

## Indian Petrochemicals Corporation Limited, Dist: Bharuch

### COMPANY PROFILE:

Indian Petrochemicals Corporation Limited with management control by Reliance Petroinvest Co. and one of the Navratnas established in 1969 by Govt. of India is leading entity in corporate circles of India. IPCL's mutiprodukt portfolio includes Polymers, Synthetic Rubber, Synthetic Fibre & Fibre Intermediates, Solvents, Industrial Chemicals, Synthetic Resins, Engineering Plastics, Catalysts, Absorbents, and Wire & Cable Compounds. IPCL have manufacturing facility at three locations, (a) Baroda in Gujarat, (b) Nagothane in Maharashtra, (C) Gandhar near Bharuch in Gujarat.

### GANDHAR COMPLEX:

Gandhar Complex is the youngest complex of IPCL (1996) spread over 800 hectares of land at estuary of Narmada. Have own captive jetty and well connected with GCPTCL and manufacturing facilities of ethylene, propylene, EO-EG, HDPE, PVC, VCM, Caustic & Chlorine. The complex houses the country only chlorine integrated PVC manufacturing facility backed by captive power plant and Gas Cracker unit. Power & Steam generation capacity is 154.5 MW & 540 MT/hr.

### Energy Management Policy

Mimimise use of energy and its purchased cost by continuous measuring and controlling the energy index and its cost

Promote energy awareness culture in the organization and imbibe habits of improved house keeping and waste elimination.

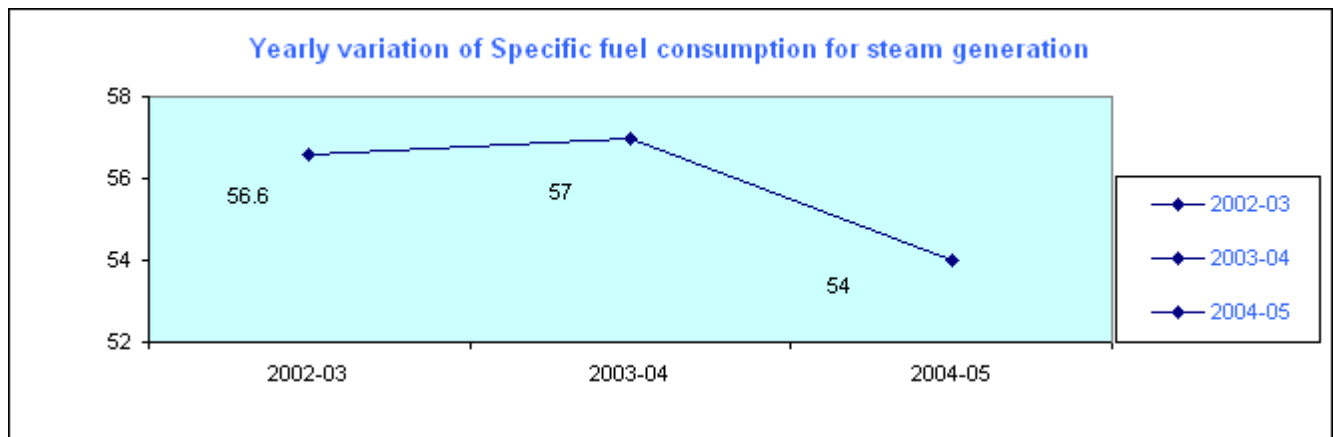
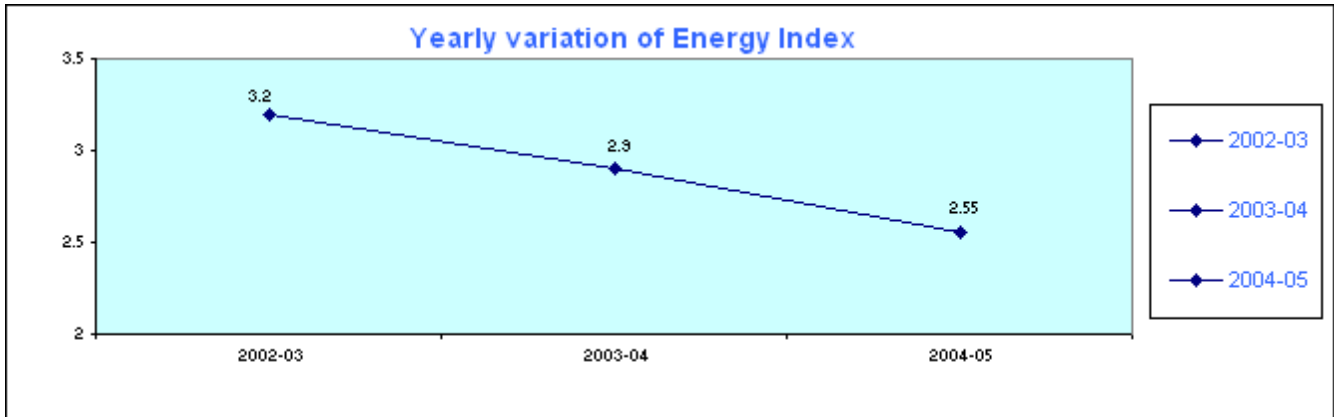
Carry out periodic energy audit and implement identified improvements.

Benchmark continuously our performance against the best in the industry.

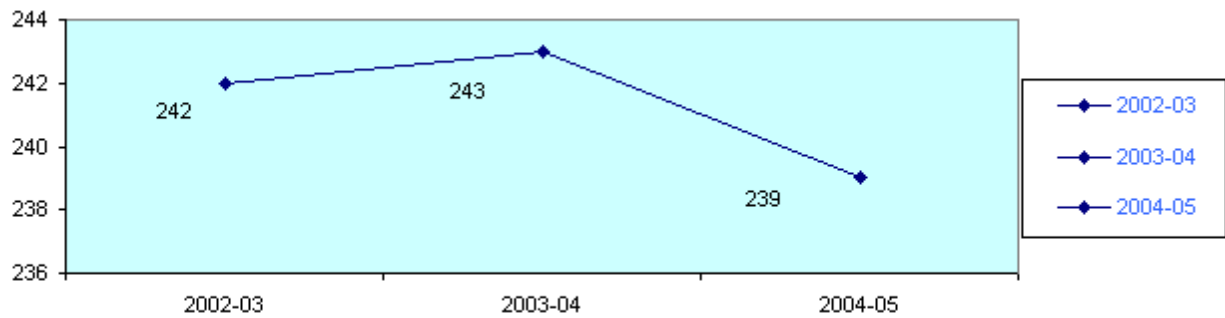
Make best endeavour for the development and use of renewable sources of energy.

### Energy Consumption

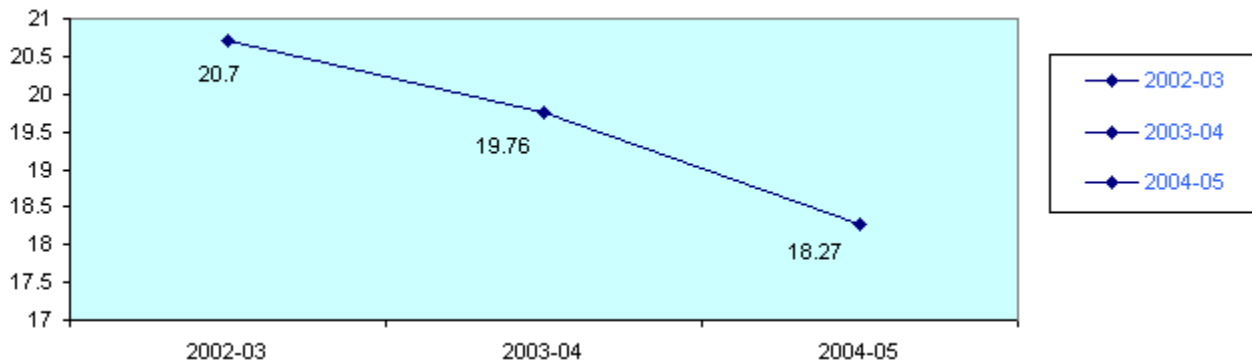
Following trends shows about energy consumption for the complex:



**Specific fuel consumption for power generation KG/ MWH**



**Yearly variation of % Energy cost of manufacturing cost.**



**All reducing trends reflect the story of energy conservation efforts taken up at IPCL-Gandhar complex.**

Few energy conservation schemes implemented in 2004-05 are listed below. Biggest achievement for the year 2004-05 is that our energy index reduced by 12% as compare to previous year.

**Utilization of excess CA hydrogen as a fuel in boilers to generate steam.** In chlor alkali

plant hydrogen at low pressure is produced as a by product. partially it is being used in CA plant furnace and rest is being vented. As this available hydrogen is at low pressure it cant be used in furnace, Two number of reciprocating compressors of 1500 nm<sup>3</sup> each with a discharge pressure of 4.5 kg/ cm<sup>2</sup>g is installed and this pressurised hydrogen is used as fuel in boilers for generating steam, burners are designed for 49-71 mole % hydrogen.

**Hydrogen saved : 2384 MT/ annum**

**Equal Naphtha Saved : 6566 MT/ annum**

**Total saving Rs lacs / annum : 1180**

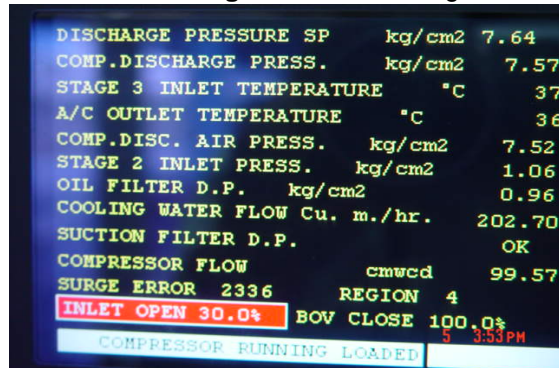
**Investment Made : 460**

**Payback period : 5 months**



**Reduction in air compressor discharge pressure from 8.2 –7.8 kg/cm2.** For catering demand of instrument air, plant air and process air two numbers of centrifugal air compressors are in operation with discharge pressure of 8.2 kg/cm2g. Meeting of all instrument manager done and decision is taken that at farthest point pressure should be 6.5 kg/cm2g. Gradually in steps pressure is reduced from 8.2- 8.1- 8.0- 7.9- 7.8 kg/cm2 g.

**Annual power saved : 9.6 lacs KWH**  
**Total saving Rs lacs / annum : 34.9**  
**Investment Made : Negligible**  
**payback period : Immediate**



**Operating philosophy of CPP-1 & CPP-2 Modified based on incremental fuel firing concept. & Optimization of excess O2 in flue gas of Utility boilers & HRSG's.** Operating philosophy of CPP-1 & CPP-2 Modified based on incremental fuel firing concept. We have two captive power plants CPP-1 & CPP-2 with following configuration **CPP-1** GT-1 (frame-6)(30.5 MW) **HRSG-1** (100 MT/hr) **UB-1&2** (100 MT/hr) **STG** (34.0 MW)

**CPP-2** GT-2&3 (45 MW each) **LM6000 HRSG 2 &3** (120MT/hr each)

To meet the power and steam requirement all four turbines and five steam generators are in operation, due to different type of turbine the open cycle heat rate of turbine are different hence flue gas temperatures are different. Temperature of flue gas for Frame-6 is 550 0c and 440 0c for LM –6000 machine. In HRSG 's specific fuel consumption for supplementary firing is always less than in Utility boilers. But if calculations are done for incremental fuel firing for incremental steam generation than increase in HRSG-02/03 fuel is higher than utility boilers. in case of total naphtha firing increase of load should be the following order. **HRSG-01** (100 MT/hr) -**HRSG-02&3** ( 75 MT/hr)-**UB-01/02**(Upto100 MT/hr) .

**Equivalent Naphtha saved/ annum : 7738 MT**  
**Total saving Rs lacs / annum : 1394**  
**Investment Made : Negligible**  
**payback period : Immediate**

**Segregation of high & low pressure air requirement users:** After reducing the pressure of air upto 7.8 kg/cm2 g thought of segregation of low and high pressure consumer comes into mind, after a lot of discussion decision had been taken to install a new air compressor for CA plant where the requirement of air pressure is only 3.5 kg/ cm2g. Now CA instrument air consumption is met by new compressor only at 3.5 kg/cm2g.

**Annual power saved : 16.8 lacs KWH**  
**Total saving Rs lacs / annum : 61**  
**Investment Made : 50**  
**payback period : 10 Months**



**Use of waste flash steam in HDPE plant VAR machine.** In HDPE plant flash steam is generated at atmospheric pressure, this very low pressure steam is tapped from atmospheric condensate tank and used in vapour absorption system and hence reduces the LP (4.0 kg/cm<sup>2</sup>g) steam consumption.



**Equivalent naphtha saved/ annum** : 178  
**MT**  
**Total saving Rs lacs / annum** : 32  
**Investment Made** : 3  
**payback period** : 1.2 Months

**Bypassing of raw water reservoir pump :** Complex raw water requirement is met by water supplied from angareshwar pump house, we are receiving this water in our reservoir at a pressure of 1.1-1.2 kg/cm<sup>2</sup>g from this reservoir it is pumped to stilling chamber for further treatment. in this scheme we had taken this water directly to stilling chamber which enables the stopping of raw water reservoir pump. In angareshwar pumps are running for 16 hrs/ day hence for 16 hrs raw water reservoir pumps is stopped.

**Annual power saved** : 6.57 lacs KWH  
**Total saving Rs lacs / annum** : 23.9  
**Investment Made** : Negligible  
**Payback period** : Immediate

**Excess Process steam from 5th effect evaporator is used in VAR machine in EO-EG Plant.**

During the engineering stage of expansion of EO-EG plant to 157% capacity it was noticed that excess process steam will be available (with 0.3 wt% MEG at a pressure of 1.2 kg/cm<sup>2</sup>g). Interaction with vapour absorption refrigeration unit vendor for MOC suitable for process steam.



**Equivalent naphtha saved/ annum** : 2420  
**MT**  
**Total saving Rs lacs / annum** : 436  
**Investment Made** : Negligible  
**Payback period** : Immediate

**Use of waste steam from CPP-2 to VAR of PVC plant :** In CPP-2 excess low pressure steam is being vented, water balance across the plant done and came to know that 13-15 T/ hr steam is being wasted in winter season, as in winter chilling requirement is low hence low steam consumption. To utilize this steam 2 number of 1000 TR each VAR is installed and hence VC machines is stopped.



**Equivalent naphtha saved/ annum** : 3578  
**MT**  
**Total saving Rs lacs / annum** : 767  
**Investment Made** : 971  
**Payback period** : 15

## Plans and targets

### Energy Conservation Measures (Planned)

| Energy Conservation Measures(Planned)                           | Expected Saving Rs lacs/ annum | Investment Rs lacs/ annum |
|---|--------------------------------|---------------------------|
| Utilization of Natural Gas in CPP-1                             | 10700                          | Negligible                |
| Modification to utilize Gas in LM 6K GTs and HRSGs in CPP-II.   | 18300                          | 4000                      |
| Low pressure cooling water pumps for PVC plant VAR.             | 41                             | 20                        |
| Thermal Insulation survey of entire complex                     | 25                             | 5                         |
| Compressed air system efficiency enhancement.                   | 95                             | Negligible                |
| Feasibility Study of Waste heat recovery from boiler blow down. | 37                             | 15                        |
| Training of non supervisor cadre on Energy Conservation         | culture building               | Negligible                |

### System we follow:

- We have evolved our own system of performance analysis of individual plant & complex.
- We compare with whatever best we ever achieved (Depsilon, Epsilon.)
- Internal Benchmarking among six sites. (RIL/ IPCL).
- We have FIR / FAR (First information / Failure Analysis report) system, which is very helpful to identify the cause & remedy of a problem if it occurred in past.
- To intensify the internal efforts for improving energy efficiency separate Energy Cell was created and it is operational since 2001 under the guidance of Sr. Vice President.
- E- learning, facility audits, VOC monitoring, Mutual aid, self development module, First aid training are some of the best practices among hundreds of Best Manufacturing practices we follow.
- Periodic energy consumption & Energy Index and cost monitoring.
- Explore energy savings through increased Internet & Intranet use.
- Periodic in house survey of steam trap & insulation checking and recording keeping.
- Periodic steam & compressed air leak survey.
- Reduction in lighting voltage and use of energy efficient CFL's.
- Power factor improvement
- Energy conservation Awareness programme (Poster, Slogan competition)
- Training on energy conservation at grass root level.
- Usage of gas instead of liquid fuels for environment concern and economics.

### Substitution of Conventional Energy with Renewable Energy

**We had generated 12767MWH wind power in 2004-05 which saves Rs. 464 lakhs for the year.**

**We had generated 2100 KWH from Solar Photovoltaic pnael in 2004-05**

### Monitoring and reporting system

Dy. General Manager (Technical Services), a management representative is the pivotal person to oversee the activities of "Energy conservation cell" at IPCL- Gandhar. The cell consists of highly Qualified & experienced engineers with operational background with multi unit experience. The energy consumption parameters are analyzed daily, weekly and monthly forums for keeping constant focus on commitments on energy conservation. Specific energy consumption for

different plants is reported on weekly basis. Monthly energy reports for complex and different plants are released on 10th of every month. Energy index is reported on monthly basis. **Daily meeting is conducted by Energy cell. Weekly meetings are conducted by Site president & Sr Vice President (Tech services) separately.** Site President conducts monthly meeting.