NATIONA ENERGY CONSERVATION AWARD – 2004

SUBSECTOR: CHLOR-ALKALY

PRESENTATION BY

GUJARAT ALKALIES AND CHEMICALS LIMITED

CAUSTIC SODA PLANT

DAHEJ

UNIT PROFILE

GACL – Company promoted by Gujarat Government in the joint sector. Caustic Soda Plant having annual installed capacity of 116500MT along with 90MW Combined Cycle Co-generation Power Plant and 80TPD Phosphoric Acid Plant (technical grade). GACL markets its products all over India and exports many products. The Plant Technology is UHDE India Ltd., Mumbai. GACL contributes 16 % of total Caustic Soda Production in India.

“ENERGY MANAGEMENT POLICY”

At GACL, we are committed to minimize the Specific Energy Consumptions for our products to International Standards.

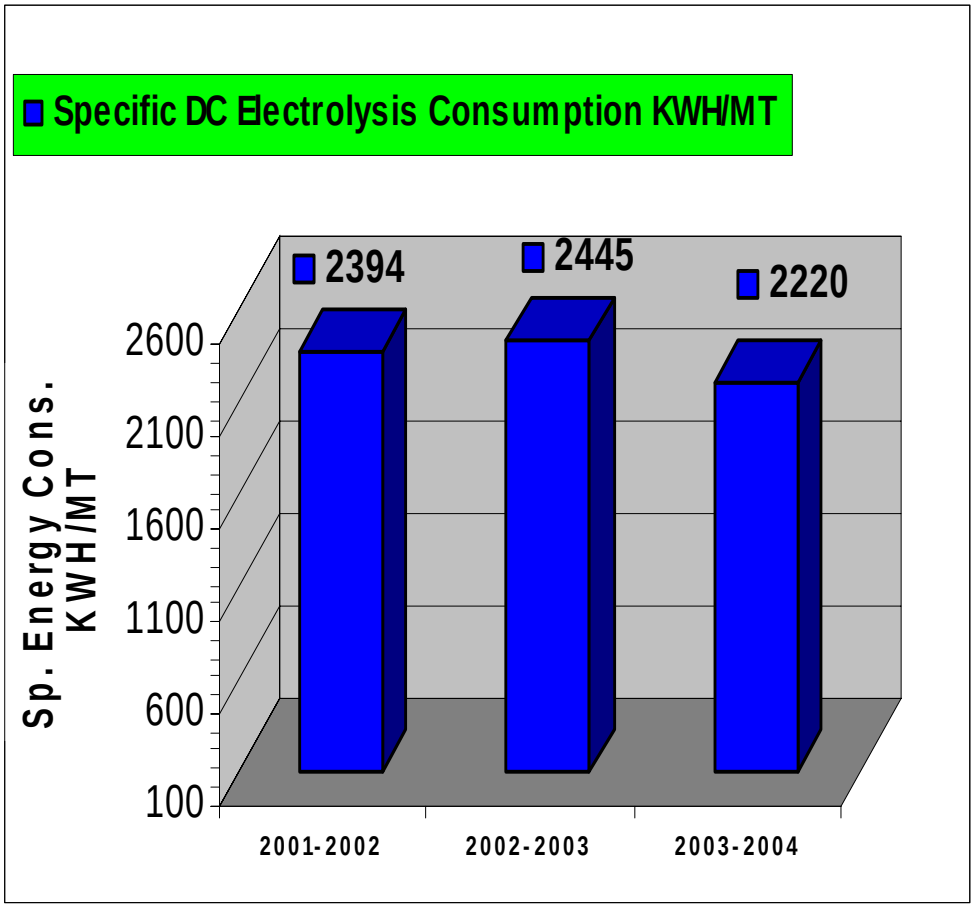
THROUGH

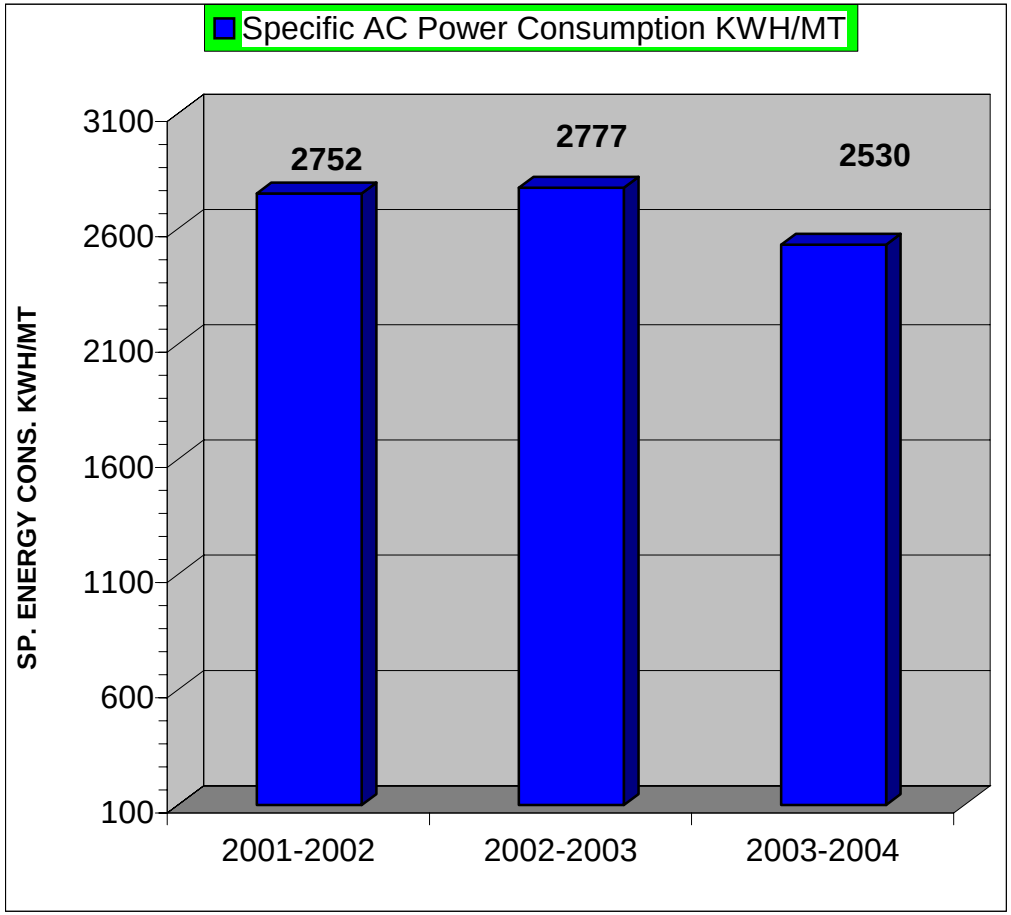
1. Maximizing the Capacity Utilisation.
2. Fine tuning our Operations and Maintenance continuously to achieve the above Goal.
3. Technology Up-gradation with energy efficient processes and equipments.
4. Motivating, Training and Encouraging our employees to achieve a target of reducing specific energy consumption by minimizing 1% every year till 2010 by Employee Awareness & Incentive Programes.
5. Promoting the use of renewable natural resources for sustainable development, safeguard the society and protecting the Environment.
6. Setting up a system to continuously monitor the progress.

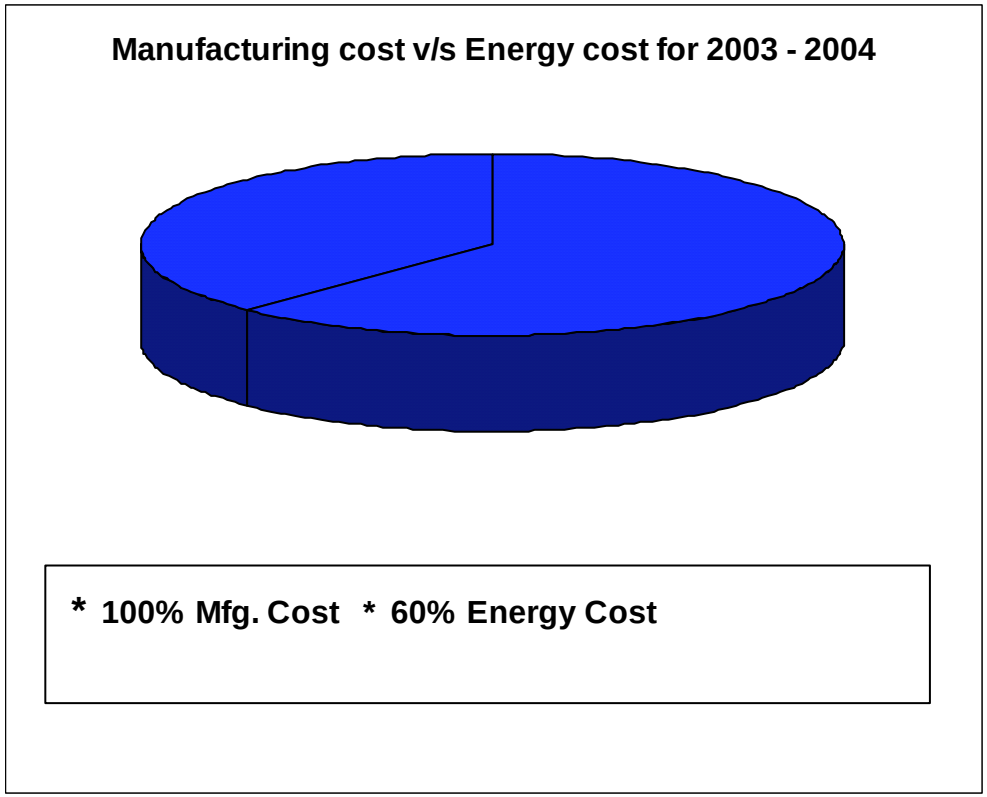
ENERGY CONSUMPTION

SPECIFIC POWER CONSUMPTION DETAILS	UNIT	2001-2002	2002-2003	2003-2004
Annual Production	MT	134354	141504	142205
Total Energy consumption per annum	KWH (lakhs)	3697	3930	3598
Total Thermal Energy Consumption	Million Kcal	60494	64070	56403
Total Manufacturing Cost in Rs. (lakhs)	Rs. Lakhs	23533	20166	19591
Total Energy Cost in Rs. (lakhs)	Rs. Lakhs	14331	11891	11851
Energy Cost as % of Raw-Material cost	%	61	59	60
DC Electrolysis Power Consumption	KWH/MT	2394	2445	2220
AC rectification power consumption.	KWH/MT	2456	2507	2277
AC Power Consumption with Auxiliaries & without CCU	KWH/MT	2752	2777	2530
AC Power Consumption with Auxiliaries & CCU	KWH/MT	2802	2820	2569
Auxiliary Power Consumption only	KWH/MT	296	270	253
Power Consump for CCU flakes & prills	KWH/MT	50	40	39
Steam Consumption	MKcal/MT	0.4503	0.4528	0.3966

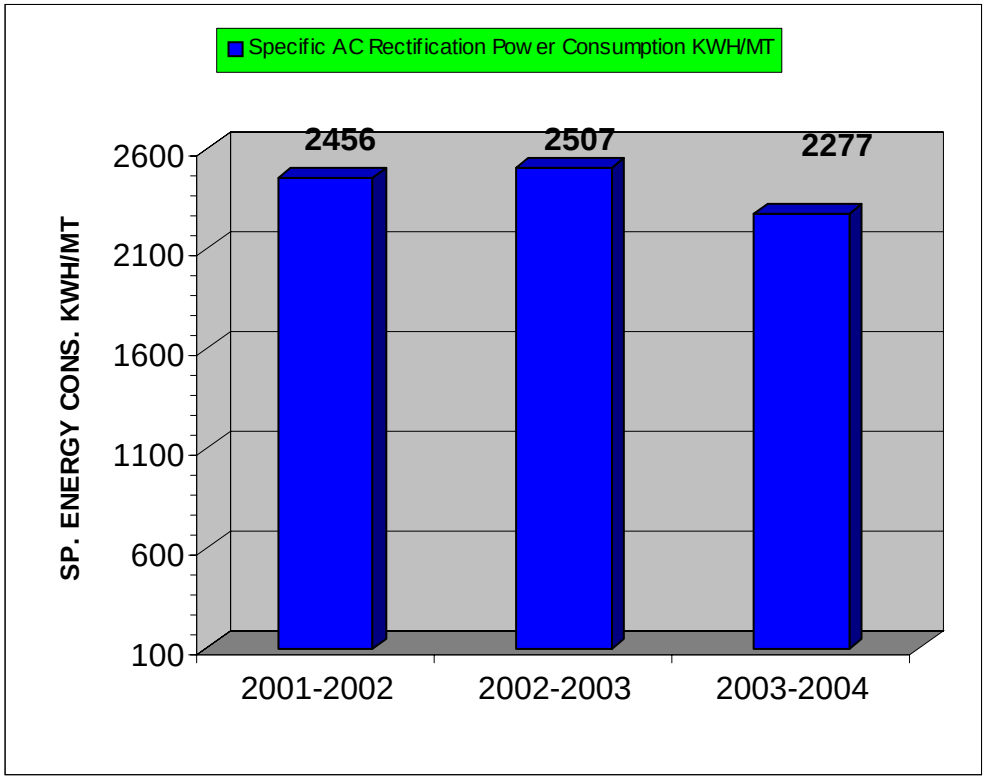
GRAPHICAL REPRESENTATION OF SPECIFIC ENERGY CONSUMPTION

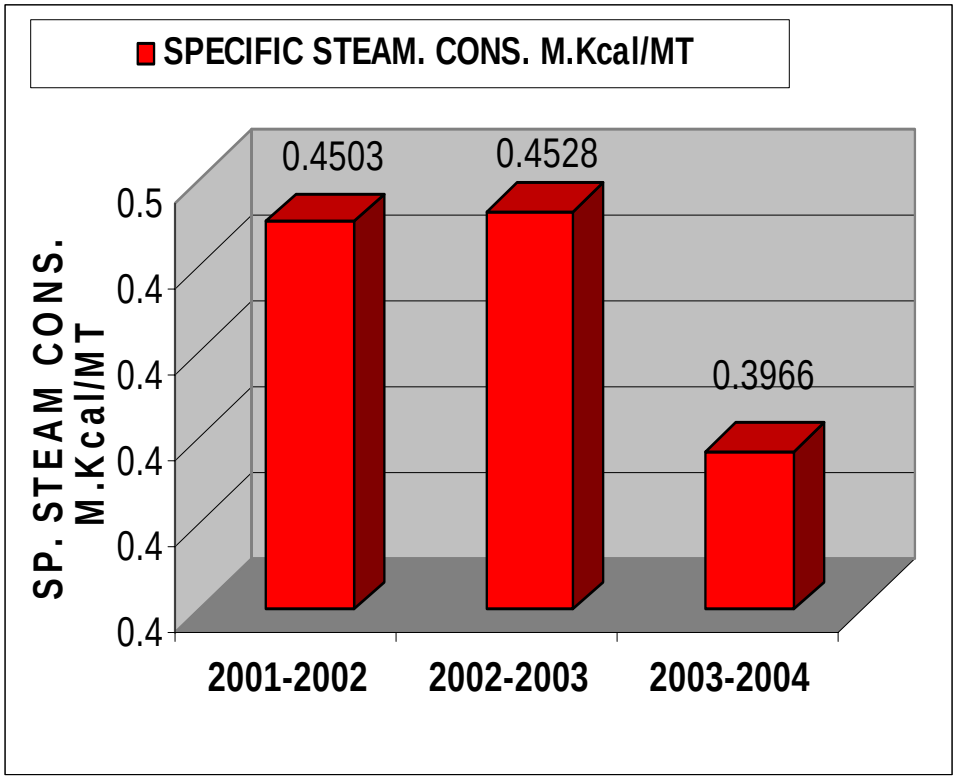






SP. ENERGY CONS. KWH/MT


Specific AC Rectification Power Consumption KWH/MT
SP. ENERGY CONS. KWH/MT
2600
2100
1600
1100
600
100
2456
2507
2277
2001-2002
2002-2003
2003-2004


SPECIFIC STEAM. CONS. M.Kcal/MT
SP. STEAM CONS. M.Kcal/MT
0.5
0.4
0.4
0.4
0.4
0.4
0.4503
0.4528
0.3966
2001-2002
2002-2003
2003-2004

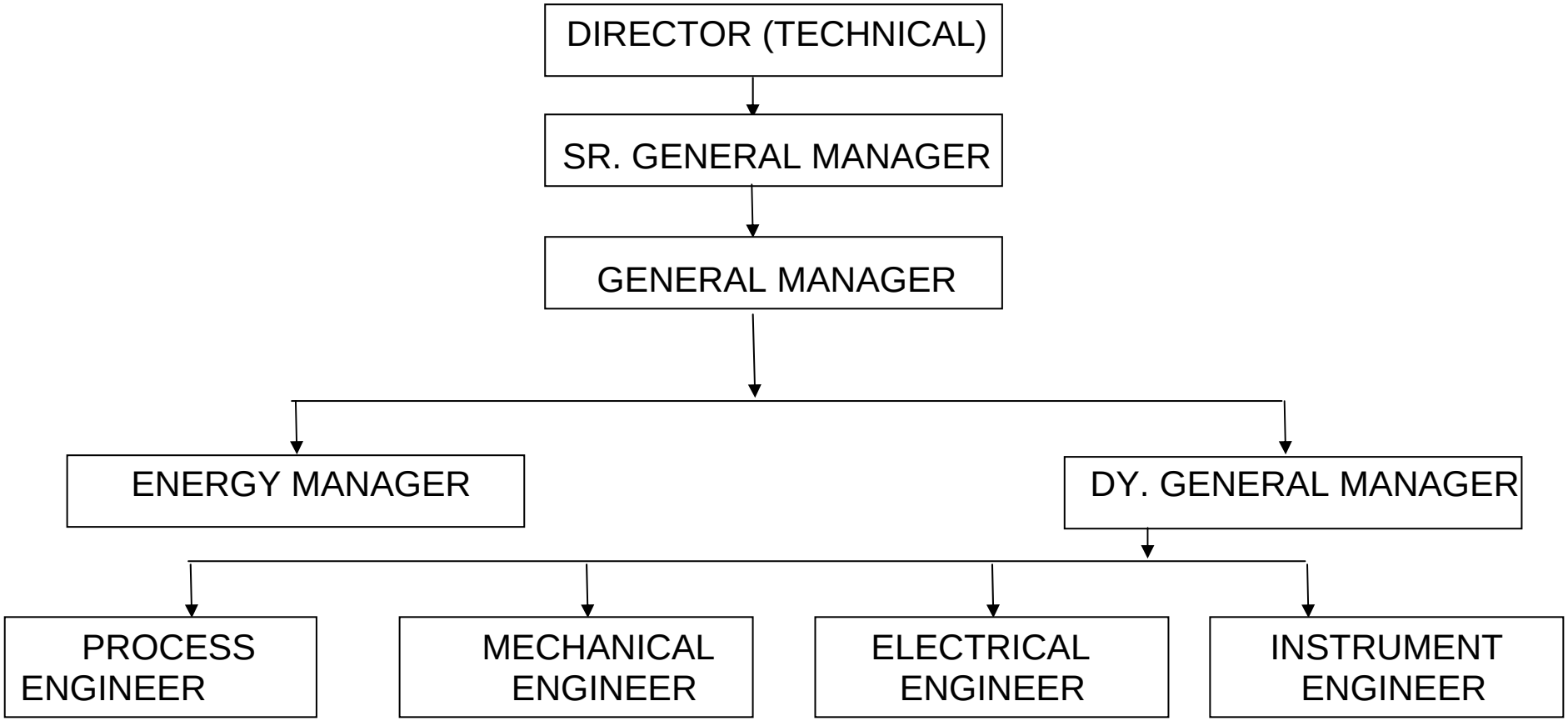
ENERGY CONSERVATION POLICY & SET UP

SALIENT FEATURES OF ENERGY CONSERVATION CELL:

We have our own Energy Conservation Cell at Dahej Complex, headed by General Manager (D) assisted by Energy Manager and supported by two Engineers from each department forming a team. This team finds various energy saving potential in their working areas, brings the proposal to Energy Cell for elaborate discussions and brain storming sessions for finalization and implementation. We are committed to fine tuning operations & maintenance continuously to achieve the goal. Technology up gradation with energy efficient process and equipments. Motivating, Training & encouraging our employees to achieve a target of reducing specific energy consumption by minimizing 1% every year. Promoting the use of renewable natural

resources for sustainable development, safeguarding the society and protecting the environment. Setting up a system to continuously monitor the progress.

ENERGY CONSERVATION CELL STRUCTURE



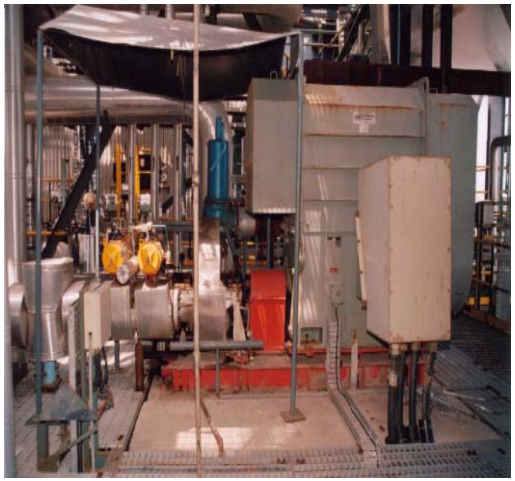
ENERGY CONSERVATION ACHIEVEMENTS DURING 2003-04.

GACL has implemented many energy saving proposals of small, medium & large scale. We have substituted Naphtha with Natural Gas, low pressure Natural Gas which was being flared at ONGC gas fields instead of high pressure Natural Gas. Retrofitting of luminaries, Mini STG of 800 KW across I.P. PRV and replacement of old membranes

with new membranes. During 2003-04 with energy conservation measures, we have saved an amount to the tune of Rs. 1290/- Lakhs.

MAJOR ENERGY CONSERVATION PROJECTS IMPLEMENTATED DURING THE YEAR 03-04.

1) Installation of mini steam turbo generator.

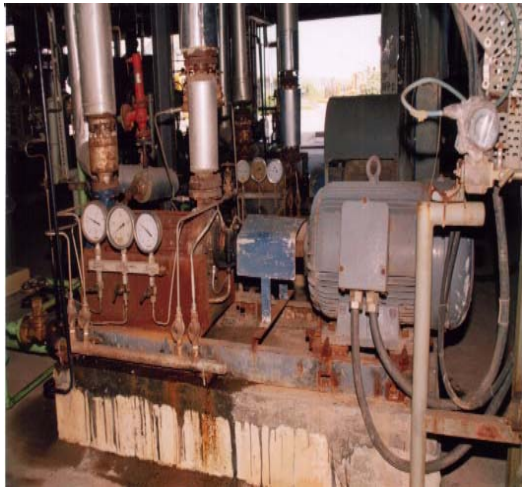


Mini Steam Turbo Generator of 800 KW capacity has been installed in place of pressure reducing valve in intermediate steam pressure line to dearator at our waste heat recovery boiler. This way the energy which was not being used while reducing the pressure from 11kg./CM^2 steam to 1.2kg./CM^2 which is the pressure of dearator. The details are given below:

Total Investment : Rs. 129 Lakhs.

Capacity of Mini Steam
Turbine Generator Steam Input : 803 KWH at 20T / Hr
The average power generated per year : 11000 KWH/Day at 14.5 T/Hr Steam.
Total power generated : 3168000 KWH per year .
Total amount saved @ Rs. 1.9 per KWH is Rs. 60 Lakhs.
Payback period : 709 Days.

2) IPBFP modifications:



In the IP feed water circuit, 2nos. of IP feed pumps are provided. Both these pumps were required to be kept in operation prior to modification. The pumps were modified by increasing three more stages. With this, the pump capacity has enhanced and operation of only one pump is sufficient. Energy is being saved as detailed below:

Earlier power consumption by operating two pumps per hour = 63.25 KWH
Present power consumption by operating only one Pump = 43.12 KWH
Saving of Power = 20.13 KWH
Total Saving of Power per annum = 1.6 KWH
Lakhs
Total Net Saving of amt. per annum = Rs. 3.04
Lakhs
Total Investment = Rs. 3.00 Lakhs

3) Drinking Water line modifications :

Previously, drinking water was supplied with drinking water pump of 3.7 KW capacity. After connecting drinking water pipeline to the existing drinking water overhead tank, the pump was stopped permanently.

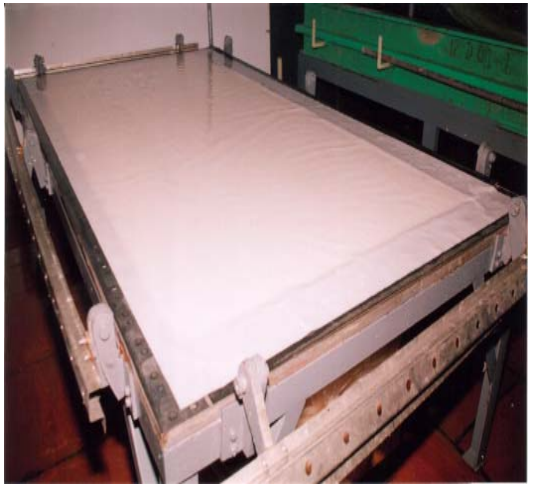
Power saved : 31000 KWH
Amount saved : Rs. 0.93 Lakhs
Investment : NIL

4) Installation of PRV in air line & reducing compressor pressure settings of loading / unloading.

Before modifications, power consumed by the air compressor was 81 KW during 80% of loading time and 54 KW during 20% of unloading time. Pressure settings before modification loading 7.4 Kg/cm^2 & 8.4 unloading. After modification settings change to 6.8 & 7.5 respectively.

Power consumed per hour
Before modifications was : 75.6 KWH
Power consumed per hour
After modifications/setting
Of loading/unloading
Pressure was : 70.2 KWH
Power saved per annum : 42768 KWH
Amount saved per annum: Rs. 1.28 Lakhs

5) New Energy Efficient Membranes Replacement.



Before replacement of the membranes, the specific power consumption is 2530 Kwh / MT
After replacement of the membranes, the specific power consumption is 2252 Kwh / MT
Net Energy Saving after replacement of Membranes 278 KWH/MT
Total Production for the year 142205 MT
Energy saved per annum 395.33 Kwh lakhs
Amount saved @ Rs. 3 per KWH
Per annum Rs. 1186 lakhs
Expenditure incurred Rs. 1580 lakhs.

6) Flare LP gas utilized.

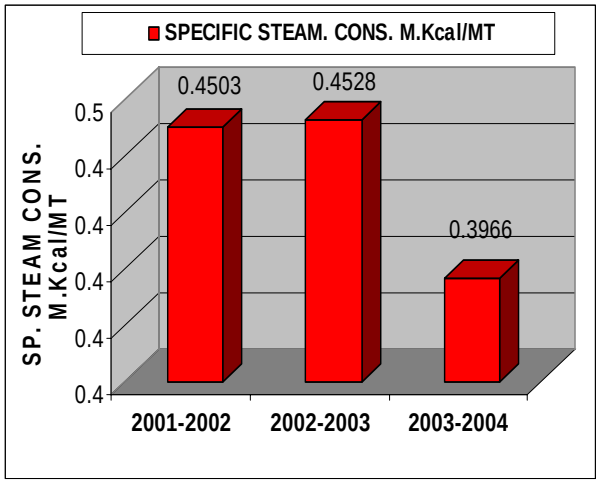
We are using high pressure Natural Gas as fuel for gas turbines. There are numbers of gas fields in and around Dahej – Gandhar area producing low pressure Natural Gas, part of which was being flared. We have tied up for the same with M/s. GAIL and we have installed compressors for increasing the low pressure gas to high pressure & this gas is mixed with our HP gas and utilized as fuel. With this, 60,000 M3 / day gas having 9500 Kcal / SM3 of net heat value is used i.e. 60,000 x 9,500 Kcal / day. This way the flared gas energy is being used which is economical also. With this arrangement, we have saved Rs. 376.0 lakhs / year by replacing low cost low pressure natural gas as against high cost high pressure natural gas. The cost of the project has been observed in the rate calculations.

7)Energy saved by stopping one number 75 KW, Bleach lye circulation pump.

By installing redox analyzer for monitoring the waste chlorinated air going to hypo plant, only one 75 KW pump was put in operation instead of two pumps which were in operation earlier.
With two pumps in operation the power consumed = 94 KW
With one pump in operation the power consumed = 50 KW
The power saved = 44 KW
Power saved per annum = 3.48 KWH lakhs
Amount saved per annum = Rs. 6.92 lakhs

8) Saving of Thermal Energy.

GACL has adopted a policy of leakage free plant. We have attended steam leakage points at 21 places. Frequent pop up of steam line safety valve at receiving end was stopped totally by reducing the steam pressure from 12 kg to 10 kg/cm^2. we have saved the thermal energy to the tune of 7792 MKcal per annum. With this we have saved an amount of Rs. 21.15 lakhs.



OTHER PROJECTS IMPLEMENTED DURING 2003-04.

1) Photocell control for lighting.

2) Stoppage of idle running of motors.

3) Electronic chokes in place of conventional chokes.

4) Thermal insulations provided wherever damaged.

5) Condensate water recovered from Hydrogen holder and other hot condensate blowdown points and diverted to cooling tower.

6) Switching off lights, fans, ACs, by individuals whenever offices are not occupied.

7) We have implemented the 5s' system (short, set in order, shine, standardize & sustain) for good & clean environment. Kaizens system has been implemented for improvement.

ENERGY CONSERVATION PLANS & TARGETS

Energy Saving Measure	Amount Saved (Rs.)	Investement (Rs. Lakhs)	Project*
Reduction of system power loss by relocation of p.f. at load end.	1.86	0.00	2004-2005
Improvement in flow of HP CW pump in CSP.	13.00	0.50	2004-2005
Improvement of volumetric efficiency of air compressors.	10.48	2.00	2004-2005
Operation of one pump for final effluent discharge to sea.	4.41	0.00	2004-2005
Improvement in performance of CW/DM pump in PAP/CSP by trimming the impeller..	13.13	0.30	2004-2005
Replacement of pump for final effluent disposal to lagoon.	2.52	0.40	2004-2005
Reduction of lighting voltage from 418 to 390 in 3 phase system by installing lighting transformer.	1.67	1.10	2004-2005
Waste Hydrogen gas & waste effluent will be used to produce CaCl2 flakes.	18.65	8.00	2004-2005
Hot Condensate at 70 ˚Crecovery Scheme from CaCl2, PAP & CSP which will be used to preheat the Deaerator make-up water.	41.00	24.00	2004-2005
Condensate recovery Water will be used in Cooling Tower as make-up water at 38 ˚C.	25.00	2.00	2004-2005
Rectiformer Control room split AC will be replaced by utilizing existing under utilized chiller capacity.	2.25	2.00	2004-2005
Existing Electrically operating water coolers will be replaced by utilizing existing under utilized chiller capacity.	0.09	0.09	2004-2005
Providing next higher size impeller and 55 KW in place of 45 KW motor in Pure Brine Pump the production will be increase by 15 MT due to which Auxiliary consumption will be reduced.	0.08	0.08	2004-2005
Replacement of existing cooling tower metallic fan by Energy Efficient	3.00	2.70	2004-2005

FRP Fan of Arrow Dynamically designed.			

ENVIRONMENT & SAFETY

Safety:

GACL, Dahej has a Safety Department maintains stringent safety standards and ensure that safety measures are being followed strictly.

We have a Central Control Room which functions round the clock with junior management level officers as In-charge. where an Engineer/Officer will be the in-charge who will co-ordinate and organize necessary help required from outside agencies as well as In-house in case of emergency.

As we manufacture chlorine gas at GACL, Dahej and also are having the facility of storing liquid chlorine in the bullets, necessary safety requirement and standards are followed strictly. We also comply all the statutory Regulations and Acts, the same are enforced and are being reviewed time to time without fail. The statutory measures are obtaining from different Government authorities are enclosed.

GACL, Dahej, has a First-Aid Centre in Complex managed by Doctor round the clock. An Ambulance is also readily available to shift the patients in case of emergency.

Environment:

As part of our culture, it is our endeavor to maintain all the plants with zero leakage of hazardous chemicals as well as steam air and water. We have special teams in each plants who monitors and ensures housekeeping of the highest standard. We have taken up drive of '5S' for upgrading our housekeeping standards to international level. As part of our management thrust, we have also teams for 'Kaizen' which means continuous improvement in all fields.

For improvement of environment, we have taken up massive tree plantation programme in the large area where earlier Babool jungle was existing. Details of tree plantation, raw water harvesting, vermicomposting activities and effluent recovery for improving environment are given below:

i) Tree plantation & drip irrigation:

Out of 100 hectors of available land in our complex, we have covered 30 hectors of land with 71,000 tress & 5.15 hectors of land with gardening.

In the year 2003-04, 12 hectors of area was covered with 30,000 trees. Also, we are having portable network for drip irrigation system.

ii) Water harvesting:

We have made 10 nos. of earthern ponds in last two years with total water storage capacity of 35,750 M3 in our complex to fulfill our water requirement for large scale plantation activity.

iii) Recovery of $CaCl_2$ from effluent:

Our effluent from Phosphoric Acid Plant contains 18% $CaCl_2$. We have recently installed a plant to recover that $CaCl_2$ to produce 50 TPD $CaCl_2$ (100% basis). This has reduced effluent load by approximately 200 M3/Day and in form of condensate recovery, conservation of water is achieved by approximately 140 M3/day.

iv) Vermicomposting of canteen waste.

We have recently started vermicomposting of all our canteen waste. By which we are generating valuable vermicompost for use in greenbelt / garden from canteen waste.

SHE POLICY

GUJARAT ALKALIES AND CHEMICALS LTD.

We are committed to ensure safe, healthy and clean Environment to our employees and the society

Through

1. Selection of state-of-the-art environment friendly technologies for our manufacturing processes
   a. To minimize waste & emissions.
   b. To conserve natural resources.
2. Pro-active "SHE" management system so as to:
   a. Fully comply with standards laid down by legislation and regulation.
   b. Provide the framework to set, review & improve safety, health & environment objectives and targets.
3. Appropriate information & training to employees & stake holders in matters pertaining to safety, health and environment protection.
4. Involvement & dedication of one and all employees in "SHE" performance.
5. Revalidation of measures to control & contain hazards by periodic assessment of risk and by "SHE" audits.
6. Avoidance of all activities that will have an adverse

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5. Promoting the use of renewable natural resources for sustainable development, safeguarding the society & protecting

GACL, Dahej Unit is the latest Caustic Soda Plant, we have taken utmost care in selecting the equipments to their best operating efficiency. But still our efforts will be on for continuous implement in achieving energy savings. In future, we are going for many expansions in our industrial campus where we will take care in selecting energy efficient equipments.