SHRIRAM ALKALI AND CHEMICALS
Jhagadia, Dist. Bharuch (Gujarat)

Unit Profile

SHRIRAM ALKALI & CHEMICALS (SAC) is a 62,500 tonnes per annum Chlor Alkali Plant situated at Jhagadia (Distt Bharuch , Gujarat) based on state of the art membrane cell technology and integrated with energy efficient captive co-generation plants with 5 nos. DG sets of 3 X 6 + 2 X 3MW .

The unit is manufacturing caustic soda lye, caustic soda flakes, chlorine , hydrochloric acid & hydrogen since March'1996

The major raw materials are common salt and power.

The installed capacities of various products being manufactured at the unit are as follows:

	Product	Capacity (TPA)
1.	Caustic soda lye	62500
2.	Caustic soda flakes	33000
3.	Chlorine	54000
4.	Hydro chloric acid	12000
5.	Hydrogen	1560

Energy Consumption

The Caustic Soda plant is having state-of-the-art membrane cell energy efficient technology supplied by M/s Asahi Chemicals Industries, Japan. The electrical energy consumed for the year 2003-04 is 1858 Lakh Kwh

There has been a continuous decease in the specific energy consumption due to implementation of various energy conservation measures.

1. Reduction in specific power consumption for caustic soda production

Normally the specific power consumption to produce caustic soda in membrane cell plant increases with ageing of membrane and cell units due to reasons given as follows:

➔ **Increase in cell voltage due to ageing of membrane**

- With deposition of calcium and magnesium on membrane, which enters the membrane cell (though in ppb level i.e. milligrams/MT) with feed brine, the resistance of membrane increases, resulting increase in cell voltage and hence power consumption.
- Reduction in active area due to patch welding on membranes for stopping the pin hole leakage, increases the voltage drop and the power consumption.

➔ Over potential (voltage drop) of anode and cathode also increases due to gradual de-activation of anodic and cathodic coating with ageing of cell units.

As per industry norms, the normal increase in power consumption to produce caustic soda on account of above two reasons, is 30 to 40 Kwh/MT every year.

Due to continuous efforts to conserve energy in all possible areas:

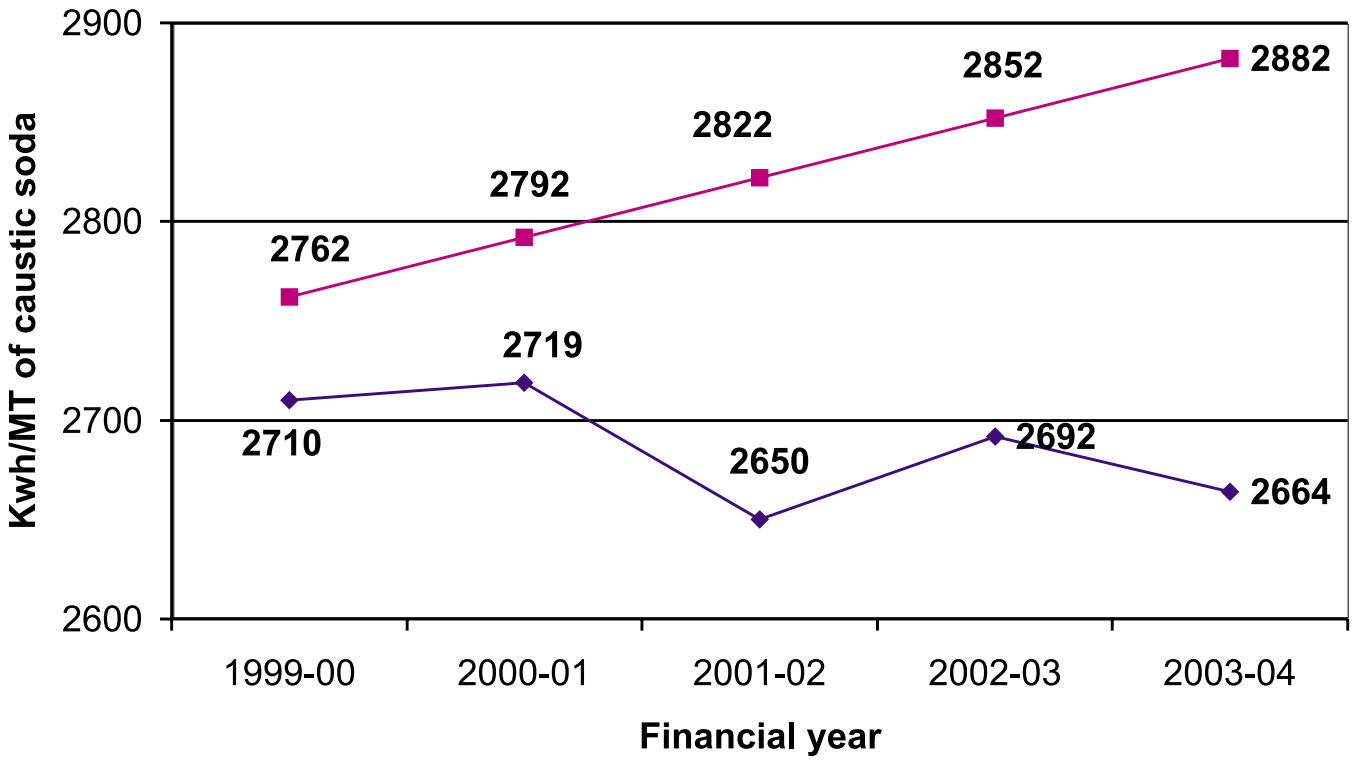
Actual power consumption has in fact reduced by **38 Kwh/MT** (from 2702 Kwh/MT in 1997-98 to 2664 Kwh/MT in 2003-04**)** instead of increasing (as per industry norms) **by 180-240 Kwh/MT** (from 2702 Kwh/MT in 1997-98 to 2882 ~ 2942 Kwh/MT in 2003-04) over a **period of six years.**

The effective **reduction** in **power consumption** is **218 KWH/T of caustic soda** over a base figure of 2702 KWH/T in 1997-98.

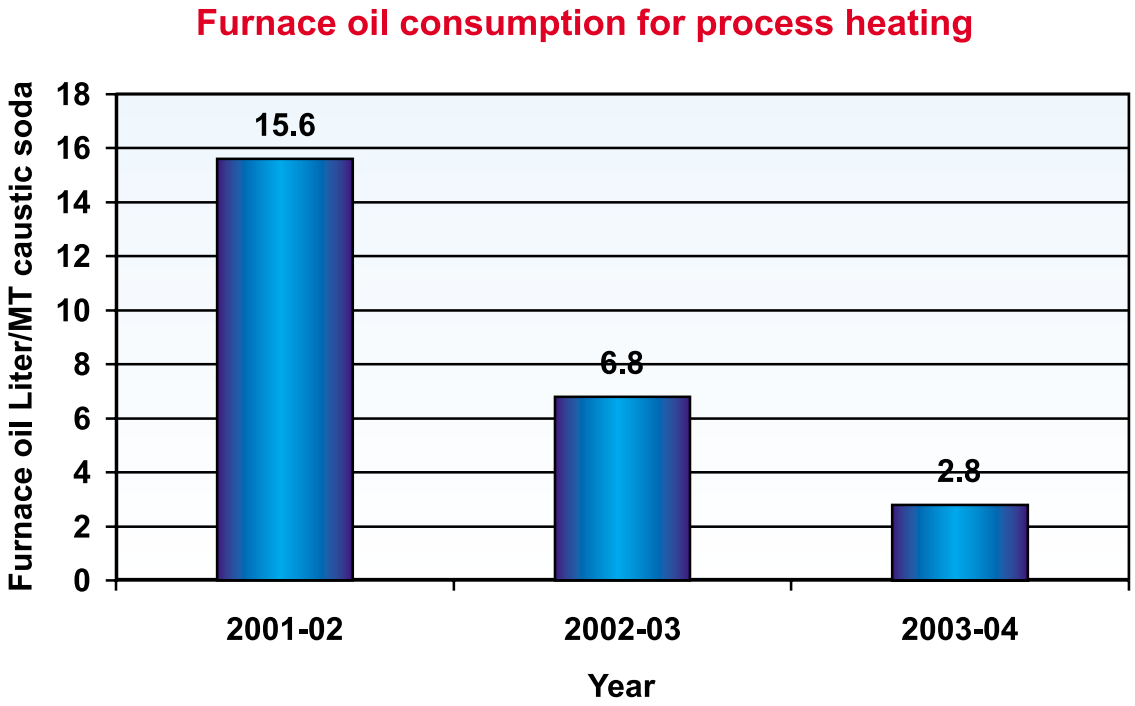
Specific power consumption (cell power + aux power) for caustic soda Production

Year	Target Based on base figure of **2702 KWH/T in 1997-98**	Actual	**Savings**
1999-00	2762	2710	**52**
2000-01	2792	2719	**73**
2001-02	2822	2650	**172**
2002-03	2852	2692	**160**
2003-04	2882	2664	**218**

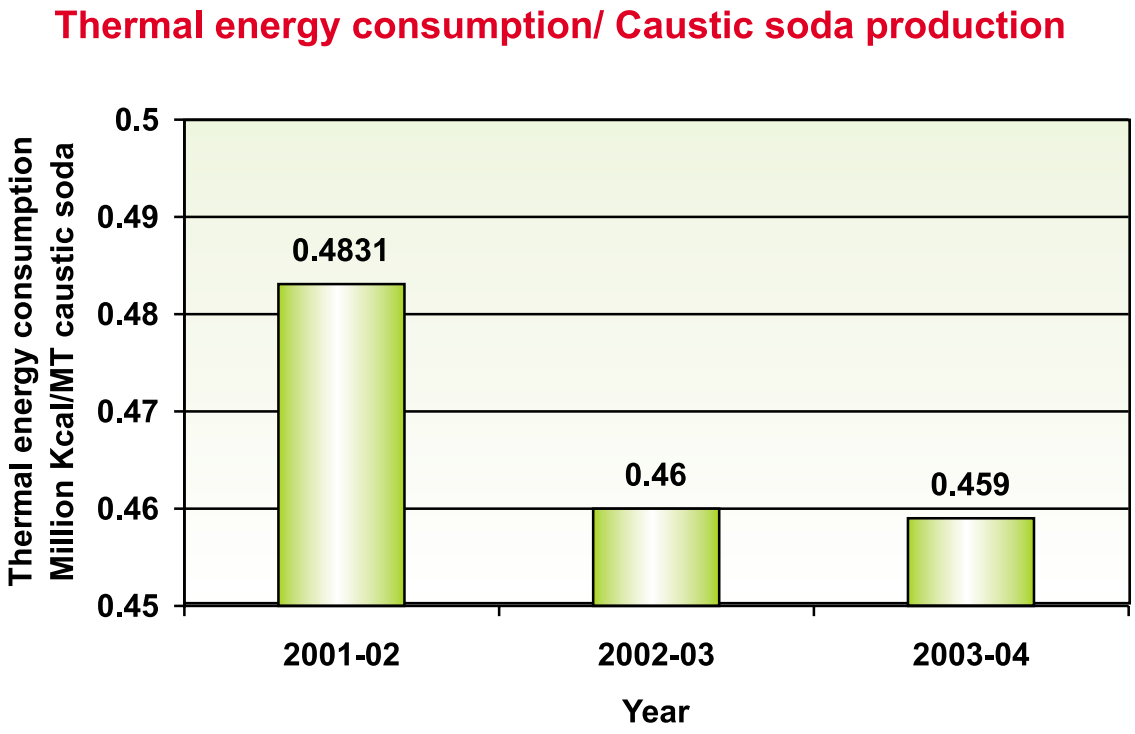
Specific power consumption



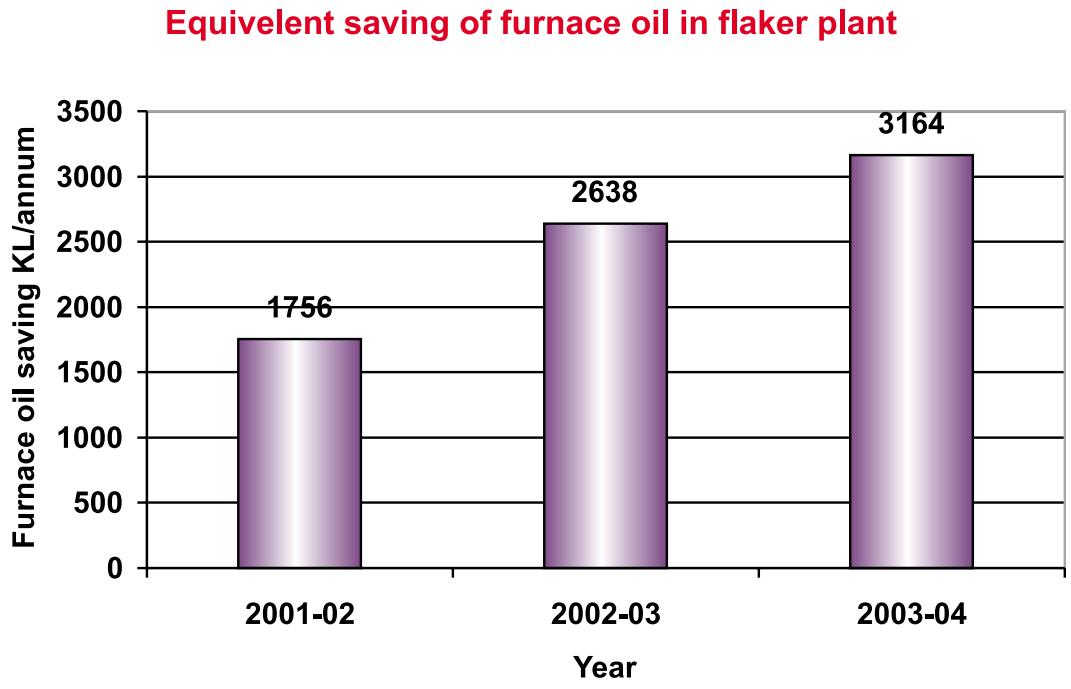
2. Reduction in furnace oil consumption for process heating (flaker plant + auxiliary boiler)



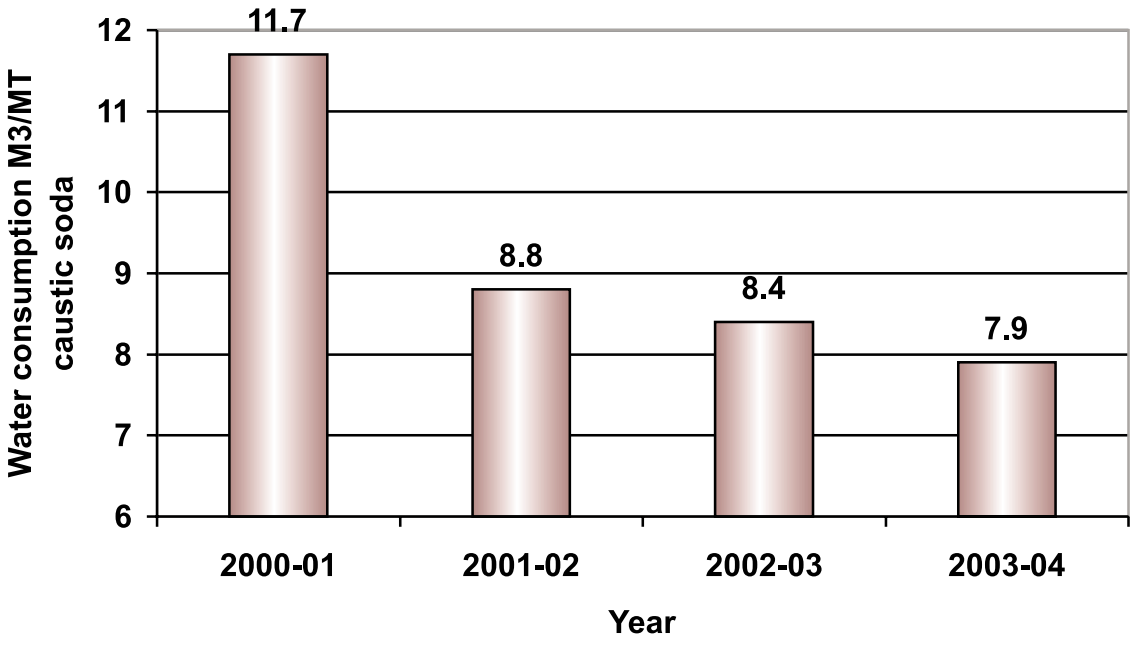
3. Reduction in thermal energy consumption in process



4. Saving of furnace oil in flaker plant by substituting it by waste hydrogen gas (earlier it was being vented)



5. Reduction in water consumption



Energy Conservation Commitment, Policy and Set up

The chlor alkali plant which has been set up at Shriram Alkali & Chemicals, Jhagadia (Bharuch Dist., Gujarat) is a state of the art membrane technology plant supplied by M/s Asahi Chemical Industries, Japan. The plant is highly energy efficient & environment friendly.

Ever since the commissioning of the plant in March '96, there has been a continuous & dedicated effort by the team to strive and make it the most energy efficient plant in the Chlor alkali industry.

To achieve this, the management led by a team of professionals has been continuously looking for area where improvement is possible.

The whole approach has been to identify the problems, evaluate them in the most analytical manner, make cross-functional teams, carry out root cause analysis and successfully implement energy conservation schemes. The benefits are then monitored on regular basis.

As a result, substantial gains & benefits have accrued to the unit in the field of energy conservation during the last three years, which have drastically reduced our cost of production.

Energy Conservation Achievements

Due to consistent all around efforts, The unit law achieved considerable amount of savings by implementation of various energy saving schemes.

During the period of 2001-2004 unit has achieved a **saving** of **Rs 1213 lakhs** with an **investment** of **Rs 495 lakhs.**

Major projects implemented during the year 2003-04 are listed below:

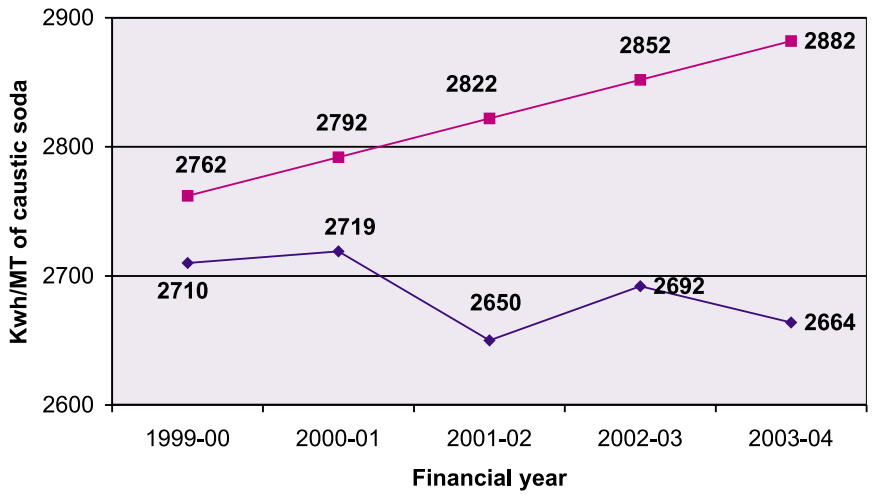
➔ **Reduction in specific power consumption for caustic soda production**

As explained above, the specific power consumption to produce caustic soda in membrane cell plant increases with ageing of membrane and cell units

As per industry norms, the normal increase in power consumption to produce caustic soda is 30 to 40 Kwh/MT every year.

Due to continuous efforts to conserve energy in all possible areas, **the actual power consumption** has been **reduced** by **38 Kwh/MT** (from 2702 Kwh/MT in 1997-98 to 2664 Kwh/MT in 2003-04**)**

Specific power consumption



The specific power consumption has been substantially brought down as follows :

Target		**2003-04**
	Based on base figure of 2702 **KWH/T in 1997-98 & industry norms of** 30 Kwh/Ton/year increase **due to ageing** of membranes/cell unis)	2882
Specific power consumption (Kwh/MT)		**2664**
Savings	- **Kwh/MT** of caustic soda	**218**
	(caustic production - MT)	(67826)
	- **Mwh/annum**	**14786**
	- **Rs./Lakhs/annum**	**296**
	(power cost Rs /kwh)	(2.0)
Investment	- **Rs/Lakhs**	**129**
Payback	- **Months**	**5**

Other projects implemented during the year 2003-04 are listed below:

Schemes	Power consumption (kwh/day)			Saving	Invest-ment	Payback
	Earlier	Now	Saving	Rs/Lakhs	Rs/Lakhs	Months
1. Reduction in power consumption for anolyte circulation pumps in all 5 electrolysers by installing **variable frequency drives**	1000	300	700	5.8	5.0	10
2. Reduction in power consumption by **eliminating** steam condensate **pump** requirement in caustic concentration plant (CCU).	53	0	53	0.4	NIL	-
3. Replacement of DM water pump (**1 pump for equivalent duty of 2 nos running pumps**) to **reduce power consumption**	216	120	96	0.9	0.4	5
4. Reduction in power consumption by replacement of process condensate pump for HPD plant by **energy efficient spare pump** available at another location	158	86	72	0.6	0.2	4
5. Reduction in power consumption by installation of Installation of reflex glass (**double glass arrangement**, 5 mm reflex + 6 mm existing tinted with 12 mm gap) in **power plant** control room	729	612	117	0.8	0.3	5

6. Reduction in power consumption by installation of Installation of reflex glass (**double glass arrangement**, 5 mm reflex + 6 mm existing tinted with 12 mm gap) in **main plant** control room	435	310	125	0.8	0.3	5
7. Reduction in specific power consumption for chlorine liquification by **changing of pulley** of Freon - A to increase the compressor capacity	5978	5790	188	1.2	0.2	1
8. Reduction in power consumption by providing of **delta star starters** for HFO separator motors	730	680	50	0.3	0.4	16
9. Reduction in power consumption by **switching off** of Non industrial lighting transformer (**saving no load loss**)	26	0	26	0.2	0.03	2
10. Reduction in power consumption by providing **auto stop function** based on temperature from DCS for **Cooling tower ID fan - A.**	864	784	80	0.2	0.03	2
11. Replacement of **V belt by flat belt** in freon compressor to reduce power consumption.	2441	2273	168	1	1	12
12. Replacement of body feed centrifugal pump by reciprocating pump	37	14	23	0.2	0.1	6
13. Substitution of furnace oil heating from 50 to 89^0 C before feeding to centrifuge from electrical heating to steam (generated using waste heat of flue gas).	1300	50	1250	9	1	1

Energy Conservation Plans and Targets

The company is consistently striving for further reduction in energy savings. Some of the energy saving schemes proposed for future are as follows:

- Replacement of cell units, which are consuming more power due to their deterioration of active anodes and cathodes surfaces with passage of time.
- Install variable voltage variable frequency drive for various pumps which normally do not run at its full capacity.
- Increasing the plant capacity by **de-bottlenecking** of the existing equipments to reduce auxiliary power consumption.

Environment and Safety

Safety and Environment have always been given top most priority at the unit: Some of the salient steps taken ever since the unit started commercial production in March.' 96 are highlighted below.

Effluent treatment plant

To insure compliance of the norms specified by the pollution control board, all the time, an auto pH correction system is installed in effluent treatment plant. This system makes pH correction of the effluent automatically and allows effluent to discharge only, if it complies with the norms specified by the pollution control board.

Installation of highly efficient waste centrifuge system

In place of conventional leaf filter highly efficient centrifuge system is installed for dewatering of brine sludge, generated from salt purification process. This centrifuge for dewatering converts slurry waste into sludge cake form, so that it can be disposed of without damaging the environment.

Secured land-fill type solid waste disposal facility

Despite the fact that the brine sludge is not categorized as hazardous waste, secured land-fill type solid waste disposal facility is created for the ultimate disposal of brine sludge. This waste disposal facility is as per National Productivity Council design and duly approved by Gujarat Pollution Control Board as well as district level and state level authority.

Air pollution control system

Chlorine absorption system is installed to absorb fugitive chlorine in caustic lye & convert into salable product i.e. Sodium hypochlorite.