

(i) COMPANY PROFILE

Chemfab Alkalis Limited was incorporated as a public limited company in 1983. It is the first Chlor-Alkali industry in India to adopt environment-friendly and energy efficient Ion Exchange membrane electrolyser technology in India for the manufacture of Caustic Soda and Chlorine.

The membrane cell technology totally banished the use of mercury, which results in significant power saving, which in the Indian condition is as good as power produced.

The company has received "National Energy Conservation Award" for the three consecutive years for excellence in energy conservation and management for the period 1995 to 97, from the Government of India.

AIMO (All India Manufactureres Association) Award, 1994 in appreciation and recognition of the pioneering efforts of CAL in successfully operating the **first Caustic Chlorine Plant**, manufacturing high quality grade Caustic Soda Lye and Hydrogen using latest state-of-art Ion Exchange Membrane Cell Technology.

FICCI (Federation of Indian Chamber of Commerce and Industries) Award, 1998 for Environmental Preservation and Pollution Control.

ICMA (Indian Chemical Manufacturers Association) Award, 1992 for Environmental Control Strategies and Safety in chemical Plants.

ICMA award 2003 for Water Resource Management.

(ii) ENERGY CONSUMPTION

By going in for membrane technology, the company could demonstrate a substantial savings in energy consumption for the manufacture of Caustic as compared to conventional mercury cell and diaphragm cells. The company is constantly in touch with the latest developments in this field to further bring down the specific energy consumption. Also there is reduction in furnace oil consumption for 48% from 163 KL to 85 KL this year despite increase in production from 29802 MT to 32616 MT (12 months annualised).

(iii) ENERGY CONSERVATION COMMITMENT, POLICY AND SET UP

The unit is committed to optimisation of energy utilisation. To reinstate this the company has adopted Environmental policy with greater thrust on energy conservation and prevention of pollution. The company has an energy conservation cell which is headed by Vice President operation.

The responsibilities of Energy conservation cell are, to implement and monitor the measures on energy conservation. Some of the responsibilities of Energy Conservation Cell are given below :

- 1) Effective utilisation of available power.
- 2) To look into the possibility of utilising non-conventional energy resources.
- 3) Improving the operational efficiency of the plant.
- 4) To conserve natural resources with a commitment to sustained environment.

(iv) ENERGY CONSERVATION ACHIEVEMENT

We are the first to **sell hydrogen in manifold** trucks to various consumer industries like vanaspathi, precision tool industries, electronic industries etc. sparing the consumers from using electricity for **captive hydrogen plant**. Prior to this, the plants were generating their own hydrogen, which was avoided by saving the nation more than **77.8 million units of power in the last 10 years**.

During the last three years, the company has adopted various energy conservation measures resulting in substantial saving in energy consumption. The main highlights are, utilising by-product Hydrogen as a fuel in place of furnace oil, installation of latest energy efficient bipolar cell technology, going in for high performance energy efficient membrane, waste heat recovery in caustic concentration plant, installation of variable speed drives for pumps, going for independent cathode coating application for electrolyzers.. The company has implemented the following energy conservation measures for the year 2003-04.

1. Cathode coating.
2. Narrow gap configuration

The above measures were implemented at a total cost of Rs. 33.44 Lakhs with an annual energy savings to the tune of Rs. 20.04 Lakhs.

The company has also increased the utilisation of Hydrogen, which is a by-product, as a fuel thereby substantially reducing the usage of furnace oil. Hydrogen utilisation for the year 2003-04 was 96.5% and the purchase of furnace oil reduced to 140KL from 253 KL of previous year 2002-03.

Thus Chemfab Alkalis Limited has embarked upon an ambitious project of optimal use of natural resources and energy and minimising the adverse impact on the eco system by prevention of pollution.

Installed Ultra Filter to recover entire quantity of cylinder cleaning water.

(v) ENERGY CONSERVATION PLANS AND TARGETS

- **Waste Heat Recovery :** Plan to recover waste heat to produce chilled water thereby saving energy. Estimate cost of the project is Rs.20 lacs and we expect a ROI of 1.1 year. Technique proposed is absorption refrigeration.
- **Ultra Filter System :** We are planning to go in for Ultra Filter System, which is the latest technology to ultra purify the brine to reduce suspended solids from 0.7ppm to < 0.2ppm in our plant. The conventional filtration has precoat filter, in which suspended solids are trapped. In the precoat filter, we need filter aid – Alpha Cellulose. By going for Ultra Filter, no filter aid will be used. The Ultra Filter automatically backwash and send out the suspended solid particles. We envisage annualised saving of Rs.45 lacs upon an investment of Rs.85 lacs.
- **Energy Conservation:** Study on new generation membranes and improved electrolyser components for better service and reduce power.
- **Inventory Control :** Reduction in raw-material consumption, chemical consumption, water consumption ,etc]
- **Desalination of sea water . :** To conserve the ground water by going for sea water desalination, though we will incur some power cost. We will be a **Trend Setter** in this area as we will be conserving ground water.

The company is actively working on all the above so that progress for most of the above proposals can be seen in the coming financial year.

(vi) ENVIRONMENT AND SAFETY

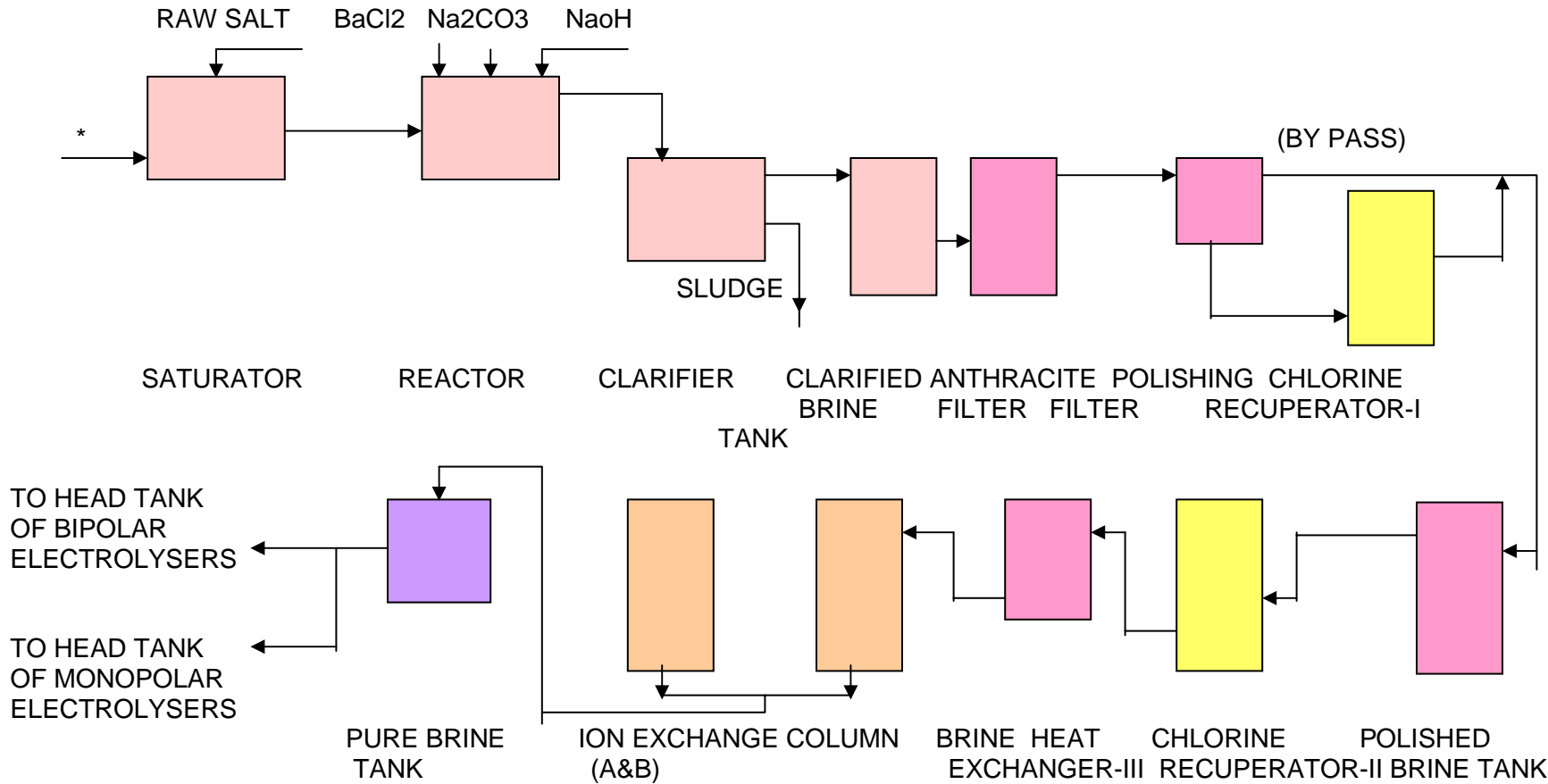
- Eco efficiency of CAL is 94% while the average of Indian Chlor-Alkali Sector is 54% as per study conducted by **Centre for Science and Environment (CSE)**, New Delhi. Recently we were awarded **THREE LEAVES** by **CSE** for corporate environmental performance and declared as the **GREENEST Chlor –Alkali plant in India**
- Chemfab Alkalis Limited is proud to be the first Chlor-Alkali Industry in India, to be certified the prestigious **BS EN ISO 14001 : 1996** by **M/s BSI for the manufacture of, Caustic Soda Lye, Chlorine, Hydrochloric acid, Compressed hydrogen gas, Sodium Hypo, Barium Sulphate** and associated site activities in accordance with the publicly available environmental policy. Also certified for **OHSAS 18001:1999**.
- We are the recipient of **ICMA award** in Nov-03 for excellence in **Water Resource Management** for the year 2002-03.

The company has elaborate pollution control and pollution prevention measures in place

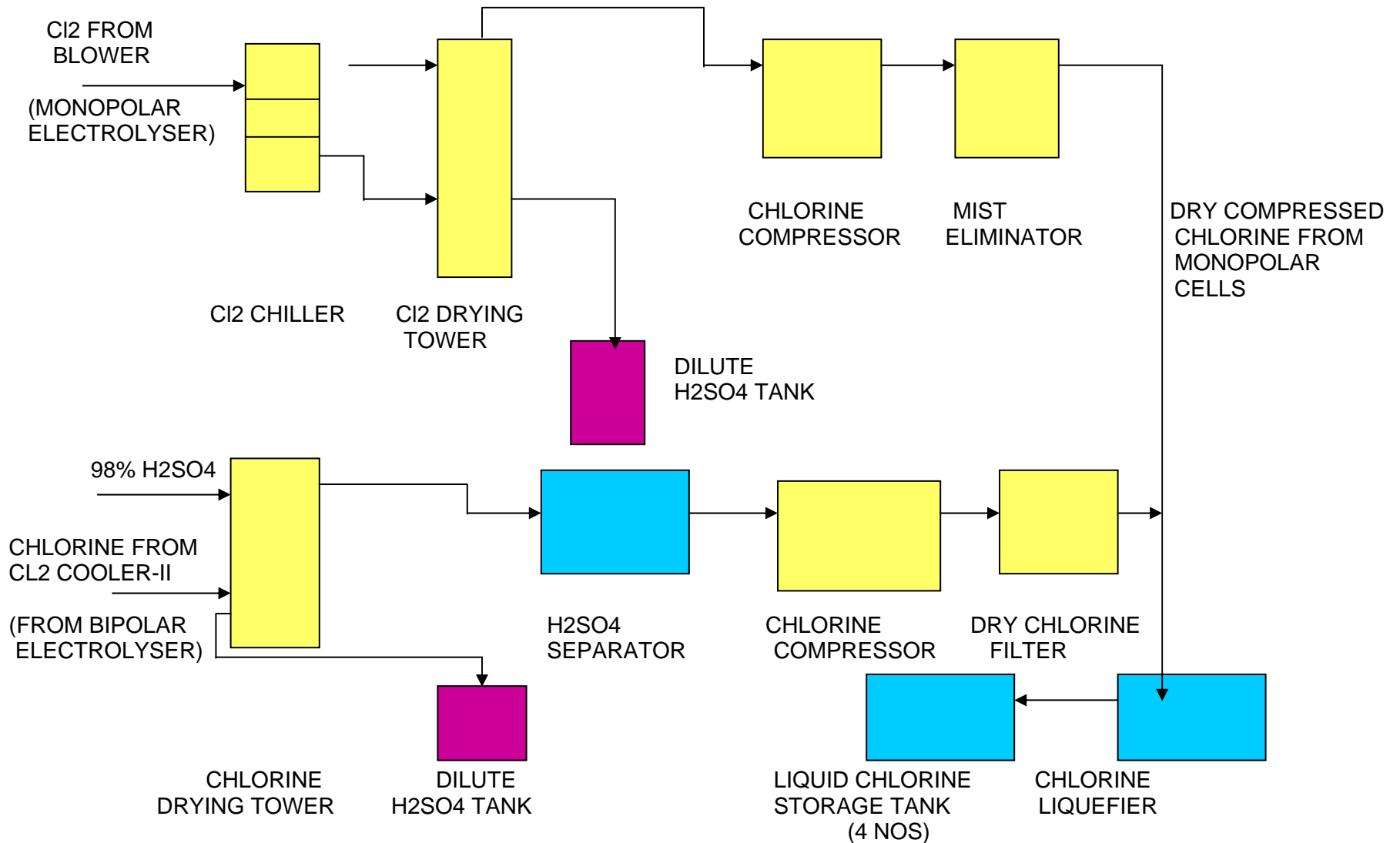
- An Environmental Quality Assessment was conducted by **M/s NEERI**. In the year 2001
- The effluent which is lowest in the national chlor alkali sector at 0.11 M³/MT of caustic had further come down to 0.1 M³/MT, almost reaching the global standards.
- solid waste generation is effectively reduced by recovering saleable Barium sulphate (A patented process standing in the company's name).
- a well drawn out emergency preparedness and response plan for tackling any emergency.
- CAL have made an Off-Site Emergency Plan in consultation with M/s CLRI.
- emission monitoring instruments placed at strategic locations for continuous air quality monitoring.
- promoting cleaner fuel of tomorrow "Hydrogen" more extensively. By using hydrogen and by avoiding furnace oil, we have reduced liberation of 5000 MT of Co₂ last year.
- quality assurance of raw-materials and chemicals to manage at source reduction in waste generation.
- a vast green belt with varieties of trees, plants covering more than 70% of the total area of the plant.
- regular safety audits by external agencies.
- a full fledged and active safety committee with due representation from all departments of the plant, safety consciousness in and around the plant.
- library consisting of valuable safety magazines, references, video films, floppies, etc., for constant knowledge up gradation.

PROCESS FLOW DIAGRAM FOR PURE BRINE PREPARATION

* LEAN / DEPLETED
BRINE FROM
MONOPOLAR &
BIPOLAR
ELECTROLYSERS

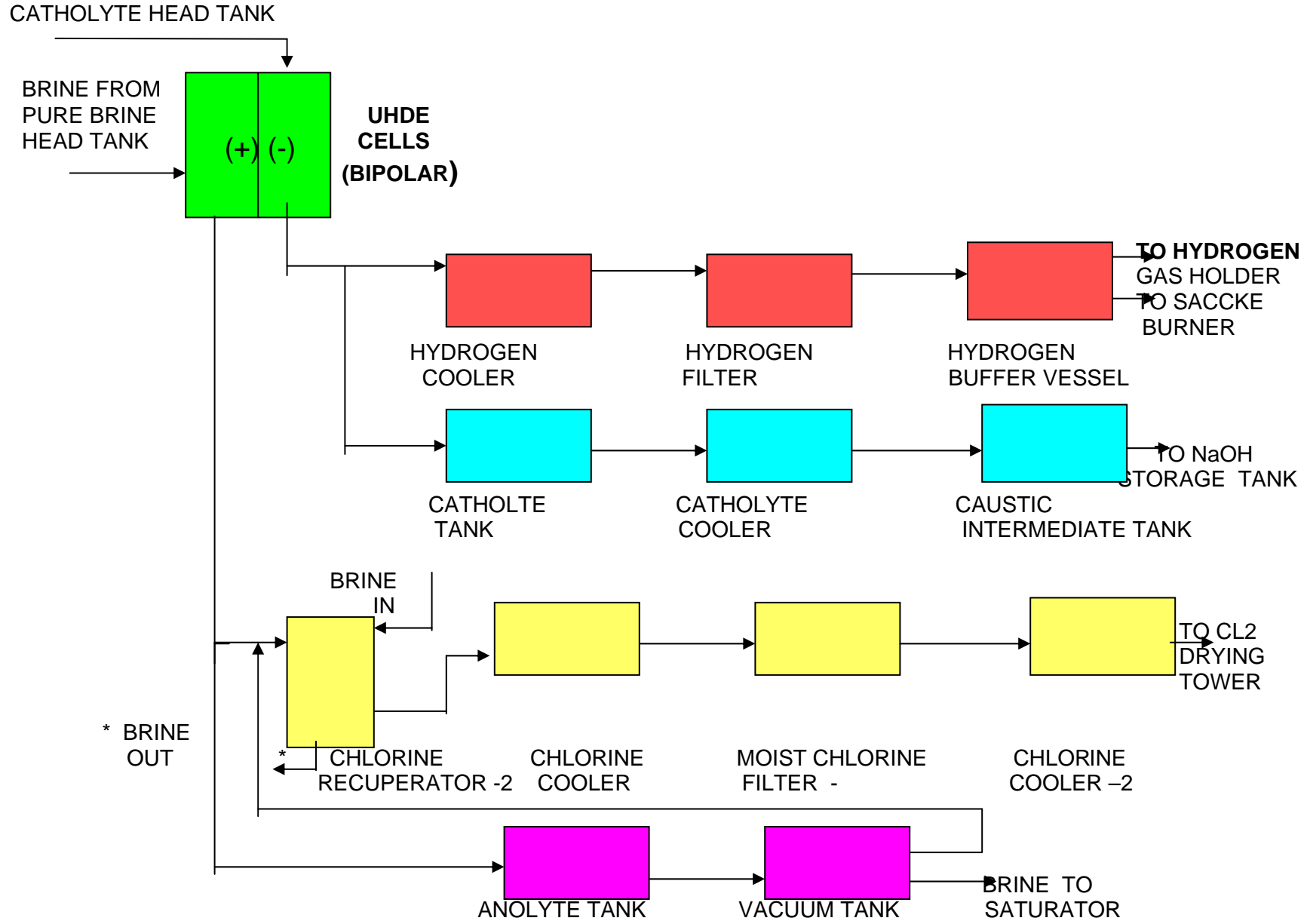


PROCESS FLOW DIAGRAM FOR CHLORINE DRYING & COMPRESSION

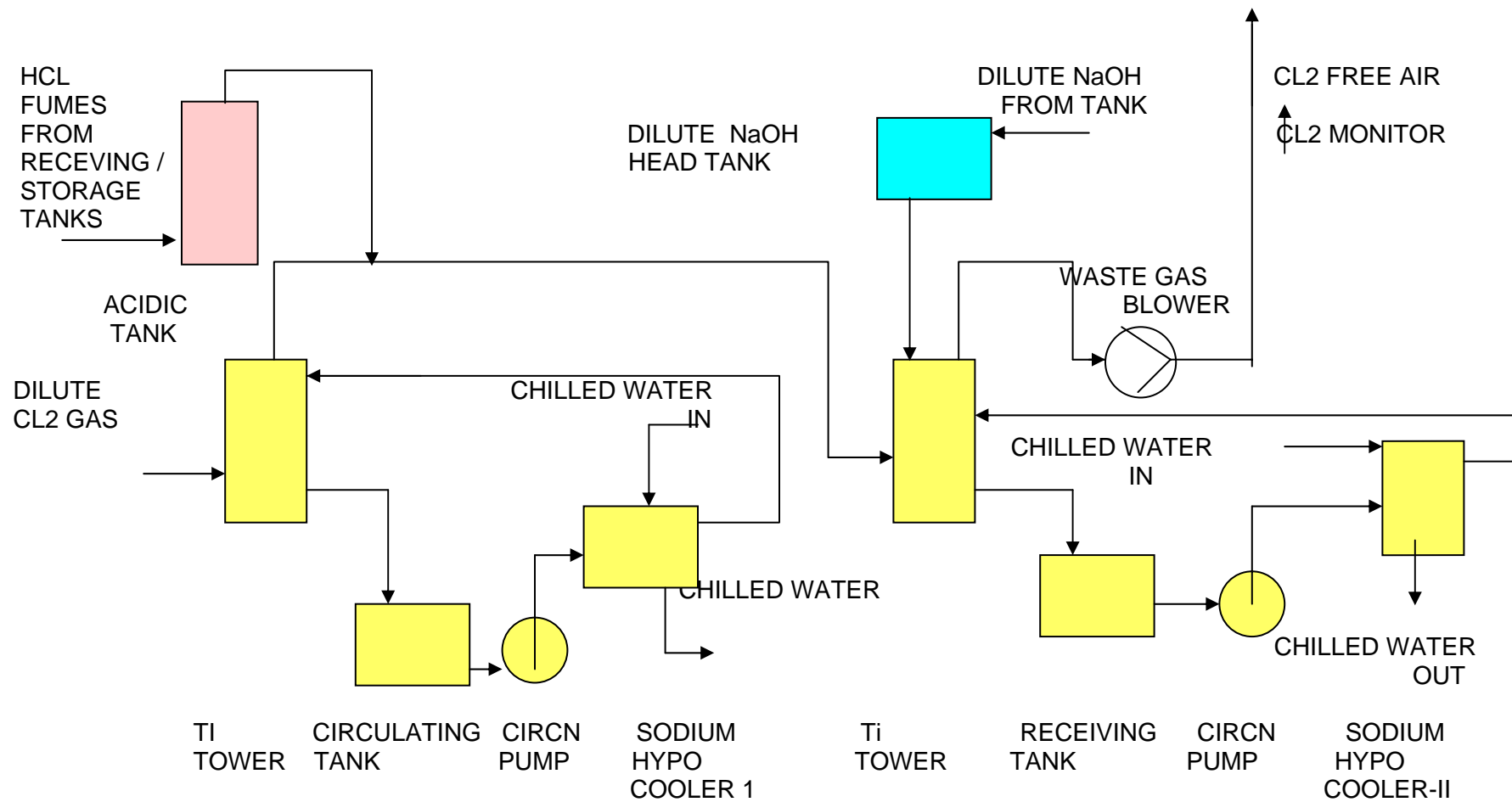


PROCESS FLOW DIAGRAM FOR BIPOLAR CIRCUIT

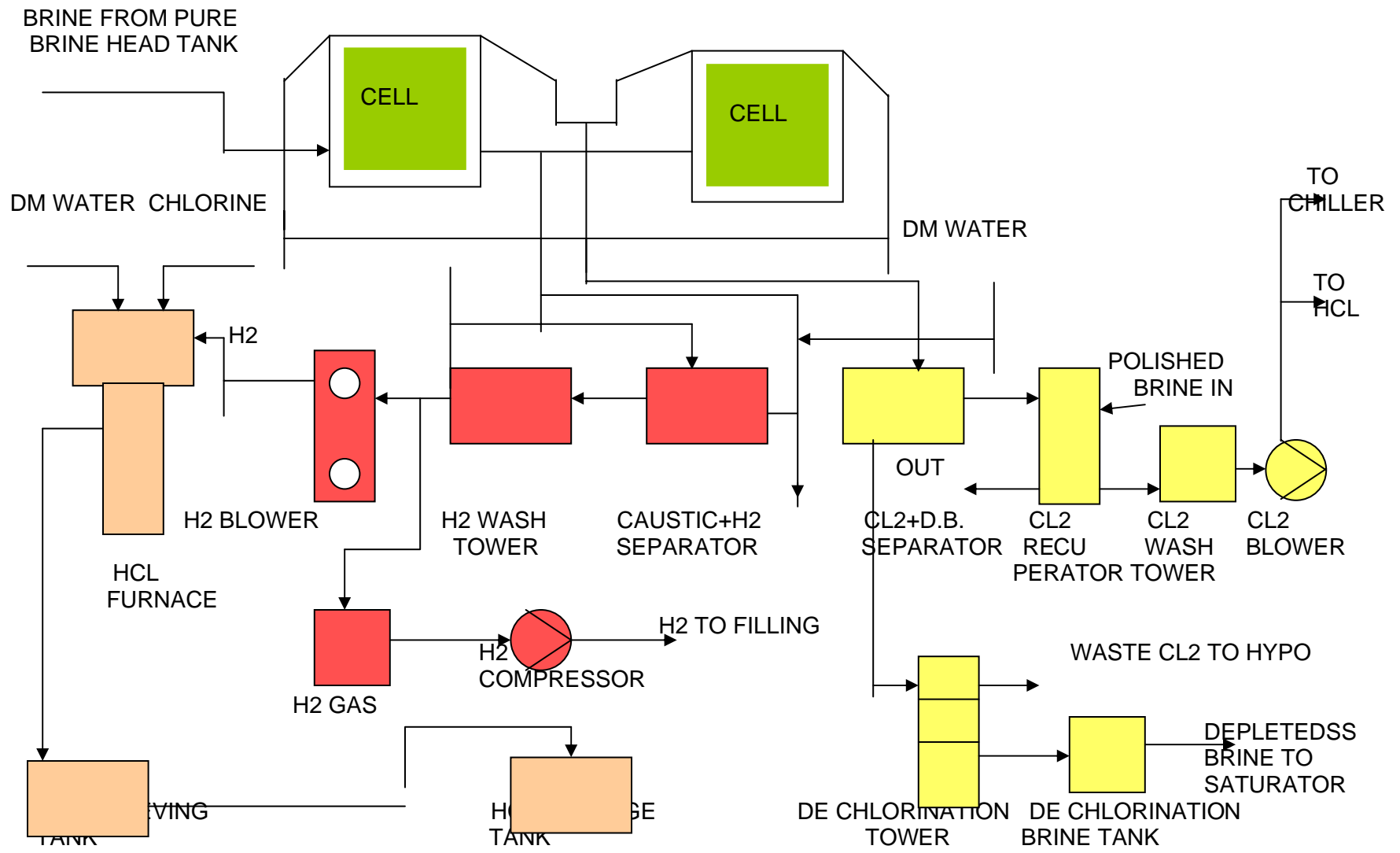
CAUSTIC FROM



PROCESS FLOW DIAGRAM FOR SODIUM HYPO

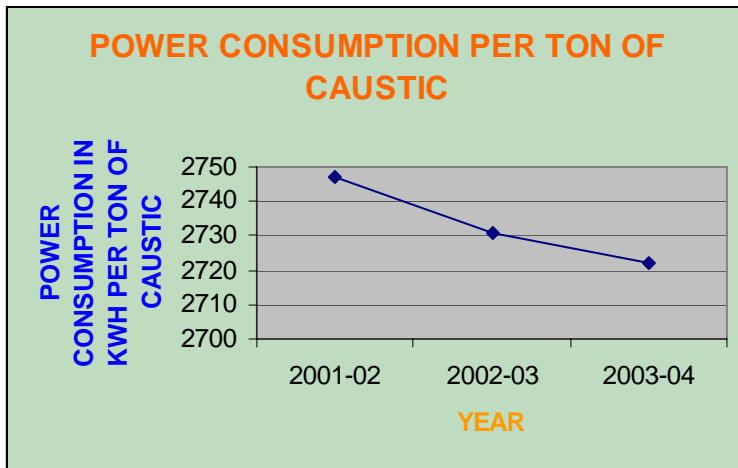


PROCESS FLOW DIAGRAM FOR MONOPOLAR CIRCUIT

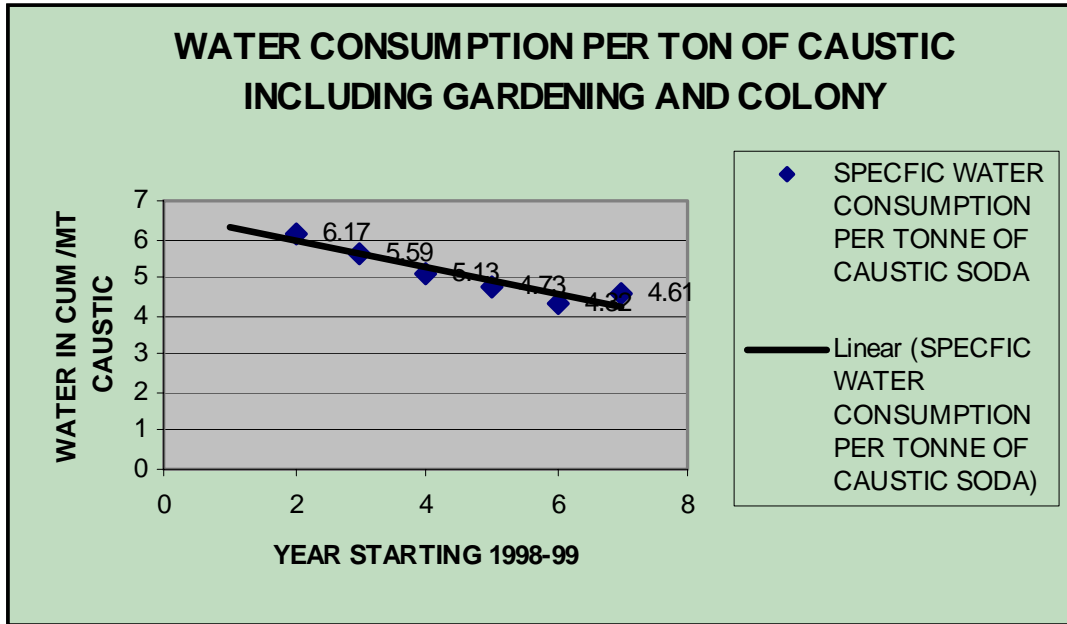


EXECUTIVE SUMMARY

- CAL has been rated as the **greenest chlor-alkali plant** in the country with following highlights by Centre for Science and Environment, New Delhi.
 1. The eco-efficiency of 94.7% as against Indian average of 54%.
 2. Best company in production and conversion stage with a score of 51.6% -- the only company to cross 50% in the rating.
 3. The best waste management company in the chlor-alkali sector.
- CAL has been awarded ICMA award for excellence in water resource management for the year 2002-03.
- The lowest effluent generating plant in the country.
- Promoted clean fuel and reduced liberation of CO₂ to the tune of 5000 MT in the last year thereby reducing green house effect to that effect.
- 1% reduction in power consumption in the last 2 years despite increase of production 7% by increasing the current density. Hence, the actual saving achieved is much more considered in the higher CD of operation.



- Specific water consumption has come down by 22% in the last 6 years.



- By bottling hydrogen and selling the same the company has saved the nation's electricity to the tune of 77.8 million units in the last 10 years as otherwise the conventional water electrolysis was used for producing hydrogen inefficiently. Thus, energy conservation accomplished by CAL for the clients also.