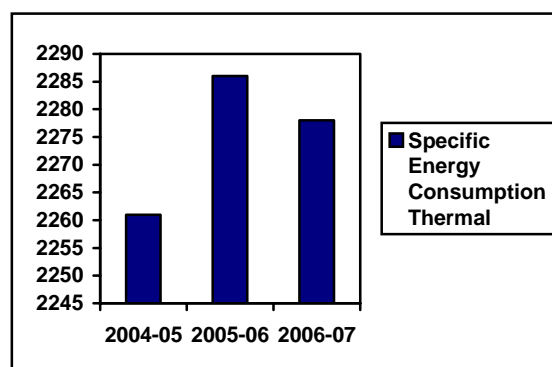
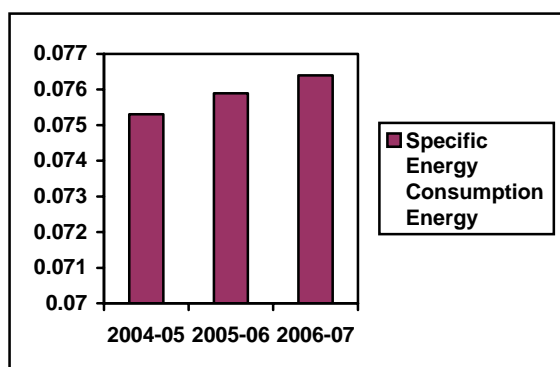
2.0 ENERGY CONSUMPTION

The plant achieved newer heights in most of the key operating and Energy management performance parameters over the period as tabulated below.

Financial Year	PLF (%)	Availability (%)	Heat Rate (Kcal/kwh)	Sp. Oil (ml/KHW)	Aux. Power (%)	DM Makeup (%)	No of trips / 1000 hrs
2004-05	101.35	96.88	2261	0.139	7.53	0.37	0.412
2005-06	98.70	94.71	2286	0.182	7.59	0.38	0.301
2006-07	101.79	96.79	2278	0.118	7.64	0.24	0.177

Sp. Energy Consumption:

DESCRIPTION	UNIT	2004-05	2005-06	2006-07
Annual Generation	Lakhs kWh	44391.9	43230.7	44584.06
Total Electrical Energy Consumption	Lakhs kWh/year	3342.86	3281.20	3407.94
Sp. Energy Consumption- Electrical	KWh / kWh	0.0753	0.0759	0.0764
Total Thermal (Fuel) Consumption	Million KCal / year	10037397	9839445	10155645
Sp. Energy Consumption- Thermal	Kcal / Kwh	2261	2286	2278



Note: Specific energy consumption Electrical increased due to erection and commissioning activities of Flue Gas Desulphurisation plant and in 2007-08 expected to be increased by 0.01 kwh/kwh due operations of the FGD plant

Benchmarking in Indian Power Sector 2006-07:

DTPS has sustained and excelled in its performance and set benchmark for consecutive third year amongst Indian Power sector on key performance indicators related to Energy Management. The Benchmark Efforts are recognized by Central Electricity Authority GOI and got Silver shield For Meritorious Performance For the year 2005-06, First prize for Meritorious Performance For the year 2004-05 & Prestigious Infraline Energy Excellence Award-2007 by Government of India

National Benchmark is the Normative guidelines for Coal Based Power Generating Stations, issued by MERC, MERC Web site----
<http://www.mercindia.org.in> , International Benchmarking with Top US Power Utilities, Source: Platts Power Magazine, July-2005,Platts Power Web site-----
<http://www.powermag.com> Refer Annexure – F for details

3.0 Energy Commitment, Policy and Set Up:

3.1 Energy Management Policy

DTPS has energy management policy

3.2 Energy Management Cell

DTPS consist of structured Energy Management cell head by Station head. EMC consists of more than 40 (out of 172 total executives) Energy manager, Energy Auditors certified by BEE and Sectional Head of all Departments. DTPS management recognizes the employees who are certified energy manager / auditor and provide reward to the employees for their efforts towards energy conservation.

Refer Questionnaire for Detail structure

3.3 Commitment for Energy conservation by integrated approach

Integrated Energy Conservation

One of the most important aspects of the operation of a power station is the energy consumption. With this in view various programmes were implemented during the Financial Year (F.Y.) 2004 -05, 2005-06 & 2006-07 so as to

1. Improve the Heat Rate
2. Reduce the Auxiliary power consumption

By improving heat rate and auxiliary power consumption DTPS working continuously in fulfilling the core objectives of proving economical and reliable power to consumers

The benefits gained from the implementation of the programmes taken up which have a direct bearing on the environmental performance of the power plant as reduction in both results in:

- Reduced coal consumption
- Reduced emissions from the plant
- Reduced waste generation (ash)

In order to improve the identified aspects, the process areas with potential for Improvement were identified. Then are classified as below

- Quality Improvement plans *QIP*
- Environment improvement plans *EMP*
- Safety Improvement Plans *SIP*

3.4 Energy Conservation Achievements in year 2006-07

15 nos. of ENCON projects implemented and resulting in savings of Rs 318.86 Lakhs annually.

01 Installation of VFD for condensate extraction pump. Trend setter project

Condensate flow is controlled by installation of Variable Frequency drive to Condensate Extraction Pump first time in India in power utilities.
Investment done : 65 lakhs
Savings : 44.15 lakhs
Power saving : 12.61 lakhs kwh



02 Energy conservation of Auxiliary cooling water pumps (3 numbers)by corrocoating -Technology Enhancement

Energy conservation is done by improving Efficiency of Auxiliary Cooling Water Pumps from 57% to 77% by FLUGLIDE COATING On Pump Impeller And Casing
Investment done : 3 lakhs
Savings : 10.77 lakhs



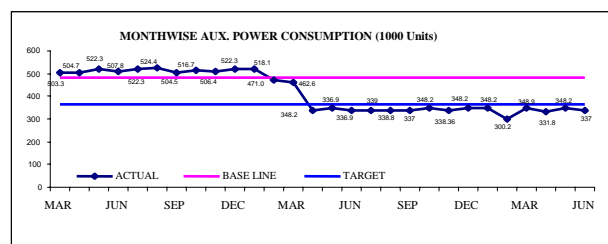
03 Energy conservation of cooling water pumps1&2 by corrocoating - Technology Enhancement

Energy conservation is done by improving Efficiency of Auxiliary Cooling Water Pumps from 69% to 78% by FLUGLIDE COATING On Pump Impeller And Casing
Investment done : 6 lakhs
Savings : 39 lakhs



04 Auxiliary power reduction by reduction in running of air compressors

Six Sigma approach DAMIC is used to reduce the auxiliary power consumption of air compressors by reducing variations in running hours.
Investment done : NIL
Power savings : 61.32 lakhs kwh



05 Reduction in oil consumption by reducing frequency of oil gun trial							
<p>Ignitor guns used to provide ignition energy to oil guns are replaced by High Energy Arcs. As Ignitor guns proved to be unreliable In subsequent oil gun trials it is observed that HEA are more reliable than the ignitor guns hence gun trail frequency revised without effecting in the reliability of system Investment done : NIL Oil savings : 84 KL / annum</p>							
	<table border="1"> <thead> <tr> <th></th> <th>With old schedule</th> <th>With revised scheduled</th> </tr> </thead> <tbody> <tr> <td>Average OIL Consumption / month</td> <td>7.5 KL</td> <td>0.5 KL</td> </tr> </tbody> </table>		With old schedule	With revised scheduled	Average OIL Consumption / month	7.5 KL	0.5 KL
	With old schedule	With revised scheduled					
Average OIL Consumption / month	7.5 KL	0.5 KL					

Sr. No.	Project description	Total savings in (Rs. lakhs)	Investment incurred on the project (Rs. lakhs)
06	Improvement of illumination level and saving of auxiliary power by installation of energy efficient lighting fixtures in main control rooms	3.20	4.00
07	Installation of BECK Actuators for SAD-1 & SAD-2 in Unit-01	11.42	6.60
08	Provision of HEA igniters for CD & EF Elevation in both units	2.81	12.00
09	To stop using of ignitor fan	6.00	0.00
10	Saving of auxiliary power by installation of LED base aviation lighting.	0.70	1.92
11	Procurement & installation of VFD for Dry Ash Classification vent fan motors	7.05	7.00
12	Installation Of VFD for LDO Firing Pump	1.47	1.63
13	Installation Of VFD for Seal Air Fans of Coal Mills	88.20	45.00
14	Replacement of V-belt with Flat belt of Air Washer Unit	0.93	0.80
15	Fuel Conservation by reduction in DM make up by substituting HFO by LDO	26.24	1.50
	Sub Total	318.86	154.45

3.5 Energy Conservation Plans & Targets for year 2007-08:

Energy Conservation Measures (Planned)	Anticipated savings Rs. Lakhs	Approx. investment (Rs.lakhs)	Project Commencement & Completion year
Increase diameter of CW Pumps by corocoating	14.75	16.80	Mar-08
Installation of VFD for CEP in Unit # I	44.15	65.00	Mar-07
Installation of VFD for PA fans in Unit # II	176.40	300.00	Installation completed, Trial in progress
Reduce cable loss in CMA-1 & 2 Feeders	0.36	0.25	Mar-08
Replace the existing street lights with solar lights	0.5	5.00	Procurement in Progress
Replace the existing ECW pumps with new correct size pumps	73.75	90.00	Mar-08
Utilize ECW for air condition unit condenser water requirement	6.31	2.00	Mar-08
Install VFD for chilled water pumps	1.31	2.00	Mar-08
Install vapor absorption machine for air conditioning unit	11.90	45.00	Mar-08
Utilize cold reheat steam for auxiliary steam requirement	37.50	0.00	Mar-08
Install VFD for raw water pump house	0.86	1.00	Mar-08
Install high efficiency separators for the coal mill	154.98	450.00	Mar-08
Install VFD for FD fans for Unit # I	88.20	100.80	Mar-08
Install intermediate controller in compressed air system/ Stopping of 3rd running Compressor(6-Sigma project)	15.75	15.00	Trial In progress

4.0 Sustenance of Energy Conservation

4.1 Six Sigma Initiatives (Quality Improvement)

To provide economical and reliable power to customer and to ensure that the efforts made for energy conservation are irreversible six sigma quality improvements initiatives taken at DTSP. Under these initiatives *106 employees given Green belt training and 11 had given Black belt training*. Total 23 numbers of pain identified keeping customers perspectives in the process and six sigma DMAIC (Define - Measure – Analyze - Improve – Control) approach is

used. During the year 2006-07 09 projects has been successfully implemented The counteractions for the root causes are implemented through structured formats at DTSPS through Quality Improvement Plans & Environment Management Program & Total expenditure is 200 lakhs and cost benefit is 500 lakhs

14 projects are in Control Phase and will be completed by dec-2007

4.2 Quality Improvement Plan (QIP)

During financial year 2006-07 total 79 numbers of Quality improvement plans identified under different category like technology improvement, reliability improvement, automation, preserving natural resources & Energy conservation

Total expenditure : 422.22 lakhs

Cost benefit : 1198.50 lakhs

4.3 Environment Management Program (EMP)

As part of continual improvement in Environmental management, Environmental Management Programmes (EMPs) were implemented.

Most significant EMPs are

1. Rain Water Harvesting
2. Recycle of process water

Total Number of EMP Implemented : 07

Total Expenditure : 5.25 lakhs

4.4 Training to Employees for technology update, personal development, knowledge improvement and on Energy Conservation and sustenance

Total No of employees' undergone training programme	In house Training – 400 External - 57
Training Man hours / Employee	49.03 hrs/Employee
Total Expenditure	26.91lakhs

5.0 Environment & Safety:

5.1 Environmental performance:

DTSPS has also substantially improved its environmental performance as well and today it is recognized as one of the best environmentally performing plant in the country.

Waste Ash disposal

Dry Fly Ash Evacuation System has been installed and commissioned with investment of Rs. 82 million using Strutvent, USA Classifier technology in tear 2005-06

In this financial year the ash utilization has been improved from 43% to 51.73% of ash generated. The DTSPS team is working to utilize 100% ash generated in the subsequent years.

Waste ash disposed is reduced by 59225 MT/year in financial year 2006-07

Air Emissions

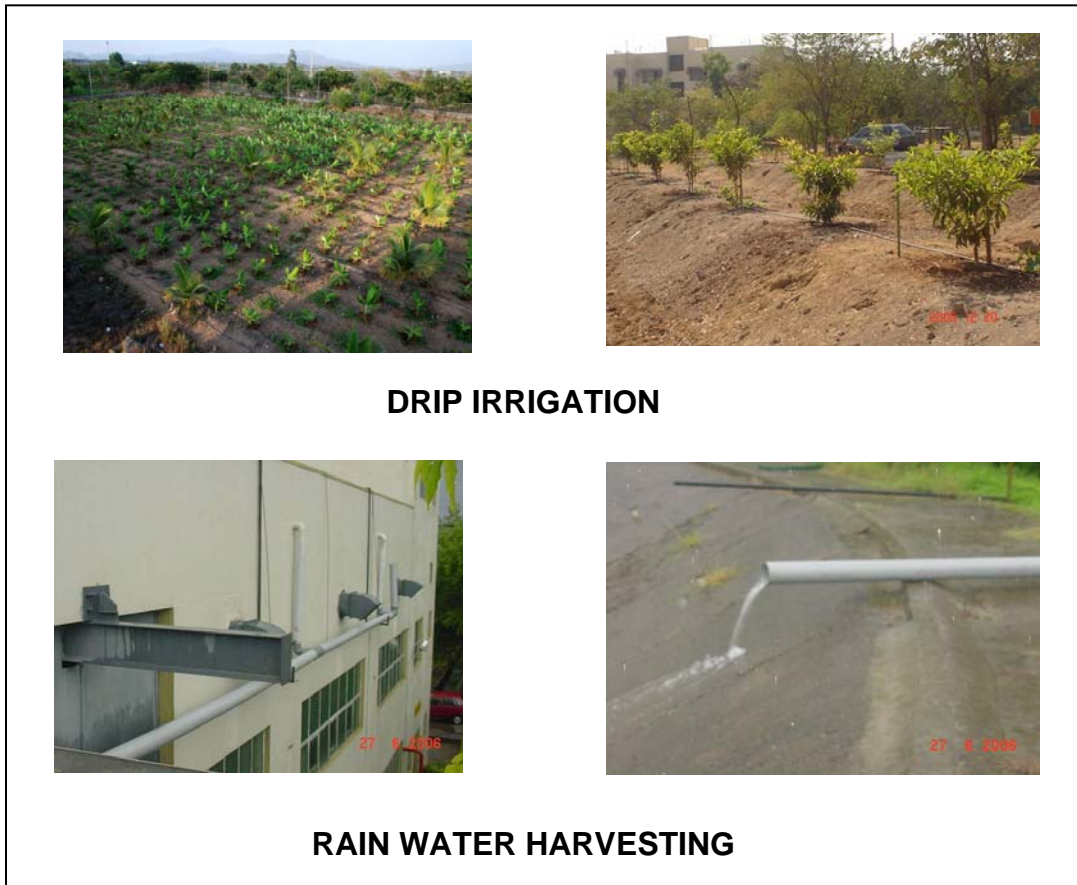
Emissions such as NOx, SOx and total particulate matter are much below the MPCB limits

	MPCB Limits	Target	Actual in 2006-07
NOx (ppm) at 15% excess air	150	150	76.3
Sox (T/day)	80.4	66	54.3
TPM (mg/Nm ³)	150	50	39.8
Coal (MT/day)	8040	-	6548.75

Ammonia dosing is done in ESP to reduce TPM from flue gas and Flue Gas Desulphurisation plant commissioning work is in progress to reduce SOx in flue gas to 6T/day with investment of Rs 240 Crores

Water Conservation and Green Belt Development

Water consumption and effluent generated is within limits set by MPCB (Consent is attached in Annexure J). EMP are identified and implemented to conserve water and for green belt development with Drip Irrigation with expenditure of Rs 61 lakhs. Water conservation done with rain water harvesting of the plant buildings. Two buildings covered in this financial year.



5.2 Health and Safety performance:

DTPS is the first utility in power sector to be certified ISO 14001 for its Environment Management System. The plant is also accredited with OHSAS - 18001 certification for its Occupational Health and Safety management

DTPS is accident free form 1133 days from 03-11-2003

Year	Accident	Man hours Working
2004	NIL	3118964
2005	NIL	2962592
2006	NIL	3297308

6.0 AWARDS AND RECOGNITIONS:

In the last 12 years of operation DTPS has won many Awards and has been recognized at various forums for its sustained and excellent performance in plant operation-maintenance, environment and OHS management. Apart from this DTPS employee has won many individual reorganization from BEE in development of website and delivering case studies in 3L programme

Details are attached in Annexure - H

Excellence in Energy & Performance Management

Year	Name of Award	Awarding Agency
2007	Infraline Energy Excellence Award 2007	Government of India
2007	International Diamond Globe for Quality award-2007	International star for Leadership, Moscow
2007	International Quality Crown-2006 Award in Gold Category	Business Initiative Directions BID, London UK
2007	Silver shield For Meritorious Performance For the year 2005-06	CEA, GOI
2006	"CII National Award for Excellence in Energy Management" for 2006.	Confederation of Indian Industries (CII)
2006	First Prize – National Award for Meritorious Performance by Central Electricity Authority (CEA), Govt. of India for its Excellent PERFORMANCE amongst Indian Thermal Power Plants in the year 2004-05.	Central Electricity Authority (CEA)
2006	Maharastra Energy Development Agency (MEDA) Award for Excellence in Energy Conservation & Management in Thermal Power Station sector for the year 2005.	Maharastra Energy Development Agency (MEDA)
2006	"Vishwakarma Rashtriya Purasakar – 2005" (Four Employees).	Ministry of Labour and Employment. (Govt. Of India)

2005	“CII National Award for excellence in Water Management” for 2005.	Confederation of Indian Industries (CII)
2005	“CII National Award for Excellence in Energy Management” for 2005.	Confederation of Indian Industries (CII)
2005	“Vishwakarma Rashtriya Purasakar – 2004” (Eight Employees).	Ministry of Labour and Employment. (Govt. Of India)
2004	Top Plant of World-2004	Platts Power Magazine
2004	QIMPRO Benchmark 2004 in the “ Service Category ” on the basis of its performance in 15 parameters including attributes such as Leadership, Strategic planning, Communication, Quality Management System, and Customer Interaction Management, among others	QIMPRO Foundation

Safety Awards

Year	Name of Award	Awarding Agency
2007	Greentech Safety Award - 2006	Greentech Foundation, New Delhi
2006	NSC -Maharashtra Chapter-- Safety Awards-2005 for “Lowest Accident Frequency Rate During the year 2005”	“National Safety Council-Maharashtra Chapter” by Maharashtra State Chapter.
2005	National Safety Council-Maharashtra Chapter-2004 <ul style="list-style-type: none"> ◆ Lowest accident frequency. ● Longest Accident free period. 	“National Safety Council-Maharashtra Chapter” by Maharashtra State Chapter.
2004	National Safety Council-Maharashtra Chapter-2003.	“National Safety Council-Maharashtra Chapter” by Maharashtra State Chapter.
2004	National Safety Award-2003.	Ministry of Labour, Govt. of India.
2004	Four Stars Ranking - for Occupational Health and Safety Management System.	British Safety Council, UK

Environmental Awards

Year	Name of Award	Awarding Agency
2007	G3-Award (Good Green Governance)-2006	Shrishti Publications Pvt Ltd
2006	CII-National Award for excellence in Water Mgt (beyond fence)	CII
2006	CII-National Award for excellence in Water Mgt (within fence)	CII
2006	FICCI Award 2005-06 for Environmental Conservation & Pollution Control	FICCI

2006	“Greentech Environmental Excellence Award” for 2006	Greentech Foundation, New Delhi
2005	“Greentech Environmental Excellence Award” for 2004-2005.	Greentech Foundation, New Delhi

7.0 THE JOURNEY TOWARDS EXCELLENCE:

The plant has many success stories to share. A dedicated team of employee is working behind the scene untiringly to make this power plant a **‘Show Piece’ in the state, in the country and in the world.** Today all other utilities in the country are benchmarking DTPS and trying to emulate its performance. Together, the Indian power sector is moving ahead fast and greater challenges are lying ahead. Sustaining performance at highest level is the key issue and for Reliance Energy it is our journey towards excellence.

By participating in NATIONAL LEVEL ENERGY CONSERVATION AWARD – 2007 organized by BEE we can share our practices in the field of Energy Efficiency in the Industry. At the same time any recognition from esteemed NATIONAL level nodal agency like BEE shall go a long way in motivating the organization to perform better and bring laurel to the organization and to the country.

Apart from the sustainable growth and improvement in Quality, Environment and Safety, REL-DTPS has undertaken Community Welfare activities as a part of Corporate Social Responsibility. In 2006-07 DTPS has done the activities as mention below

Sr. No.	Activities	Expenditure
01	DTPS Best Teacher award & DTPS Merit scholarship	89800.00
02	Drinking water facility for Devotees of Mahalaxami Temple	38000.00
03	Assistance for construction of community toilets in village area	18000.00
04	CSR advertisement in local news paper to call nominations for	15000.00
05	Donation for distribution of subsidized Note books	65000.00
06	Advertisement for DTPS Best Teachers Award 2006	18000.00
07	Construction of Vanrai Bandhara in 2 villages	
08	Ash bricks for construction of community toilets & school toilets	15000.00
09	17Donation of Computer Lab to Gram bal Shiksha Kendra	264200.00
10	Presentation of Teachers Award & Merit Scholarship for Medical & Engineering students	14200.00
11	Drinking water facility for Devotees of Mahalaxami Temple	30000.00

Vanrai Bhandara

Location	Length (meters)	Width (meters)	Depth (meters)	Storage Capacity m ³	Expenditure in Rupees
Ritali-Chari	180	17	2.2	6732	6,97,000.00
Vadade	310	22	1.46	9957	8,00,000.00



Ritali-Chari



Vadade