GHARDA CHEMICALS LIMITED
Unit: Dombivli, District-Thane, Maharashtra.

1. Introduction:

Gharda Chemicals Ltd. (GCL) was founded in 1964 in Mumbai. From very small beginnings the company has grown to its present stature of major manufacturing of Agrochemical in India, with other major diversification. The company has plants at Dombivli, Lote Parshuram in Maharashtra and at Panoli, Ankleshwar in Gujarat.

The Gharda Chemicals Ltd., Dombivli unit is on the outskirts of Mumbai, set up in 1971, is the biggest chemical unit in the MIDC complex in Dombivli. It has a total floor area of 7 acres for manufacturing, storage, R&D centre, and administrative and other offices. It is an ISO 9001:2000 certified company.

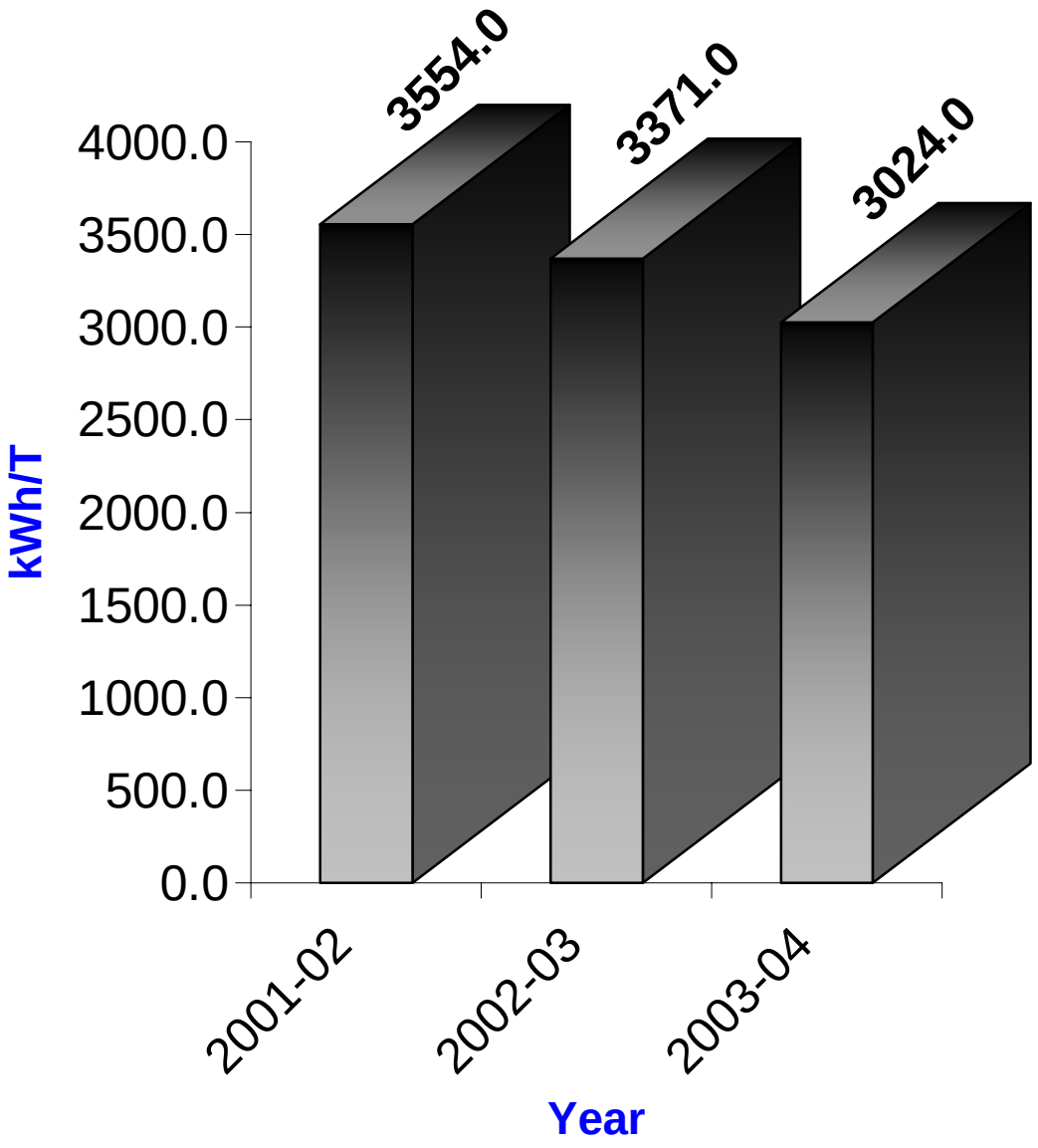
The production was 4757, 4755 and 6230 MT with capacity utilization of 127.5%, 127.55% & 166.9% during the year, 2001-02, 2002-03, and 2003-04, respectively. The unit's sales turnover was Rs. 143.96, 123.81 and 172.27 crore in the year 2001-02, 2002-03 & 2003-04 respectively.

2. Energy Consumption:

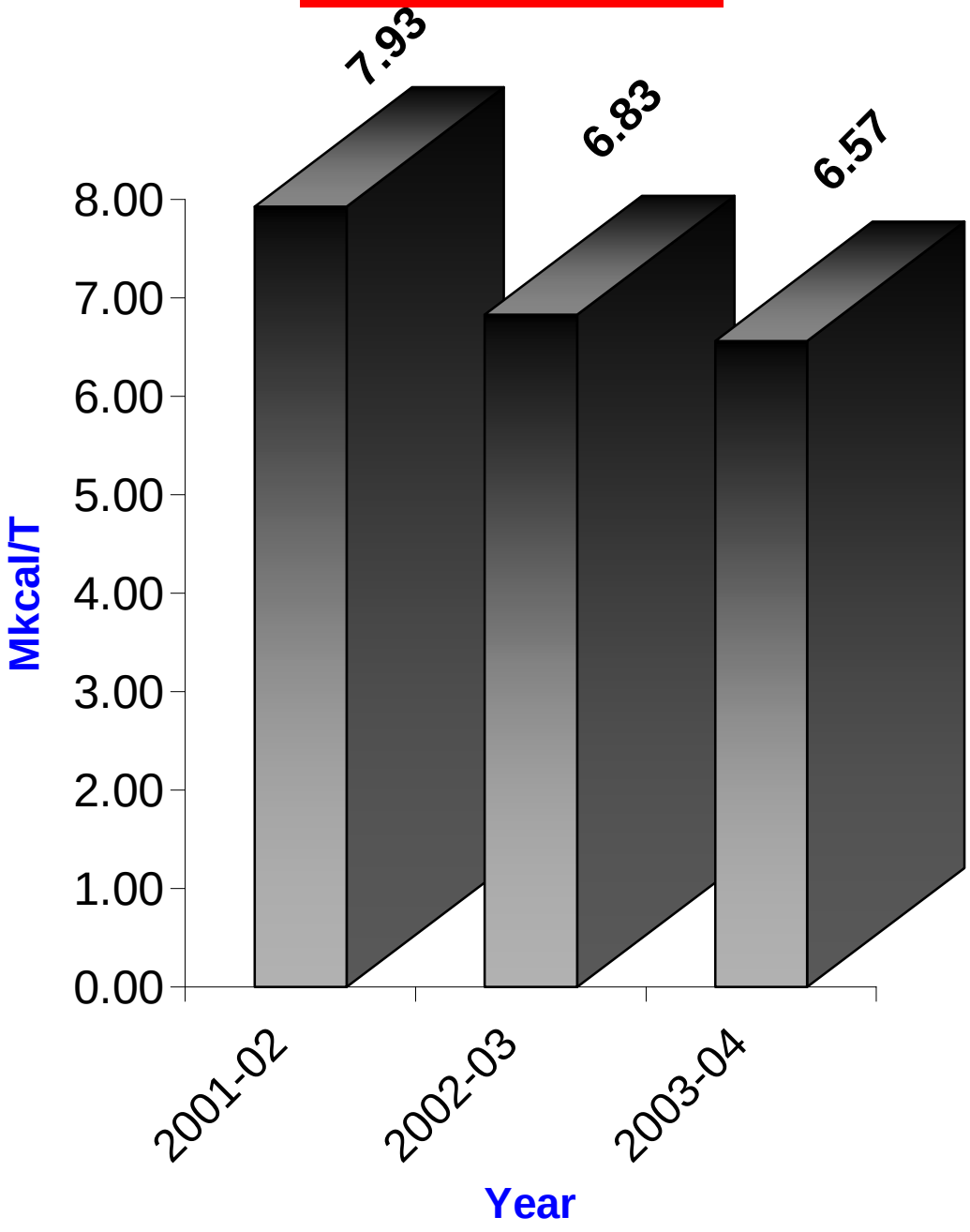
Various energy saving measures are undertaken as a routine assignment, there is steady decline of specific energy consumption. The trends of specific consumption since last three years are shown below:

DESCRIPTION	UNIT	2001-02	2002-03	2003-04
Electrical Energy	KWh/T	3554.0	3371.0	3024.0
Thermal Energy	M Kcal/T	7.93	6.83	6.57
Total Manufacturing Cost	Lakh	11126.0	9157.0	12486.0
Total Energy Bill	Lakh	1092.0	1021.0	1151.0
Energy cost as % of Total cost of production	%	9.82 %	11.14 %	9.21 %

Specific Electrical Energy Consumption



Specific Thermal Energy Consumption



3. Nomination for the Award:

We have been implementing our Energy conservation initiatives inter alia with operation activities as a routine assignment for the past many years and as a result of which we got substantial benefits on all the fronts like Monetary benefits, Optimization of resources, Conservation of non-renewable sources of energy, Social responsibility etc.

The potential areas for energy conservation and management are identified through in-house innovation, brain storming, external as well as internal audits, and literature survey. The feasibility study, trial, execution and monitoring of the activities and assessment of the benefits achieved are performed under the umbrella of structured cell called “Energy Conservation Cell (ECC)”on continual basis.

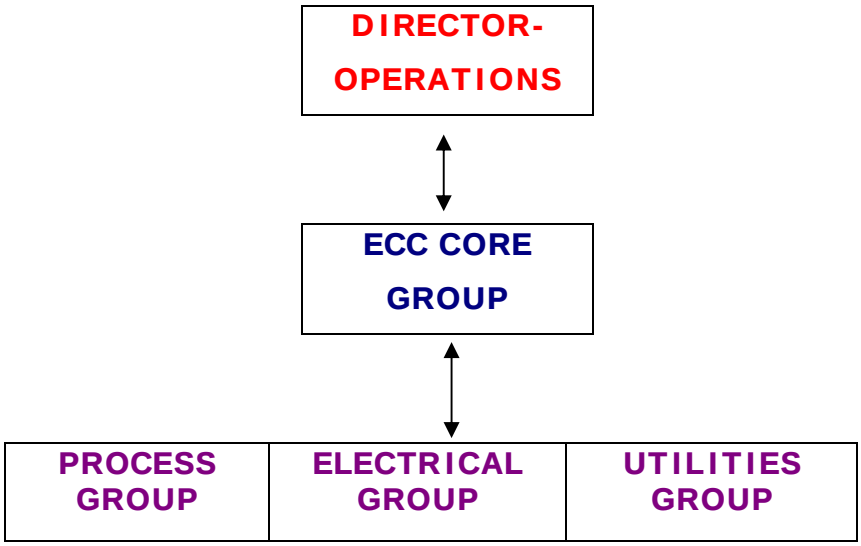
We are traditionally innovative in all areas and as a result we have been awarded for developing Sustainable and Innovative technologies, Design Engineering, Exports etc by the bodies like ICMA, Chemexcil, Government of India a number of times in the past. For last two years Ministry of Power – Government of India awarded us 2nd prize for our innovative ideas and outstanding performance in Energy Conservation.

In Brief, we are contributing to energy conservation and its usage optimization in our organization and as well as to the nation as a whole through our sustainable energy conservation programs. Hence, we feel ourselves as the deserving candidate for this award.

4. Energy Conservation Cell (ECC): Commitment, Policy and Set-up.

Energy conservation activities are always given utmost importance similar to any other development and improvement activities by all functional group. The potential areas are identified through in-house innovation, brainstorming, studies and literature survey. The feasibility study, trial, execution and monitoring of the activities and assessment of the benefits achieved are performed under the umbrella of structured cell called **"Energy Conservation Cell (ECC)"** on continual basis.

ENERGY CONSERVATION TEAM STRUCTURE



ECC CORE GROUP FACTULTIES:

	MEMBERS	CURRENT DESIGNATION	ECC DESIGNATION
1	Mr. R.P. Singhal	GM-Engineering	Chairman
2	Mr. P.U. Bhojane	GM-Engineering	Vice-chairman
3	Mr. A.S. Khanvilkar	DGM-Technical	Vice-chairman
4	Mr. U.K. Sinha	Sr. Manager-Technical	Secretary-Process related scheme
5	Mr. B.M. Sabnis	Sr. Manager-Utility	Utility related scheme
6	Mr. A.N. Ingale	Manager-Electrical	Electrical related scheme

RESPONSIBILITIES OF ECC CORE GROUP:

- INHOUSE INNOVATION
- BRAIN STORMING
- LITERATURE SURVEY
- IDENTIFIACTION OF POTENTIAL AREAS
- FEASIBILITY STUDY
- IMPLEMENTATION
- MONITORING, AUDIT AND ASSESSMENT
- SUGGESTION SCHEMES
- DEVELOPING ENERGY CONSCIOUSNESS AMONG EMPLOYEES (THROUGH TRAINING PROGRAMS)

S/d

R. P. Singhal
(ECC Chairman)

5. Energy management:

It means following all the systematic practices to minimize & control both the quantity, and cost of energy used in providing a service, while improving environmental outcomes and the level of service.

The practices include -

- Minimizing energy wastage.
- Optimizing energy efficiency with suitable technology.
- Using the most appropriate energy sources (non-renewable/renewable) with due regard to environmental benefits.
- Buying energy at the most economical price.
- Modifying operations, wherever possible, to make the best use of energy.
- Involving training and raising awareness of staff/workmen.
- Continuous monitoring to ensure energy use within predetermined limits.

6. Energy Conservation Achievements:

DESCRIPTION	UNIT	2001-02	2002-03	2003-04
Energy Saving Activities Carried Out	Nos.	42.0	35.0	20.0
Savings	Lakhs	198.2	162.6	133.7
Investment	Lakhs	14.0	34.5	90.3
Saving in energy cost	%	18.2%	15.2%	10.3%

7. The major energy savings schemes implemented during 2003-2004 are given below:

i. Commissioning of 300TR Chilled water unit with screw compressor instead of conventional centrifugal compressors.

ii. Commissioning of 800 CFM screw compressor for process air in place of reciprocating compressor (5 nos.).

iii. Process improvement (High vacuum-low temperature fractionation) in ONC-PNC fractionation system to reduce steam consumption at Reboiler.

iv. Process improvement (Decantation of top TEA layer before distillation) in Wet TEA distillation to reduce steam consumption.

v. Process improvement in TBN distillation to reduce steam consumption.

vi. Installation of ON-OFF valves on chilled water line of condenser to stop flow during idle hours.

vii. Use of cooling water as condensing medium for DMA-Ammonia condenser in place of chilled water.

viii. Installation of In-line centrifugal pump in place conventional centrifugal pump.

ix. Ceramic coating inside pump casing to reduce power consumption.

x. New fanless cooling tower (Capacity: 500 IGPM) in place of conventional induced draft cooling tower.

xi. Installation of Compact Fluorescent Lamp

xii. Addition of capacitor banks for improvement of power factor.

xiii. Generation of flash steam from high-pressure hot condensate, generated flash steam will be used as heating media in Lithium bromide absorption chilled water unit.

8. Energy Conservation Plans and Targets (2004-05):

GHARDA CHEMICALS LTD., DOMBIVLI unit is committed to improve energy performance on continual basis by finding out new schemes/projects in the areas such as steam, power & fuel etc. This unit is working on following major proposals as a part of future plans for energy conservation.

i. Lithium bromide (LiBr) absorption refrigeration system to generate chilled water with help of waste steam (Flash steam). Capacity: 100 TR

ii. Use of solar energy for street lighting, preheating, boiler feed water & Bathroom water heating.

iii. Heat recovery unit for preheat furnace oil with boiler blow down hot water.

iv. Corrugated heat exchangers to be used in place of conventional shell & tube heat exchangers (2.0 to 3.0 times high heat transfer coefficient in corrugated heat exchanger).

v. Conventional worm type gearboxes to be replaced by planetary gear boxes (gear efficiency increase from 70% to 96%).

vi. Biogas generation from Canteen waste food.

vii. Bottom guide removal to reduce power losses from reactors having RPM less than 100.

viii. Installation of ON-OFF valves on Chilled water & brine lines in order to stop flow during non-working hours.

ix. Installation of more number of fanless cooling towers (Two numbers already installed).

x. Installation of Pressure switches to avoid dry running of pumps (which cause failure of mechanical seal).

xi. Waste heat recovery form Incinerator to generate low-pressure steam for Lithium bromide absorption refrigeration unit i.e., for chilled water generation.

xii. Heat recovery from high temperature distillation unit (ONC-PNC fractionation section) to generate medium pressure steam for process heating.

xiii. Usage of energy efficient rotating equipment (I.e pumps, motors, Blowers etc).

xiv. Timer installation on Exhaust Blowers & fans to avoid idle running.

9. Environment and Safety:

The unit is committed to improve its environment & safety of its employees.

a) Effluent Treatment Plant:

We have full-fledged effluent treatment plant consisting of primary, secondary and tertiary treatment. The final treated effluent always passes all the specifications laid down by Maharashtra Pollution Control Board (MPCB).

All solid/semi solid waste generated is incinerated in our incinerator. The waste heat recovery (to generate pressurized boiler feed water at 125°C) from the incinerator flue gases is under consideration.

b) Air Monitoring:

i. We have provided gas sensors at different locations in factory to monitor the level of gases like SO_2, HCl, HCN, H_2S and NH_3. We ensure that the levels of these gases are always maintained well below the TLV values.

ii. We also have ambient air monitoring stations at these different places in the factory.

iii. We have provided brine chilling in vent condenser to minimize solvent losses as well as pollution free atmosphere in the plant.

c) IS0 14001/ISO 18000:

Process of ISO 14001 & ISO 18001-certification is under implementation stage. Target for obtaining ISO 14001 & ISO 18000 certificate is in 2005.

ENVIRONMENTAL POLICY

GHARDA CHEMICALS LIMITED, DOMBIVLI

We at Gharda Chemicals Limited, Dombivli are committed to monitor & prevent pollution and thereby help in conserving natural resources by following clean & safe manufacturing practices.

We shall provide necessary resources for complying relevant environmental legislation and statutory regulations.

We intend to take steps for effective implementation of environmental management system in the company and we will continue to do so through continuous R & D activities as well as Environmental and Energy Audits.

We shall impart training to all our employees to create environmental awareness among them and the impact of their activities on environment.

We shall operate our pollution control facilities to optimum level and try to improve them continuously.

We shall emphasize on reduction of pollutants at sources by operational control.

We shall emphasize on recycle, recovery and reuse of raw materials, solvents, water and packaging materials.

A brief resume on environmental aspects and their impacts will find way in the company's management review reports.

Sd/-

L.P. Bhanushali
Director-Operations
01st August 2003.

GHARDA CHEMICALS LIMITED

QUALITY POLICY

TO ACHIEVE AND ENHANCE CUSTOMER SATISFACTION BY PROVIDING QUALITY PRODUCTS AND SERVICES, IN THE FIELDS OF AGRO CHEMICALS, VETERINARY DRUGS AND SPECIALITY PLASTICS, ON TIME.

TO MANUFACTURE PRODUCTS THROUGH PROCESSES DEVLOPED USING IN-HOUSE RESEARCH AND DEVELOPMENT.

TO EMPLOY QUALIFIED/SKILLED MANPOWER AND CONTINUOUSLY TRAIN THEM TO ENHANCE THEIR SKILLS, KNOWLEDGE AND EFFECTIVENESS.

TO CONTINUALLY EVALUATE AND IMPROVE THE EFFECTIVENESS OF QUALITY MANAGEMENT SYSTEM BY ESTABLISHING AND REVIEWING QUALITY OBJECTIVES.

Sd/-

MUMBAI
1ST APRIL 2002.

(DR. K. H. GHARDA)
CHAIRMAN AND MANAGING DIRECTOR

TECHNOLOGY INNOVATION MEASURES UNDERTAKEN IN YEAR 2001-2002

1. RPM reduction in agitators (process reactors) & screw conveyers.
2. High efficiency impellers for the agitators.
3. Diffused air system in biological reactor no-2

TECHNOLOGY INNOVATION MEASURES UNDERTAKEN IN YEAR 2002-2003

1. Use of Byproduct (ONC) & furnace oil mixture in Boiler fuel.

2. High efficiency impellers in batch reactors.

3. Preheating of boiler feed water with hot condensate, hot organic vapours, and with flash steam.

TECHNOLOGY INNOVATION MEASURES UNDERTAKEN IN YEAR 2003-2004

1. 300TR Chilled water unit with screw compressor instead of conventional centrifugal compressors.

2. 800 CFM screw compressor for process air in place of reciprocating compressor (5 nos.).

3. In-line centrifugal pump in place conventional centrifugal pump

IN HOUSE R&D EFFORTS UNDERTAKEN TO REDUCE ENERGY CONSUMPTION FOR YEAR 2001-2002

1. Use of excess flash steam for DMA vaporisation.
2. Ceramic coating inside the utility & process effluent pumps.
3. Direct use of steam condensate in boiler feed water.
4. Removal of air heater from HP compressed air-drying system.
5. Providing mechanical seals in place of glands for reactors & pumps.
6. Used heat from steam condensate to preheat boiler feed water from 75^0C to 90^0 C.
7. Improved power factor
8. Direct drive in place of pulley/V-belt drive
9. Use of improved fuel additives

IN HOUSE R&D EFFORTS UNDERTAKEN TO REDUCE ENERGY CONSUMPTION FOR YEAR 2002-2003

1. Fanless cooling tower to prevent organic contamination
2. Brine graphite condenser on vent line of Hexane + Isobutylene tanks.
3. Float steam trap in place of thermodynamic trap
4. FRP fans for cooling towers
5. Use of Poly Urethene Foam (PUF) as insulator in place of thermocol & resin bonded glasswool.
6. Use of fuel additives in furnace oil
7. Rotary oil ring vacuum pumps in place of ejectors.
8. Installation of Compact Fluorescent Lamp & addition of capacitor bank.

IN HOUSE R&D EFFORTS UNDERTAKEN TO REDUCE ENERGY CONSUMPTION FOR YEAR 2003-2004

1. Process improvement (High vacuum-low temperature fractionation) in ONC-PNC fractionation system to reduce steam consumption at Reboiler.

2. Process improvement (Decantation of top TEA layer before distillation) in Wet TEA distillation to reduce steam consumption.

3. Process improvement in TBN distillation to reduce steam consumption.

4. Installation of ON-OFF valves on chilled water line of condenser to stop flow during idle hours.

5. Use of cooling water as condensing medium for DMA-Ammonia condenser in place of chilled water.

6. Ceramic coating inside pump casing to reduce power consumption.

7. New fanless cooling tower (Capacity: 500 IGPM) in place of conventional induced draft cooling tower.

8. Installation of Compact Fluorescent Lamp

9. Addition of capacitor banks for improvement of power factor.

10. Generation of flash steam from high-pressure hot condensate, generated flash steam will be used as heating media in Lithium bromide absorption chilled water unit.

ENERGY CONSERVATION PROJECTS: 2003-04:

The major Energy saving projects implemented during 2003-04 is given below:

1. PROJECT: CHILLED WATER UNIT WITH SCREW COMPRESSOR (300TR) INSTEAD OF CONVENTIONAL CENTRIFUGAL COMPRESSOR.

York make new generation rotary screw liquid chiller with environment friendly R_{22} was commissioned for chilled water generation (Capacity: 300 TR) in place of conventional centrifugal chiller.

✓ OBSERVATIONS MADE:

Rotary screw liquid chiller have a specific combination of heat exchanger, compressor & motor performance to achieve the lowest system KW/ton of refrigeration. This chiller eliminates Hermetic-motor burnout by using air-cooled motor, which may result in catastrophic damage. Refrigerant never comes in contact with the motor, preventing contamination of the rest of the chiller.

✓ TECHNICAL & FINANCIAL ANALYSIS:

POINTS	EXISTING CHILLER	NEW CHILLER
Make	Voltas	York
Compressor Type	Centrifugal	Screw
Capacity	300 TR at 6°C	300 TR at 6°C
Power per Ton of refrigeration	1.1 kW/TR	0.7 kW/TR

- Project Cost: Rs.4200000 /-
- Power saving: 1008000 kWh/yr.
- Annual saving: Rs.3759840/-
- Pay back period: 13 months.

✓ **IMPLEMENTATION:**

A new 300 TR rotary screw liquid chiller had been commissioned in utility section for chilled water. Power consumption of rotary screw liquid chiller is 0.7 kW/TR as against 1.1 kW/TR for centrifugal compressor.

ROTARY SCREW LIQUID CHILLER

2. PROJECT: SCREW COMPRESSOR (800CFM) FOR PROCESS AIR IN PLACE OF RECIPROCATING COMPRESSORS (5 nos.).

New single Atlas copco make screw compressor had been installed for process air in order to replace 5 numbers of reciprocating compressors.

✓ OBSERVATIONS MADE:

Existing reciprocating compressors were highly inefficient and more power consuming due to belt drive arrangement. In reciprocating compressor, there is only aftercooler and no intercooler, so the compression ratio is higher.

In screw compressor, it is direct drive through gear with intercooler and aftercooler arrangement. Therefore efficiency of the unit is higher and air fluctuation to the system is very low.

✓ TECHNICAL & FINANCIAL ANALYSIS:

POINTS	EXISTING COMPRESSOR	NEW COMPRESSOR
Make	IR	Atlas Copco
Compressor Type	Reciprocating	Screw
Capacity	800 CFM	225 CFM
PRESSURE	7.0 $kg_f/cm^2{}_g$	7.0 $kg_f/cm^2{}_g$
POWER PER CFM	0.26 kW/CFM	0.16 kW/CFM

- Project Cost: Rs.4000000/-
- Power saving: 1008000 kWh/yr.
- Annual saving: Rs.2500000/-
- Pay back period: 19 months.

✓ IMPLEMENTATION:

Highly efficient screw compressor of 800 CFM capacity had replaced 5 numbers of reciprocating compressors, each having capacity 225 CFM.

Power consumption of screw compressor is 0.16 KW/CFM as against 0.26 KW/CFM for reciprocating compressor.

SCREW PROCESS AIR COMPRESSOR

3. PROJECT: PROCESS IMPROVEMENT (HIGH VACUUM-LOW TEMPERATURE FRACTIONATION) IN ONC-PNC FRACTIONATION SYSTEM TO REDUCE STEAM CONSUMPTION AT REBOILER.

A continuous fractionation system under vacuum is used to separate ortho-nitrocumene (ONC, top product) and para-nitrocumene (PNC-bottom product).

✓ OBSERVATIONS MADE:

During continuous assessment of distillation system, it was found that if we operate column at lower pressure, below 20 mmHg(a), reboiler temperature is getting reduced, at which these nitro compounds degrade at higher temperature to cause explosion.

✓ TECHNICAL & FINANCIAL ANALYSIS:

- Fractionation column: Structured packings.
- Project Cost: Rs.25000/-
- Annual steam saving: 81694 kg/yr
- Annual Furnace oil saving: 5849 lit/yr
- Energy saved: 54 M kcal/yr
- Annual saving: Rs.69316/-
- Pay back period: 4.0 months.

✓ IMPLEMENTATION:

After complete analysis, pressure drop across demister pad was reduced by 5 mmHg in order to operate column at 15 mmHg (a). Also, ejector capacity was increased from 3.0 kg/hr to 5.0 kg/hr at 2-mmHg absolute pressure.

4. PROJECT: WET TEA (TRI ETHYL AMINE) SEPARATION INSTEAD OF DISTILLATION (STEAM SAVING).

TEA.HCl salt from is being neutralized with caustic to recover TEA. After neutralization aqueous & organic TEA layer gets separated. Previously, we use to distil organic layer. During process it has been observed that after neutralization 90%, siphoning easily separates TEA layer.

✓ OBSERVATIONS MADE:

After implementing scheme considerable steam saving is being observed. Also, time cycle of process reduced by 2 hrs. By implementing process modification, power saving is also observed, as agitator is stop for 2 hrs.

✓ TECHNICAL & FINANCIAL ANALYSIS:

- Reactor Impeller: Chemineer (HE-3)
- Power number, Np: 0.27
- Project Cost: Rs.43000/-
- Annual steam saving: 220000 kg/yr
- Annual Furnace oil saving: 15754 lit/yr
- Energy saved: 144 M kcal/yr
- Power saved: 23800 kWh/yr
- Annual saving: Rs.275459/-
- Pay back period: 2.0 months.

✓ IMPLEMENTATION:

Full-fledged automation along with conductivity meter, ON-OFF is provided. Pitch-bladed turbine impellers are replaced with high efficiency chemineer type impellers.

5. PROJECT: PROCESS IMPROVEMENT IN TBN DISTILLATION TO REDUCE STEAM CONSUMPTION.

Tetrachlorobutyronitrile (TBN) is distilled to get purified TBN. A process is carried out in a batch manner.

✓ OBSERVATIONS MADE:

TBN preparation time cycle was less as compared to that for distillation time cycle for increased capacity. With careful study of the process and with automation, TBN distillation time cycle got reduced by 3 hours. Also vacuum line size was increased from 2" to 3" MSPTFE to get higher capacity.

✓ TECHNICAL & FINANCIAL ANALYSIS:

- Project Cost: Rs.50000/-
- Annual steam saving: 2,10000 kg/yr
- Annual Furnace oil saving: 15038 lit/yr
- Energy saved: 138 M kcal/yr
- Annual saving: Rs.178199/-
- Pay back period: 3.0 months.

✓ IMPLEMENTATION:

TBN distillation capacity is increased from 800 to 1100 Kg/hr with same system. Side plant generation is totally stopped by new process substantial steam saving is achieved by batch.

6. PROJECT: INSTALLATION OF ON-OFF VALVES ON CHILLED WATER LINE OF CONDENSER.

The basic idea for installation of ON-OFF valves on chilled water lines of condenser is to stop the flow rate during non-working hours, so that chilled water saving is possible.

✓ OBSERVATION MADE:

A chilled water line ON–OFF valve on condensers will open when distillation process is on. Generally, average 5 to 6 hours idle time is available in 24 hrs.

✓ TECHNICAL AND FINANCIAL ANALYSIS:

- Project Cost: Rs.50000/-
- TR saved: 36483 TR/yr
- Power saved: 160524 kWh/yr
- Annual saving: Rs.598758/-
- Pay back period: 1.0 month.

✓ IMPLEMENTATION:

Pneumatically actuated 2” on-off valve installed on chilled water lines of HE-361, HE-327, HE-309 & HE-343. Installation of Three number ON-OFF valves planned during 2004-05.

7. PROJECT: COOLING WATER FOR DMA-AMMONIA CONDENSER IN PLACE OF CHILLED WATER.

Previously, chilled water was used as cooling medium for DMA-Ammonia condensers (KC-42 & KC-43, 4 nos.). It has been found that cooling water (partly) & chilled water (partly) can be used to save chilled water.

✓ OBSERVATIONS MADE:

After implementing scheme, it is observed that time cycle remain same.

✓ TECHNICAL AND FINANCIAL ANALYSIS:

- Project Cost: Rs.80000/-
- Chilled water TR saved: 328320 TR/yr
- Power saved: 361152 kWh/yr
- Annual saving: Rs.1347097/-
- Pay back period: 1.0 month.

✓ IMPLEMENTATION:

Cooling water is provided in shell side of two condensers by removing chilled water.

8. PROJECT: INSTALLATION OF IN-LINE CENTRIFUGAL PUMP IN PLACE CONVENTIONAL CENTRIFUGAL PUMP

Conventional centrifugal (Horizontal) pump required installation at ground floor i.e. away from the over head equipment & hence more pressure drop i.e more power consumption.To reduce line pressure drop , we have installed on-line centrifugal pump (same capacity & low diff.head) & hence saving power consumption.

✓ OBSERVATION MADE:

In-line centrifugal pumps are installed in pipeline same as valves. These pumps can be installed very near to the equipment; so that their head requirement is reduced against particular flow rate.

✓ TECHNICAL AND FINANCIAL ANALYSIS:

- Project Cost: Rs.60000/-
- Power saved: 39270 kWh/yr
- Annual saving: Rs.117810/-
- Pay back period: 6.0 month.

✓ IMPLEMENTATION:

Cooling water Booster pump (M/S Khimline make) of condenser, HE-252 was replaced by in-line centrifugal pump. In-line centrifugal pump is drawing 1.95 kW power as against 6.6 kW for Khimline centrifugal pump.

9. PROJECT: CERAMIC COATING INSIDE PUMP CASING & IMPELLER

Teroglass coatings and epoxy coating are chemically inert, polymeric resin based “High Performance” coating systems that exhibit excellent resistance to wear and low surface energy properties.

With the application of lining on utility pump casings and impellers, it has been observed that minimum 3% of power saving is achieved.

This is due to reducing frictional losses between fluid and pump casing/impeller and hence higher volumetric efficiency. This also provides good corrosion protection in addition to power saving.

✓ OBSERVATION MADE:

It is observed that average 4% power saving is achieved after coating inside chilled water, cooling water pumps.

✓ TECHNICAL AND FINANCIAL ANALYSIS:

- Project Cost: Rs.10000/-
- Power saved: 10500 kWh/yr
- Annual saving: Rs.117495/-
- Pay back period: 1.0 month.

✓ IMPLEMENTATION:

Three numbers of Cooling tower pumps coated with Epoxy coating 4% power saving is achieved. Four utility pumps are yet to be coated with epoxy coating during 2004-05.

10. PROJECT: FANLESS COOLING TOWER IN PLACE CONVENTIONAL COOLING TOWER (WITH FD FAN).

Jet Spray type Fan less Induced Draught FRP cooling tower has installed in parallel to conventional cooling tower to increase existing cooling tower capacity(from 1000 IGPM to 1500 IGPM) .

✓ OBSERVATIONS MADE:

The tower has the unique feature of inducing air without the use of FD fan. This results in a direct saving in power consumption & maintenance cost.

The tower is co-current mistfilled & has no packings or fills. Hence they eliminate the requirement of regular cleaning, maintaining & replacing them, which gives constant efficiency.

✓ TECHNICAL & FINANCIAL ANALYSIS:

- Cooling tower capacity: 500 IGPM
- Motor HP: 10.0 HP
- Project Cost: Rs.80000/-
- Power saved: 44100 kWh/yr
- Annual saving: Rs.164493/-
- Pay back period: 6.0 months.

✓ IMPLEMENTATION:

M/S Nutch make FRP fan-less cooling tower (500 IGPM) has installed to increase capacity of existing cooling tower from 1000 IGPM to 1500 IGPM.

11. PROJECT: COMPACT FLOURECENT LAMP IN PLACE OF HIGH PRESSURE MERCURY VAOUR LAMP.

125-watt High Pressure Mercury Vapour (HPMV) lamps had been replaced by 23 watts Compact Fluorescent Lamp (CFL).

✓ OBSERVATIONS MADE:

Illumination of Compact Fluorescent Lamp (CFL) is same as High Pressure Mercury Vapour (HPMV).

✓ TECHNICAL & FINANCIAL ANALYSIS:

- Capacity of CFL: 23.0 watt
- Project Cost: Rs.35000/-
- Power saved: 17136 kWh/yr
- Annual saving: Rs.63917/-
- Pay back period: 7.0 months.

✓ IMPLEMENTATION:

Twenty nos. High Pressure Mercury Vapour (HPMV) lamps had been replaced by 23 watts Compact Fluorescent Lamp (CFL). Remaining 25 nos. will be done during 2004-05.

12. PROJECT: POWER FACTOR IMPROVEMENT BY INSTALLATION OF CAPACITOR BANK.

Improvement in power factor is done installing additional capacitor bank.

✓ OBSERVATIONS MADE:

Illumination Power factor is maintained greater than 0.995. Rebate obtained from MSEB is 31.97 Lakhs.

✓ TECHNICAL & FINANCIAL ANALYSIS:

- Capacity: 300 KVA
- Project Cost: Rs.300000/-
- Rebate obtained: Rs.3197000/-
- Power saved: 857105 kWh/yr
- Pay back period: 1.0 month.

✓ IMPLEMENTATION:

Six number capacitor banks installed to improve power factor.

13. PROJECT: GENERATION OF FLASH STEAM USING HIGH PRESSURE CONDENSATE.

All high-pressure condensate steam trap have been connected to newly commissioned flash tank. Generated flash steam will be used as a heating medium for Lithium Bromide Absorption Refrigeration System.

✓ OBSERVATIONS MADE:

Around 1500 Kg/hr of pressurized condensate gets generated from P-4. Before implementation, all condensate was going to central cooling tower, increasing heat load on cooling tower.

✓ TECHNICAL & FINANCIAL ANALYSIS:

- Project Cost: Rs.100000/-
- Annual steam saving: 1150800 kg/yr
- Annual Furnace oil saving: 82406 lit/yr
- Energy saved: 755 M kcal/yr
- Annual saving: Rs.976511/-
- Pay back period: 1.0 month.

✓ IMPLEMENTATION:

10 numbers of steam traps from ONC-PNC fractionation system have been connected to new flash tank. Around 130 to 140 Kg/hr of steam gets generated at 0.8 to 1.0 Kgf/cm2g pressure. More number of traps are to be connected during 2004-05.

14. PROJECT: LITHIUM BROMIDE VAPOUR ABSORPTION SYSTEM FOR CHILLED WATER GENERATION.

The Lithium bromide vapour absorption chiller produces chilled water upto 4.5°C, waste steam as the driving source. The absorption chiller utilizes the latent heat released by the refrigerant (water) as it evaporates (in a closed pressure vessel) for cooling. Unlike a compression chiller, which uses a compressor to pressurize the vaporized refrigerant (Freon) and condenses it by cooling water, the absorption chiller uses an absorbent (LiBr) to absorb the vaporized refrigerant (water). The refrigerant is then released from the absorbent when heated by waste flash steam (0.2 to 0.5 kg_f/cm^2_g).

✓ OBSERVATIONS MADE:

Around 700-800 kg/hr flash steam generated from plants will be used for absorption unit.

✓ TECHNICAL & FINANCIAL ANALYSIS:

▪ Project Cost:	Rs.1900000/-
▪ Annual estimated saving:	Rs.2500000/-
▪ Chiller capacity:	98 TR
▪ Type of system:	Vapour absorption (LiBr)
▪ Chilled water temp: Drop	11°C to 7°C
▪ Heating medium:	Flash steam at 0.2 to 0.5 kg_f/cm^2_g.

✓ IMPLEMENTATION:

Purchase order has been placed for vapour absorption chiller unit. Absorption unit will get commissioned in December 04.