



UNIT PROFILE

Patalganga (PG) division of Reliance Industries Limited is a leading manufacturer of petrochemicals and fiber intermediates. It is located on the banks of river Patalganga. The location of the complex has well-connectivity in terms of modes of transport i.e. by road (7 kms off the Mumbai-Pune highway), by sea (Near JNPT) and air (78 kms from Mumbai Airport).

This complex was conceived in 1980. Spreading over 200 acres, it forms half the entire industrial area of Patalganga. Various products manufactured at RIL-PG include PTA, PFY, PSF and LAB. The company exports large quantities of polyester fiber even to developed countries.

The technologies for all the plants are provided by World's leading technology providers such as DuPont and UOP. The plants are efficient in specific consumptions and energy utilisation right from design stage.

The complex is self sufficient in terms of power and all other utilities. Patalganga complex has the following utilities section :

1. Two No of Gas Turbines with HRSG (Heat Recovery Steam Generator)
2. One Steam Turbo Generator.
3. Three No of Auxiliary Boilers
4. Three No of Dow Heaters
5. Compressed Air System.
6. DM Water, Cooling water and Chilled Water System.
7. Integrated Effluent Treatment Plant with Effluent Recycle Unit.

Central library and Learning centre at the site helps the employees to be well informed about the latest developments and enhancement of knowledge and skills. Other facilities at the site include well-equipped and well organised Fire and Safety departments, Information Technology department, an advanced telecommunication and full fledged medical facilities.

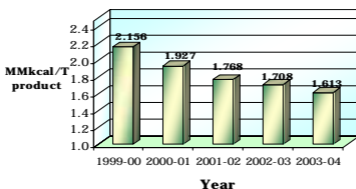
We are ISO-9001:2000 and ISO-14001 certified.

ENERGY CONSUMPTION

The energy consumption at RIL Patalganga is monitored on regular basis and optimisation of consumption is an ongoing activity. The annual electrical and fuel energy consumption at Patalganga complex as given below shows a steadily decreasing trend owing to the efforts put in for energy conservation.

Year	Electrical energy consumed (In lakh kWh)	Thermal energy (In Mkal)	KWh/T product	Mkal/T product	Overall energy consumed Mkal/T of product	% Manufacturing Cost
2001-02	4445	648072	762.6	1.112	1.768	9.8
2002-03	4600	676018	733.1	1.077	1.708	10.5
2003-04	4616	608085	740.9	0.976	1.614	11.7

OVERALL ENERGY CONSUMED - ELECTRICITY & THERMAL (MMkcal/T)



ENERGY CONSERVATION COMMITMENT, POLICY & SETUP

RIL, PG is committed to Energy conservation at both design and operating stages. The plants at PG are installed with technical collaboration with world's most competitive technology providers. Energy conservation by heat integration and superior equipments design is achieved right at the stage of designing of these plants. Still we are always conscious about energy consumptions and at every stage of operation and implementation of any new projects, energy conservation is given the top most priority



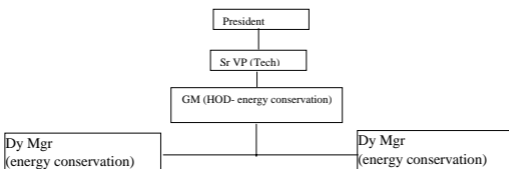
The "Employee Suggestion Scheme" allows every employee to come forward with a suggestion for improvement and this scheme is in place in a structured manner. Any employee can also raise a Management of Change (MPC) proposal for detail techno-economic evaluation through a well defined route.

Systematic energy audit of the plants is the key to continuous optimisation of process parameters. The technique of heat integration through **PINCH** analysis is adopted at Paraxylene and LAB plants and further development in the other areas are also being adopted. **L2- L3 studies** are carried out every year on various topics, in which actuals are compared with the design values. The gap analysis is done and remedies are suggested. The problem solving is through **Six Sigma -- DMAIC** technique. At Patalganga systematic implementation of Six sigma-DMAIC technique is considered as a "problem solving tools" to improve productivity. State of art monitoring systems based on latest technologies such as Aspen IP-21 and online power system monitoring have been in service.

Our energy conservation policy defines our mission to be the lowest specific energy consumer in the industry we operate, to become globally competitive and to maximise use of renewable and low energy fuels. The policy is given on next page.

The motto for energy conservation at RIL, Patalganga is "Energy saved is energy available to much needed".

The set-up for energy conservation and management consists of core team for energy conservation as follows. Also there are energy coordinators from plants and central engineering centre who work in close coordination with core team.



iv) ENERGY CONSERVATION ACHIEVEMENT :

Major Energy conservation projects/schemes are given below:

1. HEAT INTEGRATION THROUGH PINCH TECHNOLOGY IN LAB PLANT :

In-house heat integration analysis through Pinch technology was carried out and suggestions of the study were implemented in LAB plant. The implementation included installation of vessels and heat exchangers. The project resulted into saving of fuel owing to reduced fired heaters duties.

LAB process has two sections, i.e. NP Plant and LAB plant. This project integrates both the sections by exchanging heat in one section with another section. The total capex involved is Rs 166 lakhs and the benefit realized is Rs 319 lakhs per annum based on reduction in fuel oil consumption.

2. HEAT INTEGRATION BY PINCH TECHNOLOGY IN PARAXYLENE PLANT :

Similar study was completed for Paraxylene plant and the implementation of suggestions in terms of new heat exchangers installation, resulted into direct fuel saving. This is the second phase of Heat Integration Project in PX plant- especially in Platformer, Tatory and NHT Sections.

The total capex involved is Rs 77 lakhs and the benefit realized is Rs 153.7 lakhs per annum based on reduction in fuel oil consumption.

3. DISTILLATION COLUMNS OPTIMISATION IN PX PLANT :

Performance of distillation columns was studied for optimization from the point of view of energy consumption. Each column was then simulated to match the required products specifications and was studied for reflux optimization, reboiler fouling identification, optimisation number of running fin-fans etc.

Out of fourteen distillation columns, six were found to be operating at optimum performance. Reflux flow is more than required in three columns while reflux temperature can be optimized in one column. Fouling in reboilers is observed in four columns which is resulting into higher steam consumption. The fine tuning of the distillation column resulted in annual savings of Rs 109.9 lakhs.

4. USAGE OF EXTRACTION STEAM IN PX PLANT:

The supply of MP steam in PX plant was earlier through a PRDS. Modifications carried out in the plant to utilise the extraction steam as a MP steam. The fine tuning of the distillation column resulted in annual savings of Rs 77.3 lakhs.

5. NEW CONTROL SYSTEM FOR TWO PACs AT PTA :

There are two process air compressors (PACs) at PTA plant to supply air to oxidation reactor. One of the PACs is motor-driven while the other one is steam-driven. Earlier, the two compressors were controlled independently. With new compressor control system, simultaneous control of both compressors is possible to optimize on steam and power consumption. Also the accurate header pressure control is possible, reducing the fluctuations.

A benefit of Rs 75.5 lakhs were realized due to reduced steam (and hence fuel oil) consumption in the drive. The investment is of Rs 64 lakhs

6. INTEGRATION OF OLD AND NEW CHILLED WATER SYSTEMS :

The complex had a two separate chilled water system, one was being added up to another during capacity expansions. Integration of the system is done and both the system is interconnected. This results in power saving due to single pump operation. Earlier both the system has different pumps to cater the system loads.

The total benefit of integrating the two system is of Rs 67 lakhs (Phase II and Phase I respectively). The total investment is of Rs 6.75 lakhs

Energy consumption measures planned for the future, investment planned and expected savings

Energy Conservation Measures (Planned)	Anticipated savings in		Approx. investment (Rs lakh)	Project commencement &
	Energy value (MMkcal/yr)	Rs lakhs		
Waste heat recovery from HRSG flue gases.	40500	378	750	2005-06
Burning biogas in process heaters	8640	90.0	121.0	2004-05
Suction air chilling for process air compressor in PTA	6375	48	65	2005-06
Generation of flash steam from process condensate in PTA	3422	26	47	2004-05
Replacement of screw pump by gear pump at PSF CP-4	2306	25.0	140	2004-05
Inverter driven fans for process cooling tower in PSF	111	1.2	2	2004-05
Replacement of finisher agitator motor by inverter driven motor	1850	20	32	2004-05
Replacement of tension stand on Lummus cutters	810	8.8	0	2004-05
Lower capacity pump for STG condensate	486	6	1	2004-05
Separate lighting transformers in PX	378	3.5	2	2004-05
CP-IV/V virgin EG header integration	365	3.8	0	2004-05
Total	65241	610	1160	

(vi) Environment and Safety

At Reliance, protection of environment is of prime concern and an important business objective. As per our Environment policy, we are committed to comply with relevant laws and regulations as well as to take any additional measures considered necessary. We emphasise every employee's responsibility in environment performance, and ensure appropriate operating practices and training.

Our safety policy says :

"Safety of person overrides all the production targets".

The plants are properly designed with relevant codes to ensure equipment as well as personnel safety. The operating procedures and practices are developed for safe working condition and meeting all statutory requirements. The unit is also have a Effluent Recycle Unit to maintain minimum effluent generation. By principle, we have adopted a methodology to tackle effluent at source itself.

We promote awareness among contractors, suppliers and customers also for shared responsibility towards environment protection and safe work practices.

The unit is already obtained ISO-14000 certification and working towards OSHA certification by December '2004.



Energy Conservation Projects Taken Up in 2003-04

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7. OPTIMISATION OF MP STEAM TEMPERATURE OF RP UTILITIES:

MP steam is generated as extraction from Steam Turbo Generator. Part of steam is used in SDY plant where the process demands higher temperature than rest of users. For this small consumption in SDY plant the whole MP steam header needed to be maintained at higher temperature by reducing the desuperheating spray flow. In efforts of process optimisation, the thorough study of demand of each user was carried out.

Separate electrical heaters were installed at SDY for steam superheating. The temperature of MP steam header was then reduced by almost 30°C resulting in addition of more spray and reduction in main steam consumption. The cost of the modification is Rs 10 lakhs and the benefit realized is Rs 57.4 lakhs per annum.

8. PROVIDING INVERTOR DRIVEN BACK-UP CHILLED WATER PUMP:

The modifications is based on base load is being catered by a bigger pump and a smaller pump with variable speed drive taken care of the fluctuations in the system due to either system requirement or due to climatic conditions.

A benefit of Rs 35.1 lakhs were realized due to power saving against the investment of Rs 1.88 lakhs.



9. INSTRUMENT AIR SYSTEM PRESSURE DROP REDUCTION:

To reduce system pressure drop, the line size has been changed from 4" to 6" in the off-site (Energy Center) plant. A benefit of Rs 21.4 lakhs were realized due to reduction in power consumption of the drive against an investment of Rs 8 lakhs.

10. INTEGRATION & REROUTING OLD CHILLED WATER SYSTEM (PHASE I):

This scheme is splitted into two parts - firstly, the cold chilled water at the outlet of chiller is connected directly to transfer pump suction and secondly, installation of expansion tanks in PFY and PSF terraces. Total savings is Rs 21.7 lakhs per annum and investment is of Rs 15.0 lakhs.

11. PROVIDING INVEROR IN SERVICE WATER PUMP B MOTOR:

VFD was installed to bigger pumps to control discharge header pressure. Apart from power savings it has also resulted in saving of water consumption. Total benefit is Rs 11.9 lakhs against an investment of Rs 4.0 lakhs.

12. INSTALLATION OF VFD ON FD FAN OF CP1 DOW HEATERS 1:

VFD was installed to minimise excess air in the Dow heater. This is a substitution to the inefficient dampner control. The oxygen at stack is reduced to 2.5% from 11.5% and savings in terms of fuel and power has been achieved. Total benefit is Rs 7.0 lakhs against an investment of Rs 4.0 lakhs.

13. REPLACEMENT OF MPP I JET CW PUMP WITH LOWER CAPACITY PUMP:

Installed jet cooling tower circulation pump was oversized and pump was changed to a smaller one. Total benefit is Rs 6.4 lakhs against an investment of Rs 5.0 lakhs.

14. COOLING WATER RETURN HEADER INTEGRATION FOR DGS:

The cooling water returns from the DG sets are diverting at different locations of the cooling tower cells. This results in non uniformity of cooling tower load. To overcome this problem, the return from DG set 1 and 2 were diverted along with other three DG sets return lines. This results in stopping one fan in cooling tower. A benefit of Rs 4 lakhs were realized against an investment of Rs 25,000 only.

15. REDUCE EG RECOVERY LOAD BY AVOIDING PROCESSING EG SAMPLES:

Earlier Ethylene Glycol samples are collected in drums and then recovered by batch distillation. A scheme was devised to collect the sample and back into the process unit. A benefit of Rs 4 lakhs were realized against an investment of Rs 25,000 only.