

RELIANCE INDUSTRIES LIMITED

(VADODARA MFG. DIVISION)

Company Profile

Reliance Industries Limited (RIL) is world's leading and India's no: 1 Private Ltd. Company. RIL group is a highly diversified group and is in to multiproduct business like oil / gas exploration, retail of petro / consumer products and mfg. of petrochemical / refining and textile products. Also, in to infrastructure and transportation sectors.

RIL, Vadodara Mfg. Div. was earlier part of the Indian Petrochemicals Corporation Ltd. (IPCL) with Management control by Govt. of India. In 2002, due to divestment of the equity, the management control went in the hands of Reliance Petroinvest Co. of RIL group. On 5th Sept., 2007, IPCL got merged with RIL.

RIL, Vadodara Mfg. Div. multi-product mfg. portfolio includes Polymers, Synthetic Rubber, Synthetic Fibre & Fibre Intermediates, Solvents and Industrial Chemicals. It has several distinctions to its credit. Accredited earlier for Best performance award among petrochemicals companies worldwide (CI London), FICCI Awards, ICMA Awards, National Energy Awards and several awards from National Safety Council, USA and British Safety Council, UK. Infact it has Integrated Management System in place comprising of ISO-9001, ISO-14001 and OSHAS-18001 Certification for all the plants and depts. of the Site.

ENERGY MANAGEMENT POLICY

The mission of RIL is :

- **To be the lowest specific energy consumer in our industry.**
- **To widen the options for energy source and**
- **To minimize the adverse impact of our operations on the environment.**

We plan to achieve the above within the framework of sustaining the business by:

- **Integrating energy management with the business management and establishing performance drive goals.**
- **Upgrading hardware, deploying new technologies and improving our practices to increase energy efficiency, reduce greenhouse gas emissions and minimize environmental impacts.**
- **Supporting scientific research and technological efforts to deliver new sources of energy including renewable and alternate fuels.**
- **Carrying out regular audits and training employees to promote energy conservation as a culture across the entire business functions.**
- **Continuously benchmarking our energy efficiency and energy productivity against others.**
- **Promoting awareness on energy conservation among all members of the RIL family and the community at large.**

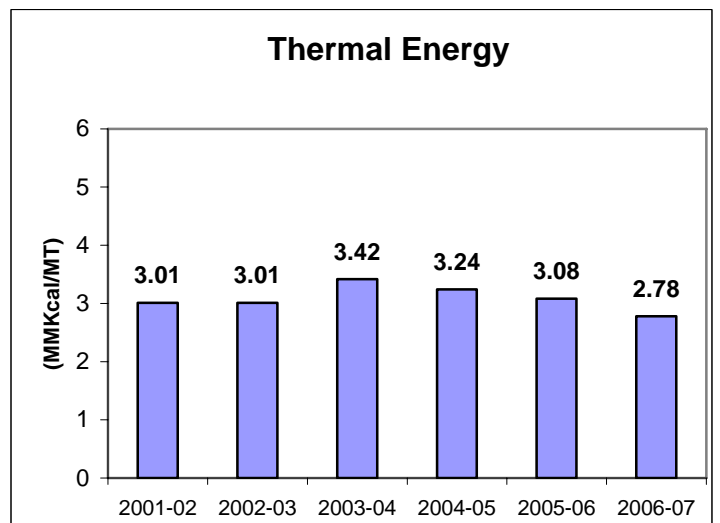
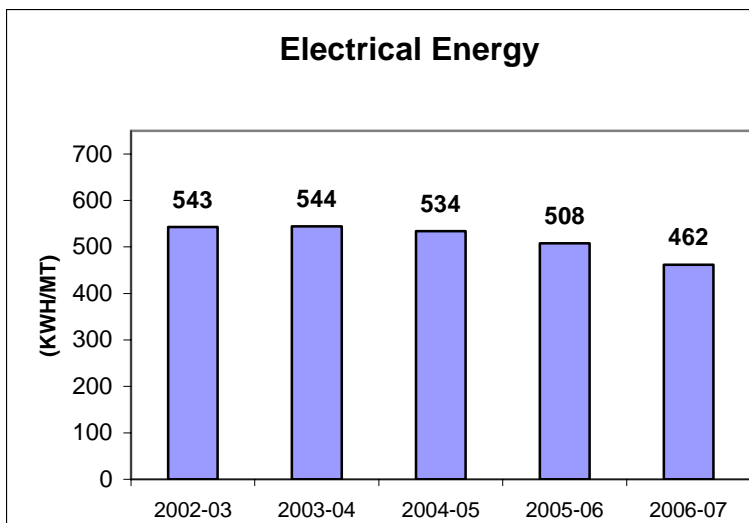
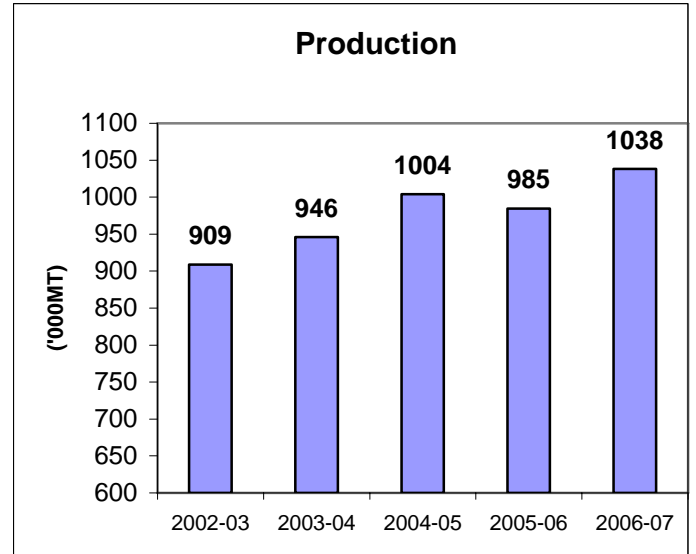
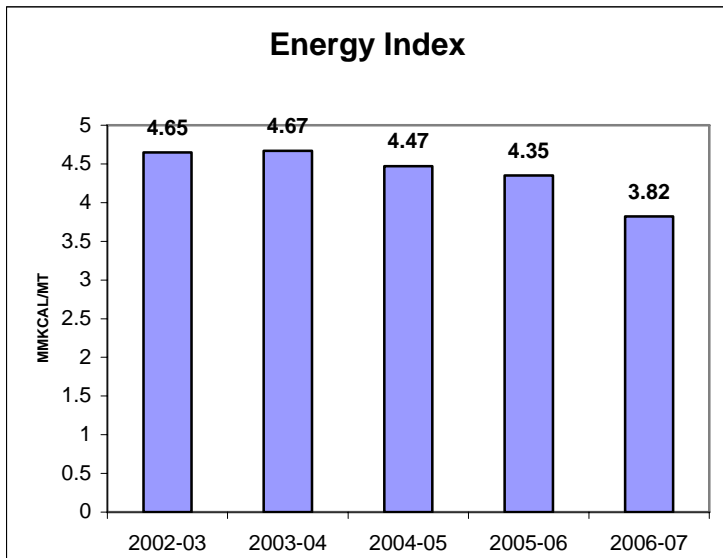
Energy Consumption

Baroda Complex energy consumption rate is around 45 MT of fuel oil equivalent i.e. 450 Million KCal per hour. 65 % of total energy consumed is purchased energy and balance 35 % energy is met through fuel gas, CBFS and Mixed oil generated in the process internally and through various waste heat recovery and energy saving schemes implemented.

Specific Consumption Details :

Parameter	Unit	2004-05	2005-06	2006-07
Annual Production	MT	1004059	984656	1037979
Overall Specific Energy Consumption	MMKcal/MT	4.47	4.35	3.82
Thermal Energy	MMKcal/MT	3.24	3.08	2.78
Electrical Energy	KWH / MT	524	508	462
Energy Cost as % of Mfg. Cost	%	13.84	12.45	11.20

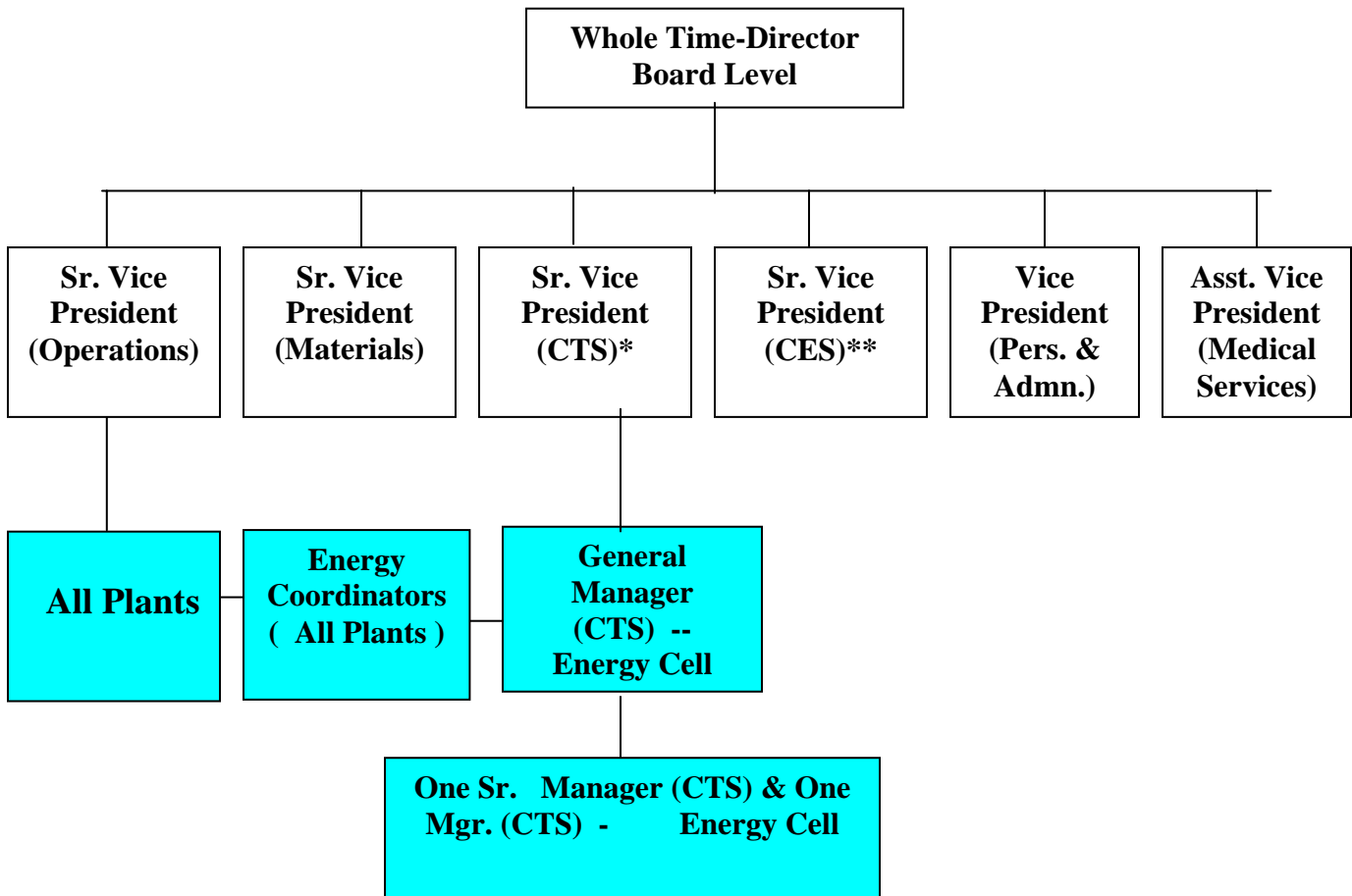
Graphical Representation of Specific Energy Consumption



Energy Conservation Commitment, Policy and Setup

Energy Conservation Cell set up at RIL, Vadodara Mfg. Div. was initiated quite early after commissioning and stabilisation of the Cracker and few downstream plants way back in 1982. Since, then the Cell has been playing a very vital role for the organization. The Cell is headed by General Mgr. (Central Technical Services) and assisted by a team comprising of full time a Sr. Mgr. & a Mgr. (Central Technical Services) for carrying out various activities of the Cell. The group works in tandem with all the nominated Energy Coordinators (19 nos.) for each and every plant for Monitoring, Motivating and Implementation of the various schemes in the Complex. It is Committed to saving Energy every year to the tune of minimum 2% every year through de-bottlenecking, technology upgradation, detailed audit studies by Experts / in-house, Optimising of Energy inputs by consuming plants / Utilities Generators and good upkeep through better and proactive Maintenance practices. The Organogram of our Complex w.r.t Energy Conservation Cell is as under :

ORGANISATION STRUCTURE **(w.r.t Energy Management)**



- * Central Technical Services
- ** Central Engineering Services

Energy Conservation Achievements

RIL, Vadodara Mfg. Div. has implemented various schemes big and small, some of them quite innovative and thereby had been successful every year in reducing the Specific Energy Consumption. The year 2006-07 had been quite successful on Energy front. Revenue Saving due to various measures carried out during the year is Rs. 3200 Lakhs. Major Energy Conservation Projects implemented during the 2006-07 are as under :

i. SRT Heater Efficiency Improvement

SRT Heater Efficiency improvement through additional convection bank and installation of WHRB. Heat recovery of 9.0 MMKCAL/hr and efficiency improvement of 9%

Total Annual savings : 1181 Rs. Lakhs
Total investment : 800 Rs. Lakhs
Payback period : 9 months



ii. Trimming of Oxygen in Superheater

Cracker Plant – In Superheater H – 107, trimming of oxygen done. Thermal efficiency improved from 84 to 86.6%

Total Annual savings : Rs. 38 Lakhs

Total investment : NIL, rigorous monitoring, follow – up & proper sealing of convection bank doors.

Payback period : Immediate



iii. External Cleaning of SRT Heaters

External cleaning of SRT heaters: H – 102 & H – 104 of convection bank resulted in reduction of stack temperature by more than 30 Deg C.

Total Annual savings : Rs. 38.0 Lakhs

Total investment : Rs. 2.0 Lakhs.

Payback period : 1 month



iv. Diversion of waste gases to fuel gas system

In FPU plant, waste gases from column C-702, diverted to fuel gas system instead of flaring.
The quantity of waste gas diverted is 20 kg/hr.

Total Annual savings : Rs. 25.0 Lakhs.
Total investment : Internal Pipings &
Instrumentations used
Payback period : Immediate



v. Re-engineering of steam and condensate system

Re-engineering of steam and condensate system of PPCP, with improved condensate recovery and steam saving. Also, installation of new De-superheater system.

Total Annual savings : Rs. 66.00 Lakhs
Total investment : Rs. 14.0 Lakhs
Payback period : 2.4 months



vi. Detailed CW Network study

Detailed CW network study of the whole Integrated Utility plant by an expert resulted in stoppage of 1 CWRP.

Total Annual savings : Rs. 144.00 Lakhs
Total investment : Rs. 6.0 Lakhs
Payback period : 1.0 month



vii. Saving of Atomising Steam by using plant air

Use of plant air in place of atomizing steam in Boilers in view of gas firing

Total Annual savings : Rs. 66.0 Lakhs
Total investment : Change in Operation methodology
Payback period : Immediate



Boilers of Utilities

viii. Detailed Steam trap audit

Detailed steam trap audit by an Expert for the whole of Vadodara Mfg. Site.

Total Annual savings : Rs. 141.0 Lakhs
Total investment : Rs. 25.0 Lakhs
Payback period : 1.0 Month



Other schemes of 2006-07 are

- ix. Installation of VFD in LAB plant for fin fan cooler.
- x. Stoppage of Service water pump for ACN plant CT make up through hook-up with another pump.
- xi. Major overhaul of Mitsubishi air compressor resulting in improved heat transfer of exchangers and improved efficiency.
- xii. Condensate recovery from PBR –I plant drying unit resulting in reduction of DM water usage.
- xiii. Installation of high lumen tubelights and louvertec reflectors for Engineering Services & Training centre Buildings.
- xiv. Trimming of excess O2 in VCM EDC heater and Auxiliary Boilers.

Energy Conservation Planned and Target**Planned Specific Energy Consumption Target for the year 2007-08 & 2008-09**

Year	Electrical kWh/MT	Thermal MMKCAL/MT	Reduction over the year 2006-07	
			Electrical %	Thermal %
2006-07 (Base Year)	462	2.78	---	---
2007-08	453	2.72	+2.0	+2.0
2008-09	444	2.67	+2.0	+2.0

The company has set quantitative objectives of minimum 2.0% overall reduction in energy usage every year. Major future plans for energy conservation are as under :

- a) Steam saving in Naphtha Cracker plant due to Heat Integration measures based on Pinch Analysis Study. Estimated Annual saving of Rs. 75.0 Lakhs.
- b) Optimisation of steam cons. by the Steam Turbines of the Complex thru' rise in temp. and pressure of the header based on Pinch Analysis Study. Estimated Annual saving of more than Rs. 29 Lakhs.

- c) Preheating of fuel gas for Gas Turbine generator based on Pinch Analysis Study. Estimated Annual saving of more than Rs. 35 Lakhs.
- d) Installation of Energy Conservation Turbine at Utility and Acrylonitrile plants for Steam letdown station. Estimated investment is Rs. 90 Lakhs & Rs. 120 Lakhs respectively. Power generation is 700KWH and 1200 KWH respectively. Payback period for both the schemes is less than a Year.

Environment and Safety

a) Environment Conservation

RIL, Vadodara Mfg. Div. has taken several environment friendly measures. Infact new plants / expansion have adopted are cleaner and with energy efficient technologies. Meets all CPCB & GPCB statutory regulations for air, water and soil. A multi-purpose incinerator for the disposal of hazardous solid waste is existing. Also existing is the secured landfill site for solid waste disposal. RIL, Vadodara have received several environment excellence awards like FICCI Award for environment preservation and pollution control and GreenTech awards for environment excellence. ISO 14001 Certification has been achieved for all the plants and depts.. of the Site w.e.f. May 2007.

b) Safety :

RIL, Vadodara Mfg. Div. gives utmost importance to Safety. Safety of human being is considered above all. Safety dept. is well organised, established and well planned for minimising losses caused by unexpected situations. Various safety practices / procedures / rules have been inbuilt in the Company ever since the inception. The Vadodara Site is recipient of no. of prestigious awards for the last three years are listed below:-

- i) Received Runners-up Trophy in "Good Housekeeping contest" conducted by Baroda Productivity Council (BPC) for 2004-05 for Gujarat State in Refinery & Petrochemicals category.
- ii) Certificate of Honour from Gujarat Safety council for achieving more than 3 Million Man Hours (MWH) Accident Free Spells.

RIL, Vadodara Mfg. Div. has assigned DuPont, USA for detailed safety audit of two important critical plants namely Acrylonitrile (ACN) and Liner Alkyl Benzene (LAB) plants wherein most dangerous polluting gas like hydrocyanic acid and hydrogen fluoride gases respectively are handled. Secondly, it has well established Process Safety Mgmt. group for improving in depth process related safety measures as per the norms of Dupont which has a reputation of high standard of Safety practices in the world.

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