Tata Chemicals Limited
Soda Ash Plant, Mithapur (Gujarat)

Unit Profile

Established in 1939, Tata Chemicals Limited (TCL) operates largest and most integrated inorganic chemicals, also manufacturing food additives. Soda Ash Plant is having annual installed capacity 875000 MT alongwith 70 MW Cogeneration Power Plant and 500000 MTPA branded Salt. TCL contributes 34% of total soda ash production and 40% in total branded salt in India.

Energy Management Approach

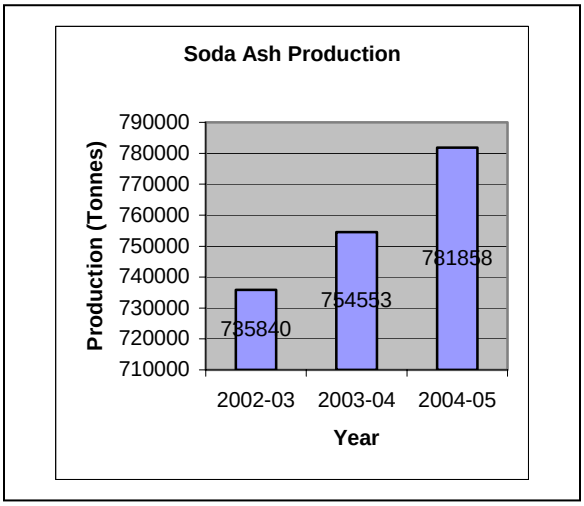
We, TATA Chemicals Limited commit our self to continuously improve energy performance in all our activities, products and services so as to make it environmentally sustainable.

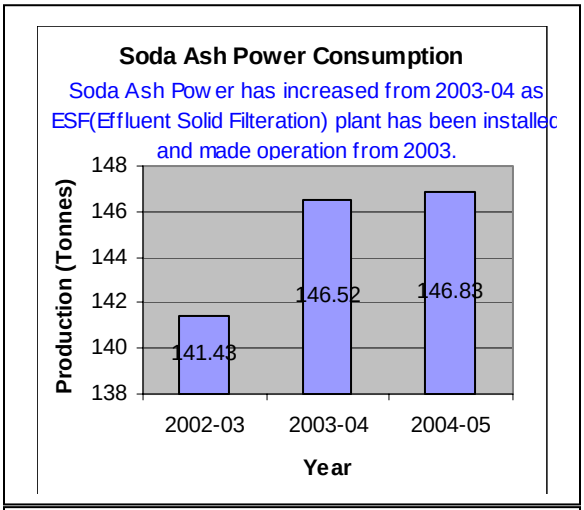
We focus Energy Management through,

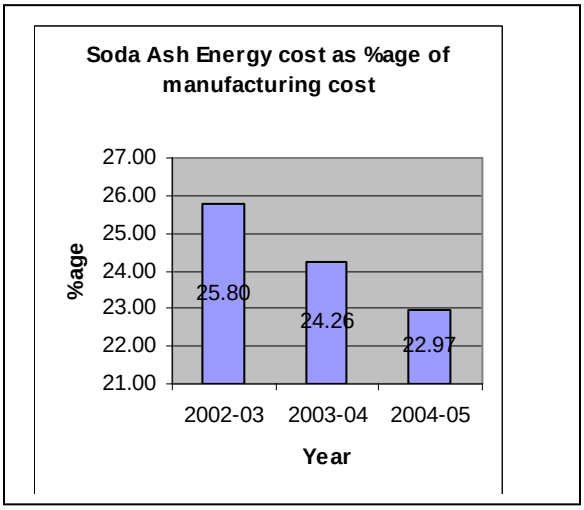
- Maximization of Co generation and waste heat recovery
- Manage efficiently utilization of energy resources (like coal, coke)
- Conduct conservation study including audits by engaging cross-functional team and external specialists.
- Creating awareness among employee, suppliers and partners in energy conservation for sustainable development
- Bench marking of energy conservation in best- in- class and continual improvement to achieve international standard.
- Share and enrich our experience on energy conservation with other organization and own group company

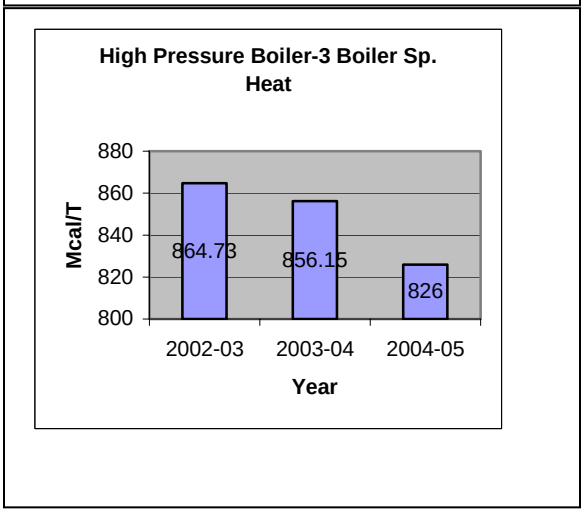
Energy Consumption

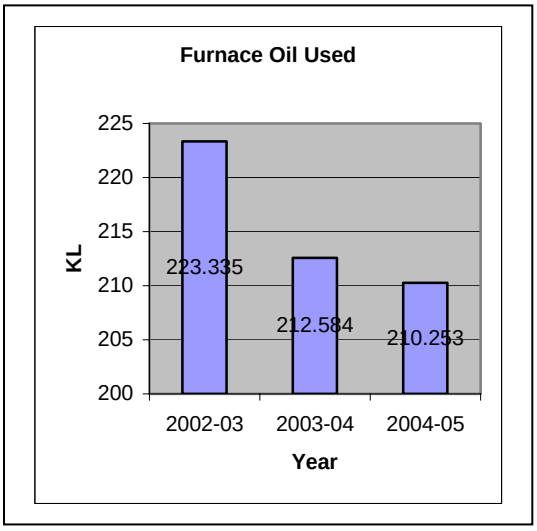
	Unit	**2002-03**	**2003-04**	**2004-05**
Annual Production Soda Ash	MT	735840	754553	781858
Annual Production Salt	MT	422225	454906	497151
Total Energy Consumption	KWH (Lakhs)	3649.71	4037.15	4034.44
Total Thermal Energy Consumption	Mkcal	3283197.49	3634886.98	4022386.36
Total Manufacturing Cost	Rs. Lakhs	38860	41184	42940
Total Energy Cost	Rs. Lakhs	18014.67	14304.91	18063.86
Energy Cost as % of Raw Material Cost - SA	%	25.80	24.26	22.97
Steam Tube Drier Steam Consumption	T / T	1.415	1.471	1.442
Ammonia Still Steam Consumption	T / T	2.162	2.359	2.182
Soda Ash Power Consumption	KWH / T of SA	141.43	146.52	146.83
High Pressure Boiler - 3 Boiler Sp. Heat	Mcal / T	864.73	856.15	826
Power Plant Utility Consumption	KWH / T of Steam	21.53	21.03	21.23
Utility Steam Cons.	Kg / T of Steam	38.31	45.29	43.54
Furnace Oil used	KL/Year	223.34	212.58	210.25

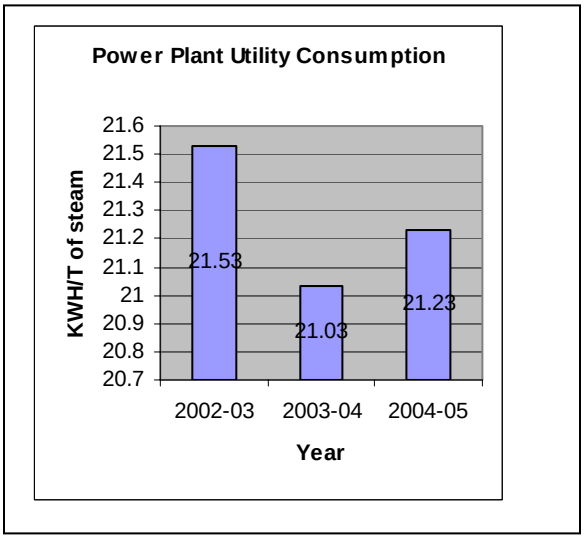

Soda Ash Production
Production (Tonnes)
790000
780000
770000
760000
750000
740000
730000
720000
710000
735840
754553
781858
2002-03
2003-04
2004-05
Year


Soda Ash Power Consumption
Soda Ash Power has increased from 2003-04 as ESF(Effluent Solid Filteration) plant has been installed and made operation from 2003.
Production (Tonnes)
148
146
144
142
140
138
141.43
146.52
146.83
2002-03
2003-04
2004-05
Year


Soda Ash Energy cost as %age of manufacturing cost
%age
27.00
26.00
25.00
24.00
23.00
22.00
21.00
25.80
24.26
22.97
2002-03
2003-04
2004-05
Year

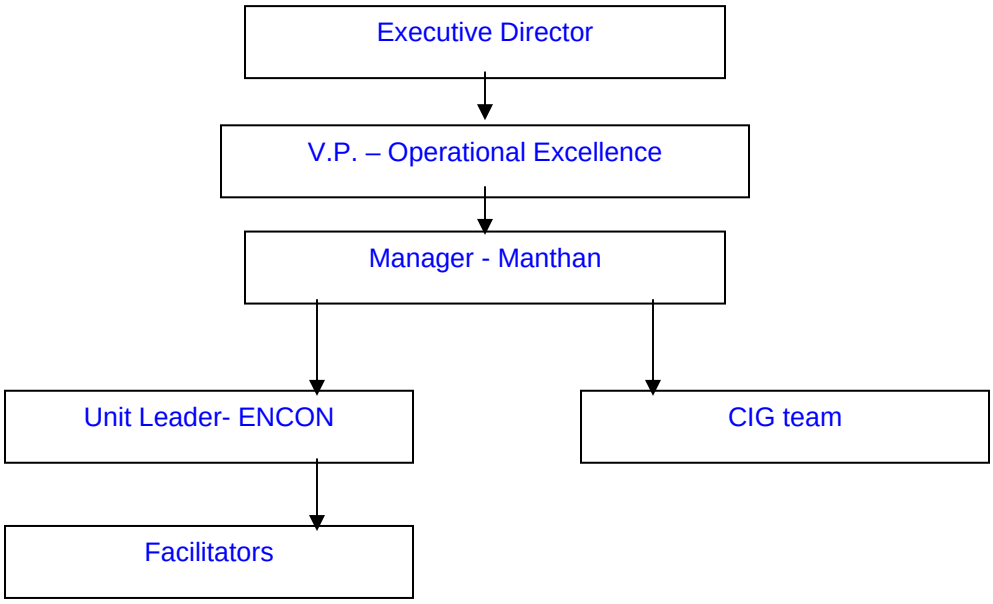

High Pressure Boiler-3 Boiler Sp. Heat
Mcal/T
880
860
840
820
800
864.73
856.15
826
2002-03
2003-04
2004-05
Year


Furnace Oil Used
KL
225
220
215
210
205
200
223.335
212.584
210.253
2002-03
2003-04
2004-05
Year


Power Plant Utility Consumption
KWH/T of steam
21.6
21.5
21.4
21.3
21.2
21.1
21
20.9
20.8
20.7
21.53
21.03
21.23
2002-03
2003-04
2004-05
Year

We have dedicated Energy Conservation Cell – **MANTHAN** , headed by VP – Operational Excellance assisted by Manager – Manthan. The Cell is supported by 15 - 20 Asst. Managers from different streams divided in 4 Units. Each Unit takes specific area / process on which they generates ideas by different means like brainstorming sessions, contacting equipment manufacturers, comparing the process with best in industry. The team evaluates the ideas, calculate the possible savings and prepared detailed implementation plan. The implementation and saving tracking is being done by CIG (Cost and Implementation Group) on continuous basis.

Energy Conservation Cell Structure



Energy Conservation Achievements

Power savings

Initiatives were taken to reduce specific power and steam consumption in plants like soda ash, power plant and MUW Plant. Many ideas were generated and taken forward for implementation. Total 100+ measures were taken for implementation.

Power Conservation projects till March-05

Identified ideas for	6.052 MW
Implemented ideas	4.2 MW
Actual Power savings	2.81 MW

Some the Key Ideas are mentioned below:

Power saving

1)REPLACMENT OF EXISTING SODA ASH COOLING WATER PUMPS WITH HIGH EFFICIENCY PUMPS

•Existing M&P 16/20 cooling water pumps were installed and were working at low efficiency due to different size of impeller and no. of modifications carried out in the pumps.
•We replaced these pumps with high efficiency pumps, to reduce power consumption

Tower	Earlier KWH	Present KWH	KWH Saving
CT-1	430.2	409.54	20.66
CT-2	507	409.54	97.46
CT-3	542	409.54	132.46
CT-4	469	409.54	59.46
	Total		310.03

Investment : Rs 60 Lakhs
Savings : Rs 31 Lakhs
Power Saving :310 KWH

2) INCREASE IN PUMPING EFFICIENCY BY RETROFITTING OF EXISTING VERTICAL PUMP SUCTION ASSEMBLIES WITH IMPROVED HIGH EFFICIENCY DESIGN.

• Sea water vertical pumps are operating at low efficiency-50%. With this efficiency, brine supply equivalent to 15 lacs tons of salt. It is proposed to retrofit existing pump assembly by replacing bowl assembly, impeller & impeller shaft of required design to give 85% efficiency
•This will result in power saving by reducing the no. of pumps operating and establish design capacity of salt works.

Investment Rs 141 Lakhs
SavingsRs 52 Lakhs
Power Savings:370 KWH

3) PREVENTION OF AIR PREHEATER LEAKAGE BY REPLACEMENT OF TUBES
There are leaky tubes in the air pre heater. As APH is always in suction there is a infusion of the incoming fresh air into the flue gas at Air Pre heater. As a consequence the mass of air in the flue gas increases, thereby :
• Increasing the load on the FD and ID fans which causes energy loss
• Decreasing the flue gas temperature and therefore the temperature of the incoming air into the boiler causing increase in specific energy consumption

Tubes of Air Preheater has been replaced and resulted in fuel savings.

Investment Rs 40 Lakhs
Savings Rs 90.2 Lakhs
Power Savings 411 KWH

Steam Savings:

Many ideas were generated and implemented for steam consumption reduction. Key ideas are

1) Insulation of Steam Tube Dryer

The skin temperature of STD drums was 85 ^{0}C (avg.). By removing the MS cladding of the shell & replacing it with effective insulation, the skin temp has been reduced to 45 ^{0}C (avg.).

Investment Rs 77 Lakhs

Heat Savings 6326 Mkcal/ Year
Savings Rs 35 Lakhs

2) Providing Auto Control valve for bicarb tower draw line

120 # Steam was sent to draw line by manual control based on the plant condition. Auto control valve is installed in 120# steam. This operation is timer based and reduced the steam consumption

Investment Rs 2 Lakhs
Savings Rs 9 Lakhs
Steam savings 4514 MT per year

3) CO2 compressor turbine Hand valves to be closed while working for partial flow

Nozzle hand valves of turbines have been closed while working at less than rated RPM. This will reduce the steam consumption. •Optimum combination of compressors have been established based on equipment efficiency and CO2 requirements

Investment NIL
Savings Rs 83 Lakhs
Steam savings 13522 (450# Steam) MTPA

Fuel Savings

1) HEAT RECOVERY FROM FLUE GAS OF CEHP-I & II

Flue gas temperature of CEHP-I boiler is 175 °C and CEHP 2 is 185 °C. It is proposed to recover the heat of the flue gas and heat boiler feed water by installing additional four rows of economiser coils by reducing the flue gas temperature up to 155 ° C. The area of boiler outlet duct has been increased for additional tubes.

Investment Rs 51 Lakhs
Savings Rs 88 Lakhs
Energy Savings 24116 Mkcal/Year

2) Optimize excess air through oxygen analyzer and providing feedback to controls

Investment Rs 38 Lakhs
Savings Rs 99 Lakhs
Energy Savings 24154 Mkcal/Year

Energy Conservation Plans & Targets

Energy Saving Measure	Potential Savings (Rs. Lakhs)	Investment (Rs. Lakhs)	Tentative Completion year
Replacement of inefficient contact cooler blowers with high efficient blowers in water treatment plant	3.87	6.95	05-06

Arambhada salt works OH lines 1.5 MVA transformer to be replaced by new 600 KVA transformer	1.80	3.90	05-06
In Salt mill SS, 3 MVA and 2X2 MVA transformer to be removed. Instead of that, one 2 MVA transformer (11kV/440 V) to be installed	7.50	10.45	05-06
In the salt works, transmission line has very high power losses (~105 kW). By installing capacitor bank at load end the current can be reduced by improving the power factor.	1.41	4.40	05-06
To stop inefficient gas washer and additional sea water pumps at MUW-1,2 by installing one more sea water pump - Voltas H125L1	0.93	2.21	05-06
To install 2 nos of additional pre heaters in MUW III	00	28.67	05-06
To replace ID fan of MUW III dryer	1.22	1.85	05-06
Installation of AC variable speed drive with exsisting motor of 1c fan of clinker cooler	2.65	5.72	05-06
Installation of AC variable speed drive with exsisting motor of 1L fan of clinker cooler	1.39	3.89	05-06
Installation of AC variable speed drive with exsisting motor of 2L fan of clinker cooler	2.79	8.00	05-06
Installation of AC variable speed drive with exsisting motor of 1R fan of clinker cooler	1.51	4.30	05-06
Installation of AC variable speed drive with exsisting motor of 2R fan of clinker cooler	3.74	6.86	05-06
Installation of AC variable speed drive with exsisting motor of 4 fan of clinker cooler	3.92	8.99	05-06
Installation of AC variable speed drive with exsisting motor of RAW MILL ESP fan of clinker cooler	3.67	8.37	05-06
Installation of VSFC in existing motor of CD fan of calciner stream	26.02	58.02	05-06
Replacement of both rotary packers from mechanical to electronic weigh system	4.11	49.86	05-06
Installation of AC variable speed drive with existing motor of larox feed pump	4.22	10.58	05-06
Installation of demister pad in after cooler top at compressor house for moisture removal	0.00	24.73	05-06
Remove 6 nos of sealing air blower at compressor by air connection through direct instrument air at CO2 compressor.	0.73	0.43	05-06

Lowering of HP-LP vessels to increase for Steam Tube Dryer output	15.71	39.27	05-06
Changing chain drive to direct drive for long and short conveyor for Bicarb Plant	0.16	0.87	05-06
Conversion of chain to direct drive for SSD 36" belt conv.	0.80	2.30	05-06
Incorporation of microprocessor based controller in the cement plant MSS-1 and CCR AC Plant to stop the operation of condenser motor when the compressor motors are not in operation	1.99	1.10	05-06
Replacing existing motorised bag divertors at packing plant with power less bag divertors	0.99	3.36	05-06
Installation of ammonia analyser at absorber outlet brine for optimisation 20#	16.24	42.87	05-06
Hot water purging for Cooling Tower No. 1, 2, 4 and 5 for reduction in Heat load 20#	18.55	13.48	05-06
Revamping of PCB liquor piping to increase circulation 20#	39.39	99.89	05-06
To Avoid The Steam Bleeding By Controlling The First Effect Body Top Pressure By Providing Electronic Control Loop. 50#	1.59	3.93	05-06