



## SUPREME PETROCHEM LTD

### Unit Profile:

Supreme Petrochem Ltd is in the business of manufacturing of Polystyrene. It is the largest manufacturer of Polystyrene in India and is market leader in Polystyrene business in India. It also exports almost 50% of its product to many countries across the globe.

The manufacturing plant is located at Village-Amdoshi in Raigad district of Maharashtra and manufactures various grades of General Purpose (GPPS), High Impact (HIPS) & Speciality Polystyrene.

Initial capacity of the plant, when commissioned in October 1995, was 66000 MT per annum. The plant capacities, since then, were enhanced by de-bottlenecking and adding one more production line. Present capacity of the plant is 204,000 MT per annum.

The manufacturing facilities are certified for ISO 9001-2000, ISO 14001-1996 & OHSAS 18001-1999. In addition to above, company has many awards to its credit.

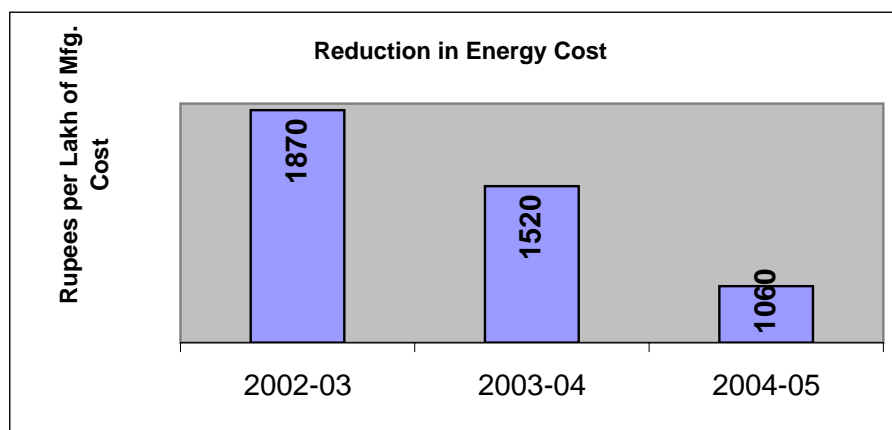
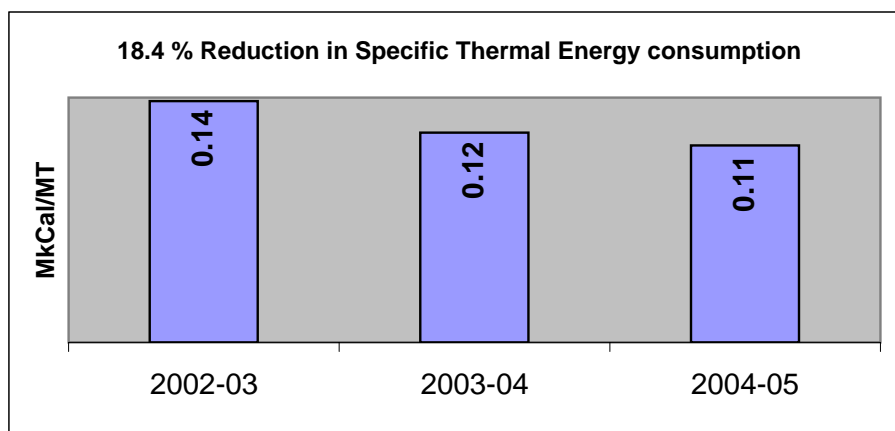
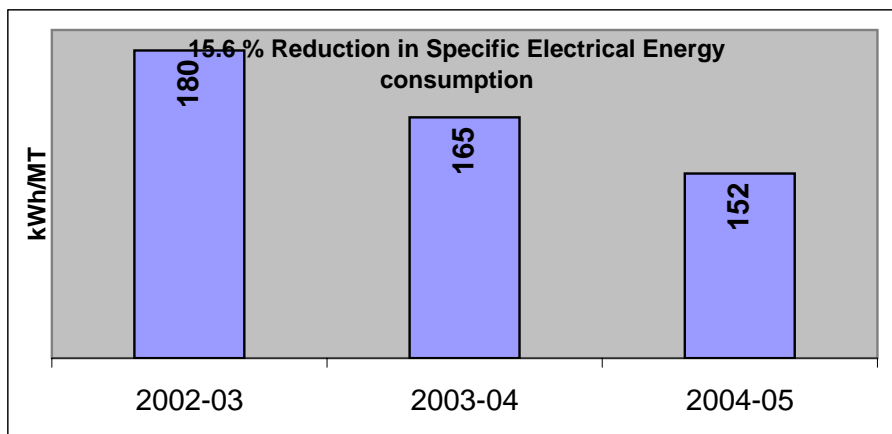
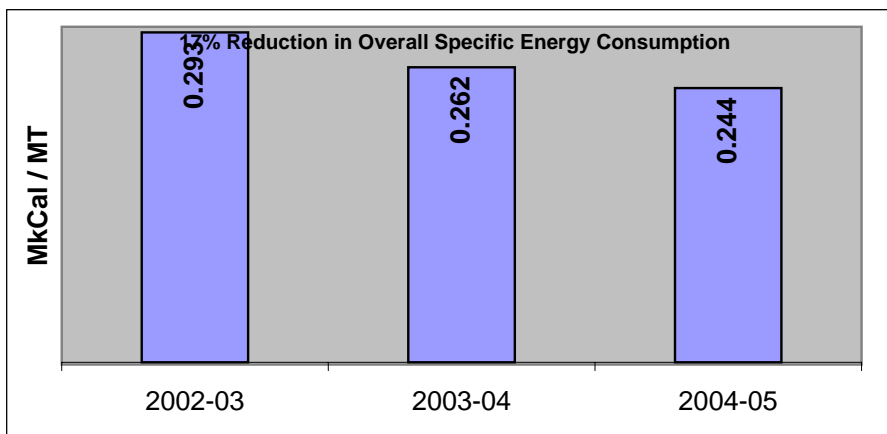
**In year 2004, we have been awarded the First Prize in Petrochemical sector at the Competition for "State Level Award For Excellence in Energy Conservation and Management for the year 2004" organised by Maharashtra Energy Development Agency (MEDA), a Govt. of Maharashtra undertaking.**

**We are also the "Lowest Specific Energy" consumer in Polystyrene business at National level.**

### Energy Consumption:

The energy consumption at SPL is monitored on regular basis and optimisation of consumption is an ongoing activity. The annual Electrical and Thermal Energy consumption as given below shows a continuously decreasing trend owing to the efforts put in for energy conservation and productivity improvement.

Year	Electrical Energy Consumed in Lakh kWh	Thermal Energy consumed in MkCal	kWh / MT of product	MkCal/ MT of product	Overall energy consumed MkCal/MT of product	% reduction (base year 2002-2003)	Manufacturing expenses (Lakh Rupees)	Energy Cost as % of manufacturing cost
2002 - 2003	258.88	18742.5	180.33	0.138	0.293	-	58720.26	1.87
2003 - 2004	302.63	20798.46	165.05	0.12	0.262	10.58	79723.68	1.52
2004 - 2005	289.65	20398.81	152.2	0.1126	0.2435	16.89	111652.57	1.06



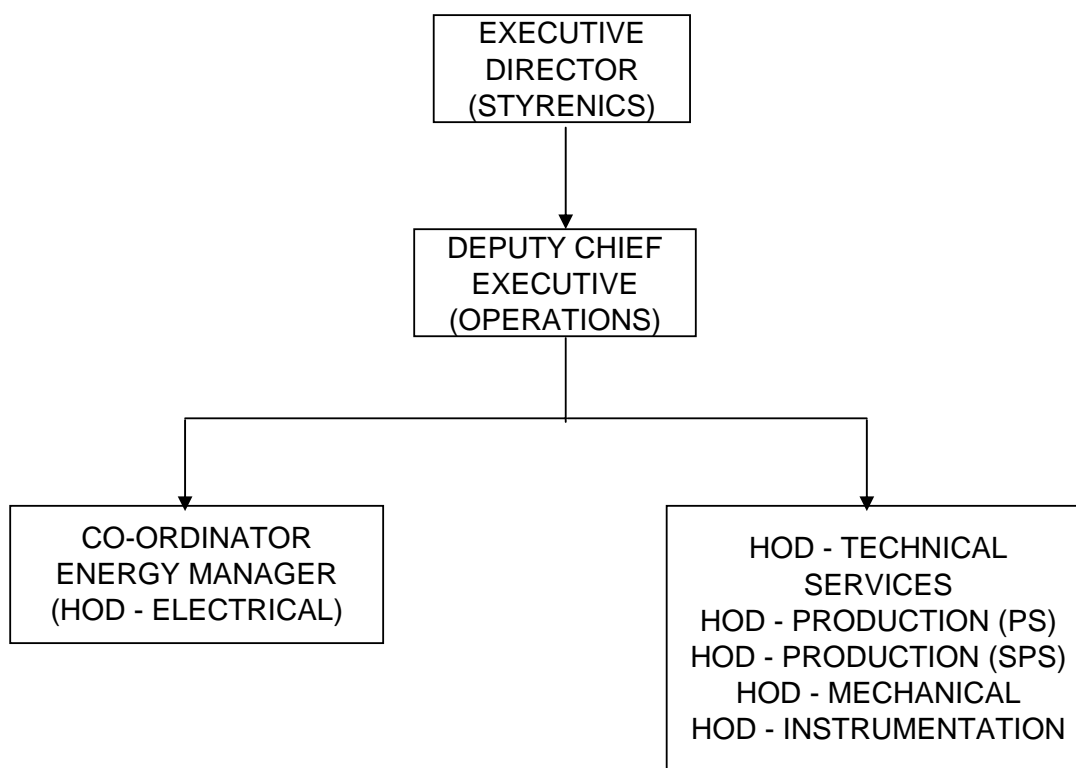


## Energy conservation commitment policy & organizational set up

At Supreme Petrochem Ltd, energy conservation is always considered as important aspect of its overall strategy to remain globally competitive by maintaining lower cost of production. Over the years, the consumption of overall energy has been systematically brought down nearer to or below benchmark norms by dedicated continuous efforts towards implementation of effective energy conservation measures.

We strive to be the lowest specific energy consumer in Polystyrene business by constantly bench marking with industry best, debottlenecking of plants for improving productivity, keeping track of latest technological advances in the field of energy conservation, greater employee participation, training of employees, periodic energy audits & constant review of our operating practices etc.

### Organizational Set up for EC cell



The company has constituted Energy Conservation cell headed by Executive Director (Styrenics) and consists of -

- Dy. Chief Executive (operations)
- Energy Manger
- HOD (Technical Services)
- HOD (Electrical)
- HOD (Production - PS)
- HOD (Production - SPS)
- HOD (Mechanical) and
- HOD (Instrumentation)

The cell meets at periodical interval to

- set key monitoring targets and indices
- Monitor energy consumption
- Discuss and evaluate various proposals for energy conservation and action plan
- Monitor progress of plans and achievements.
- Training and awareness of employees for energy conservation
- Energy conservation is planned in four phases

### 1) Energy Audits :

Audit team comprising qualified engineers from various departments (mainly Technical Services, Electrical, Mechanical and Production) conduct energy audit of each plant twice a year and identifies the areas for improvement with respect to energy conservation and also equipment which are causing production constraints for improving capacity build up.

### 2) Feasibility Studies :

The team prepares feasibility reports of various proposals identified either during the energy audit, case histories of successful energy conservation measures implemented by other organisations and or suggestions received from operating and technical personnel. The proposals are evaluated by energy conservation cell and implemented.

### 3) Employee Participation :

Employees at various levels are trained and made aware by team members of EC cell and respective HODs for sustaining energy conservation measures implemented.

### 4) Management Review :

Energy conservation measures implemented, set indices, targets achieved etc. are reviewed regularly and plans are amended as per the management directives.

## Energy Conservation Achievements during the year 2004 - 2005

Supreme Petrochem Ltd has implemented many energy conservation projects during the year 2004 - 2005, amounting to around 15.99 Lakh kWh of electrical energy saving and 1273.77 MkCal of Thermal Energy saving.

### Major energy conservation projects implemented during year 2004 - 2005

#### 1) Improvement in efficiency of air compressor unit 3 by replacing the screw elements



This air compressor unit was not performing efficiently. It was drawing 296 kW as against design power consumption of 265 kW. Free air delivery (FAD) was also less i.e. 2300 Nm<sup>3</sup>/hr as against design of 2500 Nm<sup>3</sup>/hr. This was mainly due to deterioration of screw elements. Screw elements were replaced with new screw elements. After screw element replacement, power consumption reduced by 31 kW and FAD increased by 170 Nm<sup>3</sup>/hr.

Before screw replacement: Power drawn = 296 kW,

FAD = 2300 Nm<sup>3</sup>/hr

After screw replacement: Power drawn = 265 kW,

FAD = 2470 Nm<sup>3</sup>/hr

Total Electrical Energy Saving = 3.672 Lakh kWh per annum

Investment made = Rs. 15 Lakh

Monetary Saving = Rs. 12.26 Lakh per annum

Payback period = 14 Months

## 2) Provision of variable speed drive for fume extraction blower in SPS plant



Fume extraction blower of 30 kW capacity is provided in the SPS plant to extract fume from Die-head and to maintain better atmosphere in the area. The blower was operated at full speed with power consumption of 30 kW on mains.

During energy conservation trials, it was observed that even 50% of blower speed is sufficient to extract fumes and maintain better atmosphere in the plant area. Hence, a variable speed drive was provided for the blower. It is now being run at 50% of the rated speed.

Before provision of VFD: Power drawn = 30 kW,

After provision of VFD: Power drawn = 6 kW,

Total Electrical Energy Saving = 1.05 Lakh kWh per annum

Investment made = Rs. 2 Lakh

Monetary Saving = Rs. 3.51 Lakh per annum

Payback period = 6 Months

## 3) Optimisation of MP steam requirement for Furnace Oil tank heating system



### **Steam header for FO tank in tankfarm**

MP Steam is used for heating FO stored in main FO tank at tank farm which is around 200 meter away from the boiler house. This MP steam header is used only for heating of FO tank & used to be online continuously resulting in losses through steam traps etc. In order to avoid these losses, practice of charging the header only when required is followed & other times header is kept isolated.

Thermal Energy Saving : 963.9 Mkal /year

Monetary Saving : Rs. 14.99 Lakh per annum

Investment made : Nil

## 4) Use of Solar Water Heating System for Cafeteria



In order to make use of Non Conventional source of Energy, a 500 LTPD solar water heating system has been installed for utensil cleaning for the cafeteria

Annual Energy saving Achieved : 2250 KWH

Investment Made : Rs. 75 Thousand.



5) **Optimisation of Chilled Brine temperature for -15°C refrigeration system**

Chilled brine at -10°C is used to condense styrene vapours from the polymer melt in devolatiser so that residual styrene monomer (RSM) in product is maintained below 1000 ppm. During optimisation study it was observed that even at -5°C temperature of chilled brine, RSM in product was found to be well below specified limit of 1000 ppm.

Hence it was decided to maintain chilled brine temperature at around -6°C.

**Energy Saving and investment made:**

Savings achieved for average per day production of 515 MT

Electrical Energy Saving : 3.6295 Lakh kWh per year for all three lines

Total monetary saving : Rs.12.12 Lakh per year

Investment : Nil.

Simple payback period: Not applicable.

6) **Efficiency improvement in one of the refrigeration unit (KPC unit)**

In this refrigeration unit, oil draining line of secondary oil filter in the compressor discharge line was connected to compressor suction for removal of the oil from ammonia system. As this was bypassing the chiller, resulting into unit capacity loss to the tune of 16TR.

During optimisation study, a trial was conducted to ascertain the quantity of oil from the secondary oil filter. It was found that it is not necessary to keep this line continuously on-line. Hence it was decided to operate this line at periodic intervals and accordingly necessary modifications were done in the system.

**Energy Saving and investment made:**

Electrical Energy Saving : 2.24 Lakh kWh per year.

Total monetary saving : Rs.7.48 Lakh per year

Investment : Rs.0.05 Lakh

Simple payback period: Not applicable.

7) **Elimination of pumping system for Devol preheater hot oil system**

Two pumps of 7.5 kW capacity were used for circulation of hot oil through the devol preheater. These pumps were circulating oil through the system at the same temperature existing at main hot oil loop.

The main hot oil pumps are used to circulate oil through the heater & to 2 nos. of consumer loops. Since DV preheater loop is using the oil at the same temperature as that of main loop, it was decided to connect DV preheater loop directly to main oil loop eliminating the need of two circulating pumps.

**Energy Saving and investment made:**

Electrical Energy Saving : 2.77 Lakh kWh per year for all three lines

Total monetary saving : Rs.9.26 Lakh per year

Investment : Nil.

Simple payback period: Not applicable.

**Other projects implemented are:**

- 8) Optimisation screen changer heating system for all three PS production lines.
- 9) Reduction in losses through spare hot oil heater during warm up.
- 10) Reduction in power consumption of air compressor unit 2 during unloading.



## Energy Conservation Plans and Targets

Sr. No.	Energy Conservation Measures (Planned)	Anticipated Savings in		Approximate investment (Rs. Lakhs)	Project Commencement & completion year
		Energy Value	Rs. Lakhs		
1)	Replacing screw elements for improving efficiency of Air compressor unit no. 1	1.19 Lakh kWh	3.99	15.00	September, 2005
2)	Replacement of in-efficient screw compressor for one of the refrigeration system	7.00 Lakh kWh	23.45	12.00	January, 2006
3)	Setting correct blade angle (as per design) for cooling tower fans of cooling tower 2	0.36 Lakh kWh	1.206	0	September, 2005
4)	Optimisation of cooling water circulation system.	5.79 Lakh kWh	19.40	1.00	November, 2005
5)	Improvement in efficiency of hot oil heaters	1875 Mkcals	22.00	1.00	November, 2005
6)	Provision for smaller capacity blower for line 10 die head fume extraction system.	0.925 Lakh kWh	3.09	2.00	December, 2005
7)	Gas turbine based captive Co-generation plant	2000 MT FO & 47 Lakh kWh	550.00	2300.00	December, 2007
8)	Replacement of drier system with different type of drying system for pelletizer	4.28 Lakh kWh	14.33	15.00	July, 2006
9)	Optimisation of pneumatic conveying system	0.8 Lakh kWh	2.68	0	September, 2005



## ENVIRONMENT AND SAFETY AT SPL.

SPL is committed to environment protection and safety right from its inception. The company believes in sustainable development. Health, safety and protection of environment are considered as an integral part of our business operations. As our commitment to HSE, the company has become signatory to the Responsible Care programme instituted by Indian Chemical manufacturer's Association. HSE objectives are regularly monitored by top management.

The HSE Management systems implementation is directed by Company's Health and Safety Policy and Environmental Policy.

As of 30<sup>th</sup> June 2005, the company has achieved 1721 accident free days of operation, consecutive five accident free years leading to 37,35,463 accident free man-hours.

### Elements of Health Safety Management System at SPL :

- \* The occupational health and safety management system has been established in accordance with OHSAS 18001:1999 and the environmental management system has been established in accordance with ISO 14001:1996. Both these systems are certified by M/s. BVQI and M/s. DNV respectively.
- \* Hazard identification techniques constituting application of various qualitative and quantitative hazard identification techniques such as PHA, JSA, Hazop, QRA, FTA, ETA, identification and evaluation of environmental aspects/hazards from all activities, products and services etc.
- \* The company is committed to compliance of HSE legislation applicable to its business. Till date, we have achieved zero default on account of this.
- \* HSE objectives and targets are set in line with the corporate business objectives. Suitable OHSMPs and EMPs are developed at each relevant function in order to achieve these objectives.
- \* Well established HSE training systems implemented consisting of training need assessment, training modules for various target groups and training evaluation system to improve overall competency of the employees.
- \* The company is an approved training institute by Home Dept. Govt. of Maharashtra for imparting training in Safety transportation of dangerous goods by road. Till date over 300 drivers have been training by the institute.
- \* Various safety promotional activities are implemented to achieve employee involvement and participation in HSE programmes, such as Fire and Safety campaigns, suggestion scheme, inter-departmental competitions, drills, newsletters, safety committee etc.
- \* Operational control procedures are developed and implemented for start-up, shutdown, process operations and activities, waste management, personal protection, permit to work, fire protection, maintenance, management of change, construction safety, contractor controls, environmental management etc. All such SOPs and procedures are constantly audited, reviewed and revised at a periodic interval.
- \* On-site emergency management plan has been prepared constituting prevention and mitigation procedures for all the emergency scenarios are developed and rehearsed at six monthly interval. In addition, emergency preparedness and response procedures at department level are also established.



## **Greening Efforts**

- \* 40 acres of land provided for green belt around the factory.
- \* 112 acres of plot has been developed and conserved for afforestation activities.
- \* 114618 trees are conserved in Afforestation area till April 2004.
- \* 19818 trees are conserved in Green Belt area till April 2004.
- \* 30000 trees are planted in Green belt and Afforestation area during 2003.

## **HSE ACHIEVEMENTS**

### **INTERNATIONAL CERTIFICATION**

#### **5 STAR RATING.**

- \* **SPL Works** has been awarded highest **5 Star Rating** by British Safety Council., London for Health and Safety Management System among the industries in world.

#### **ISO 14001 - ENVIRONMENTAL MANAGEMENT SYSTEM (EMS).**

- \* SPL Works has been certified for ISO 14001 by M/s. Det Norske Veritas (DNV), Netherlands for implementation of Environmental Management System.

#### **OHSAS 18001- OCCUPATIONAL HEALTH SAFETY MANAGEMENT SYSTEM:**

- \* SPL Works has been certified for OHSAS 18001 : 1999 by Bureau Veritas (BVQI) U.K. for implementation of Occupational Health and Safety Management system.

## **AWARDS**

#### **DR.R.J.RATHI TROPHY & CITATION FOR THE YEAR 1999.**

- \* SPL Works has been awarded Dr. R.J.Rathi Trophy and Citation for the year 1999 instituted by Maharatta Chambers of Commerce, Industries and Agriculture, Pune among all industries at Maharashtra State Level for Environmental Protection in and around the complex.

#### **CERTIFICATE OF MERIT.**

- \* SPL Works has been awarded 'Certificate of Merit' during the year 1999 by ICMA for Recipient of ISO 14000.

#### **STATE LEVEL FIRE DRILL COMPETITION.**

- \* SPL has been awarded with Rolling Trophy and Citation (1st Prize) for outstanding performance in Fire Drill Competition conducted by Fire Advisor, Govt. of Maharashtra.

#### **STATE LEVEL FIRST AID COMPETITION.**

- \* SPL has been awarded with Rolling Trophy and Citation (1st Prize) for outstanding performance in First Aid Competition conducted by Directorate of Industrial Safety and Health (DISH), Govt. of Maharashtra.

#### **CLEAN COMPANY / SAFE COMPANY AWARD.**

- \* SPL Works has been awarded with Trophy and Citation (1st Prize) for the year 2000 by Roha Taluka Patrakar Sangha for Health, Safety and Environment performance in and around Industries.



(v) **VERY IMPORTANT:**

For the year 2004-2005 only, a two paragraph write-up to be enclosed (as well as to be sent on CD) for each project giving in brief, (i) background of the project, (ii) observations made, (iii) technical & financial analysis made and (iv) impact of implementation. If any project which has been implemented by the unit in 2004-05 for the first time in India and can prove to be a “Trend Setter” in your opinion, should be highlighted in the write-up with salient details.

The unit not submitting the above information is likely to loose certain weightage during evaluation.

**BRIEF WRITE-UP OF ENERGY CONSERVATION PROJECT IMPLEMENTED DURING  
THE YEAR 2004 - 2005**

1) **Improvement in Efficiency of Air Compressor Unit no. 3 :**

**Background:** During one of the energy audits, it was found that power consumption for the unit was on quite higher side than the design power consumption

**Observation:** Air compressor unit was drawing 296kW as against the design power consumption of 265 kW. Free air delivery was also less i.e. 2300 Nm<sup>3</sup>/hr as against design of 2500 Nm<sup>3</sup>/hr. After detail discussion with the compressor manufacturer, it was decided to replace both the LP & HP stage screw elements of the compressor to overcome the problem of deterioration of efficiency. After replacement of the screw elements, power consumption got reduced by 31kW i.e. to design figure & there was increase in FAD by 170 Nm<sup>3</sup>/hr.

**Energy Saving and investment made:**

Electrical Energy Saving : 3.672 Lakh kWh per year  
Total monetary saving : Rs.12.26 Lakh per year  
Investment : Rs.15 Lakh  
Simple payback period: 14 months.

2) **Provision of Variable Speed drive (VFD) for fume extraction blower in SPS plant area:**

**Background:** Fume extraction blower of 30 kW capacity is provided in the SPS plant area to extract fumes & to maintain better atmosphere in the area. The blower was operated at full speed. The blower was drawing full power.

**Observation:** It was decided to reduce the blower rpm & study the impact on fume extraction as well as atmosphere in the area. So trials were taken at various speeds & effect of it on the atmosphere in the area was studied. It was found that atmosphere in the area remains unaffected when blower is run at 50% of the rated speed. Hence it was decided to operate the blower at 50% of rated speed by provision of VFD. After provision of VFD, power drawn by the blower reduced drastically by 24kW.

**Energy Saving and investment made:**

Electrical Energy Saving : 1.05 Lakh kWh per year  
Total monetary saving : Rs.3.51 Lakh per year  
Investment : Rs.2 Lakh  
Simple payback period: Less than 6 months.

After implementation, we could achieve both the purposes of energy conservation & maintaining good work environment.



**3) Optimisation of screen changer heating system for all three PS production lines**

All three PS production lines have been provided with screen changer with online screen changing facility. One screen remains in line & other screen is kept ready & kept warm with two cartridge type heaters. However in practice, only one screen is used all the time & spare screen is not used at all though it is kept ready. The spare screen is exposed to ambient conditions and is kept warm with two 1.5 kW heaters which were remaining on almost continuously. Hence it was decided to keep these heaters off as screen is not used.

**Energy Saving and investment made:**

Electrical Energy Saving : 0.7 Lakh kWh per year

Total monetary saving : Rs.2.338 Lakh per year

Investment : Nil.

Simple payback period: Not applicable.

**4) Optimisation of Chilled Brine temperature for -15°C refrigeration system**

**Background:** Chilled brine at -10°C is used to condense styrene vapours from the devolatiser. Basic purpose of the brine circulation through the condenser is to remove styrene vapours in polymer melt so that residual styrene monomer (RSM) in the product is always less than 1000 ppm.

**Observation:** During optimisation study it was observed that even if the chilled brine temperature is maintained at -5°C, we were able to maintain RSM in product well below the specified limit of 1000 ppm. Hence, it was decided to maintain brine outlet temperature at around -6°C.

**Energy Saving and investment made:**

Savings achieved for average per day production of 515 MT

Electrical Energy Saving : 3.6295 Lakh kWh per year for all three lines

Total monetary saving : Rs.12.12 Lakh per year

Investment : Nil.

Simple payback period: Not applicable.

**5) Efficiency improvement in one of the refrigeration unit (KPC unit)**

In this refrigeration unit, oil draining line of secondary oil filter in the compressor discharge line was connected to compressor suction for removal of the oil from ammonia system. As this was bypassing the chiller, resulting into unit capacity loss to the tune of 16TR.

During optimisation study, a trial was conducted to ascertain the quantity of oil from the secondary oil filter. It was found that it is not necessary to keep to keep this line continuously on-line. Hence it was decided to operate this line at periodic intervals and accordingly necessary modifications were done in the system.

**Energy Saving and investment made:**

Electrical Energy Saving : 2.24 Lakh kWh per year.

Total monetary saving : Rs.7.48 Lakh per year

Investment : Rs.0.05 Lakh

Simple payback period: Not applicable.



**5) Elimination of pumping system for Devol preheater hot oil system**

Two pumps of 7.5 kW capacity were used for circulation of hot oil through the devol preheater. These pumps were circulating oil through the system at the same temperature existing at main hot oil loop.

The main hot oil pumps are used to circulate oil through the heater & to 2 nos. of consumer loops. Since DV preheater loop is using the oil at the same temperature as that of main loop, it was decided to connect DV preheater loop directly to main oil loop eliminating the need of two circulating pumps.

**Energy Saving and investment made:**

Electrical Energy Saving : 2.77 Lakh kWh per year for all three lines

Total monetary saving : Rs.9.26 Lakh per year

Investment : Nil.

Simple payback period: Not applicable.

**7) Optimisation of MP steam requirement for Furnace oil tank heating system**

MP steam is used for heating FO stored in the main FO tank located in the tankfarm. The temperature is controlled by an on/off control valve which used to operate on temperature of the tank. For this the entire header from boiler to tankfarm (around 200 meters) was always kept charged resulting into steam losses in the form of condensate / steam traps & insulation losses.

It was decided to keep this header isolated & charge it only when FO tank temperature is low. This has resulted into steam saving of 150 kg/hr.

**Energy Saving and investment made:**

Thermal Energy Saving : 963.9 MkCals per year (107.1 KL FO per year)

Total monetary saving : Rs.14.99 Lakh per year

Investment : Nil.

Simple payback period: Not applicable.

**8) Reduction in Losses through spare hot oil heater which is kept on warm up**

Hot oil system is provided with four nos. of heater with three heaters on line & one heater is used as spare for all the three heaters. The spare heater is kept on warm up by circulating around 20 m<sup>3</sup>/hr oil at a temperature of around 285°C through it.

Since all the heaters are connected to common stack, atmospheric air was getting sucked through the combustion air blower damper resulting in heat losses. Hence a practice of keeping blower damper closed is put into operation resulting in saving of losses occurring through the heater.

**Energy Saving and investment made:**

Thermal Energy Saving : 309.9 MkCals per year (34.43 KL FO per year)

Total monetary saving : Rs.4.82 Lakh per year

Investment : Nil.

Simple payback period: Not applicable.



**9) Reduction in power consumption of air compressor unit 2**

During energy audit, it was noticed that the power consumed by the compressor unit during unloading is 80kW as against design of 50kW. The problem was in the unloader assembly of the compressor which was causing compressor to remain slightly loaded, leading to higher power consumption. The unloader assembly was rectified & power consumption found to be in order.

**Energy Saving and investment made:**

Electrical Energy Saving : 1.91 Lakh kWh per year.

Total monetary saving : Rs.6.39 Lakh per year

Investment : 0.5 Lakh

Simple payback period: Not applicable.

**10) Use of Solar Water heating system for Cafeteria**

In Cafeteria 3.0kW electric heater was being used for heating the water. The hot water was being used for cleaning of the utensils.

During the study for use of non-conventional energy resources, Cafeteria was identified as one of the potential areas. The Solar water heating system of 500 Litres per day (LPD) was installed for the Cafeteria.

**Energy Saving and investment made:**

Electrical Energy Saving : 0.023 Lakh kWh per year.

Total monetary saving : Rs. 0.075 Lakh per year

Investment : 0.75 Lakh

Simple payback period: Not applicable.