TATA CHEMICALS LTD.
FERTILISER WORKS

(I) UNIT PROFILE

Tata Chemicals Limited (TATA CHEM) founded in 1939, is a part of TATA group of companies. TATACHEM comprises four SBU - Chemical-SBU, Fertilizer- SBU, Phosphate-SBU and Food Additive-SBU. The Tata Chemical Limited operates the largest and integrated inorganic chemicals complex in India at Mithapur which produces 35 basic chemicals of which soda ash is the major product. TATACHEM holds a predominant position as a leader in the soda ash industry. The inorganic chemical complex of TATA CHEM is the largest not only in India, but also in this part of the world and ranks among the most self-reliant, energy efficient and water efficient operations anywhere in the world .A pioneer and market leader in the branded iodised salt which has a highest purity in the country. The Phosphate- SBU has been acquired recently from HLCL and plant is located at Haldia which is one of the most energy efficient plant in India.

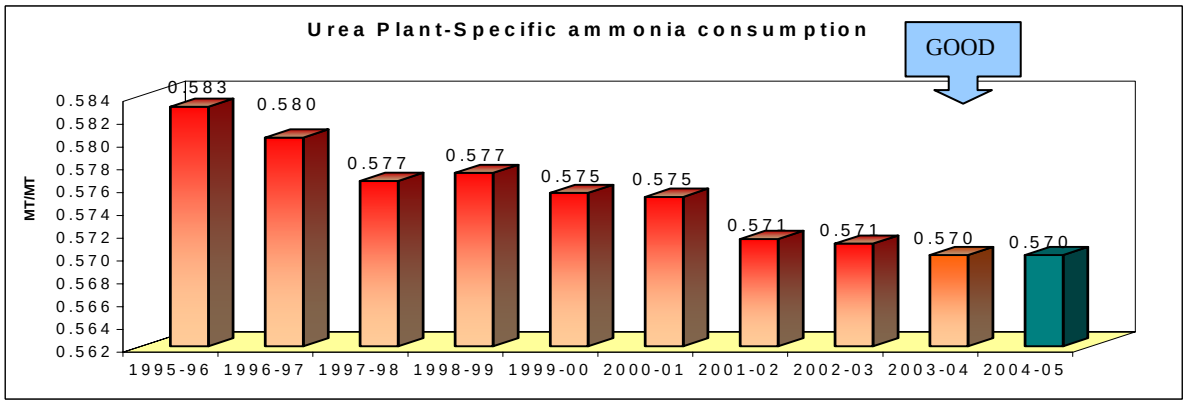
The fertilizer complex at Babrala comprises an Ammonia plant having an installed capacity of 1520 MTPD based on the “state of the art” low energy process of Haldor Topsoe A/S and two streams of Urea each having an installed capacity of 1310 TPD based on Snamprogetti spa technology incorporating several low energy features. The related facilities of off-sites and utilities consist of a captive power and steam generation plant with two Gas turbines, two heat recovery units and one service boiler, cooling towers, ammonia storage, naphtha storage, inert gas plant, effluent treatment plant etc. The design of utility plants was carried out in house. The control system at the complex is most advanced and is based on TDC3000 rel. 530 of Honeywell. An ERP system SAP 4.6 C has been installed to monitor and integrate all key business operations across the organisation for effective optimisation and control.

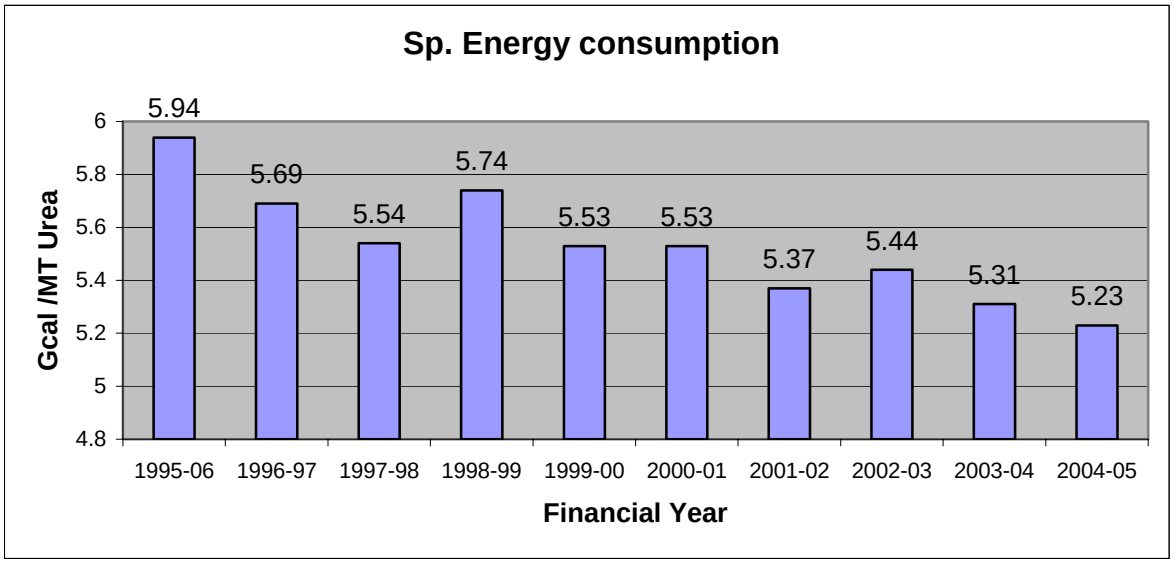
The fertilizer complex at Babrala is one of the six inland located fertilizer complexes based on cross country HBJ (Hazira- Bijaypur- Jagdishpur) natural gas pipeline. The pipeline transports associated gas from Bombay High and Natural Gas from South Basin to fertilizer and power plants located inland. Babrala happens to be at the tail end of the pipeline and experiences therefore frequent fluctuations in the gas supply pressure and quantity. As a consequence normally 70% of the total requirement of feedstock and fuel is being met with Natural Gas and the balance is met with Naphtha. Naphtha is drawn in rail tankers from a refinery in Mathura located at a distance of 150 Km by rail.

TATA CHEM Fertilizer complex is committed to bettering its already impressive quality norms and systems. It has been awarded ISO-9001-2000, ISO-14000 and OHSAS-18000 registration. The company has also embraced the Tata Business Excellence Model in its quest to become more performance oriented and customer centric. Based on the Malcolm Baldrige National Quality Award, this model takes a holistic and comprehensive approach to improving business processes and strategic -decision making. The Fertilizer complex has been awarded Sword of Honor and EMS five star rating by British Safety Council,UK which shows the highest commitment to the safety standards. The cost optimisation effort by the company is highlighted by the fact that Tata Chemicals has institutionalised the concept of "MANTHAN" (Total Operative Performance) Accelerated Performance Improvement, the project aims at saving Energy/costs in various units of operation.

(II) ENERGY CONSUMPTION

About 80% of the energy required for urea production is drawn from Ammonia. Reduction and prevention of ammonia losses in the plant helps in reduction of energy consumption. The total loss of ammonia is reflected in the form of ammonia and urea emanating as gaseous and liquid effluent continuously or intermittently from MP, LP, vacuum sections and prilling tower besides spillage and leakage. Regular monitoring of the process vents including PSV’s was initiated to ensure that the ammonia and CO2 losses are minimized. Energy check lists (see Appendix 2, 3 &4) are used to monitor the plant operating parameters and losses. Trend of specific consumption of ammonia is depicted in Tables below.





Tata chemicals have consistently achieved lower energy levels than the design parameter of 5.79 Mkcal per tonne of urea. The Company had achieved an energy consumption figure of **5.21 Mkcal per tonne of Urea** which is the lowest recorded energy consumption value on a national level. Currently Tata Chemicals is considered the ***Benchmark for energy efficiency in the Indian Fertiliser Industry.***

* The % of Naphtha used in Feed & Fuel had gone up from 5.2% in 2002-03 to 20.9% in 2003-04 **and 25.2% in 2004-05 owing to a severe restriction in NG allocation by GAIL**. **Also 11.2 % of energy came from RNLG which is costlier than APM NG**. Also the cost of Naphta had gone up by Rs.4145/KL in 2004-05 over the 2002-03 figure. **If we consider the same fuel composition as 2002-03 and negate the effect of price increase, then we get an energy cost for the actual energy consumption of 2004-05 (ie Rs 26570 Lakh/yr).**
However if we take into account the actual cost of naphtha & the naphtha consumption of 25.2% the Manufacturing cost becomes 448.15 crores and the Energy cost becomes 75.0% of manufacturing cost. **Production of urea was substantially higher than previous years.**

(III) ENERGY CONSERVATION COMMITMENT, POLICY AND SET-UP
Energy conservation is continuous and on going process. Energy Balancing/Monitoring and tracking at Tata Chemicals is done by Process Engg. Deptt on a daily basis. The energy consumption is monitored on daily basis in each plant and appropriate and immediate measures are taken to minimise consumption on a continuous basis by cross functional team comprising of Operation & Maintenance, and Technical Services. The company's strategy is to sustain the position as " Lowest Energy / Cost Consuming Urea Producer in the World".
There is well defined **Energy Policy**, modification and project management system for implementing any process changes in the plant regarding energy conservation, safety and

environment. Tata Chemicals has institutionalized the concept of **"MANTHAN"** (Total Operative Performance) Accelerated Performance Improvement, the project aims at saving Energy/costs in various units of operation.

The MANTHAN is a structured, time bound and team based with top management support and bottom up approach which uses the creativity and energy of employees and all the partners and suppliers to impact the company's bottom line with minimal investment in the shortest possible time. It is a performance focused, people driven, and Comprehensive bottom up program that channels the experience and knowledge of employee to generate and implement ideas that significantly improve operations and bring breakthrough improvements. The Manthan has completed 10 waves of operation respectively for Ammonia, Urea, Offsites , ENCON and 2 waves for marketting, logistics and fixed costs, technology up- gradation, data management etc.

All the plant data related to energy and production gets automatically downloaded each day at 10:00 AM via a DCS to SAP interface module Energy Balancing via SAP-PP module is done by Technical Services by 11:00 AM. The departments are immediately informed to take corrective and preventive actions The HOD's can confirm the production figures in SAP only after the GO AHEAD clearance form Technical Services. Each department has a Balanced Score Card (BSC) and Annual Quality Improvement Plan (AQUIP) and is daily monitored via a SAP linked Dashboard which contains the yearly targets and the asking rate to achieve the targets. Each HOD has to present his departmental project target Vs Actual before the VP-Manufacturing and GM-Operations in the AQC (Apex Quality Circle)and elaborate his action plan for deviations. VP-Manufacturing sends Monthly and Quarterly performance reports to Chief Operating Officer - Fertiliser SBU and MD.

(IV) ENERGY CONSERVATION ACHIEVEMENTS

Energy conservation and safety are given top most priority in plant operation. Ideas are generated through Brainstorming within employees, discussion with experienced vendors, ex-employees and technology supplies. All ideas are analysed for techno-commercial feasibility by a Manthan and technical cell of the plant. The ideas are implemented after critical evaluation, HAZOP study, if found suitable. In this process Tata Chemicals implemented following energy conserving projects during the year 2004-05 :-

- To connect the Low Pressure section vent to Process condensate treatment section overhead condenser of urea plant. ***Expected Savings Rs. 12.04 lakhs/year.***
- To supply oxygen enriched exhaust from Inert gas generation plant top to secondary reformer through Process air compressor. ***Expected Savings Rs.32.72 Lakhs/year***
- To provide arrangement for Pre heating of Reformer fuel in feed pre-heater coil (E-204B). ***Expected Savings Rs 81.67 Lakhs/year***
- Controlling of Steam flow of Process condensate stripper (06FIC21) through cascade control with TIC122. ***Expected Savings Rs.6.79 Lakhs/year***
- Continuous Flushing system in pre-vacuum and vacuum section. ***Expected Savings Rs.114 Lakhs/year***
- Transferring of Effluent by ejector instead of running transfer pump **Exp*ected Savings Rs 0.37 Lakhs/year***
- Re-circulation of Urea Melt system in first and second vacuum separators of Urea plant ***Expected Savings Rs.1.21 Lakhs/year***
- Re-routing of PCC O/L to de-gassed water storage tanks bypassing de-gasser leading to stopping of de-gasser blower**:**. ***Expected Savings Rs.0.95 Lakhs/year***
- Recovery of compressor area steam traps condensate to LC header:. **Ex*pected Savings Rs.1.59 Lakhs/year***
- Insulation of Superheated steam line :. ***Expected Savings Rs.85.78 Lakhs/year***
- Water spray system in the well of the Prilling tower top to recover the urea dust :. ***Expected Savings Rs.0.66 Lakhs/year***
- To provide water spray system in ME-14 of urea plant. ***Expected Savings Rs.3.58 Lakhs/year***
- Installation of Electronic chock in place of conventional chockes. ***Expected Savings Rs.3.39 Lakhs/year***
- Removal of one tube light with installtion of new reflector at site office . ***Expected Savings Rs.0.19 Lakhs/year***

- ON-OFF switch at CCR marshalling room to put off tube light whenever is not required . ***Expected Savings Rs.0.18 Lakhs/year***
- Optimization of DM plant power Consumption . ***Expected Savings Rs.1.50 Lakh/year.***
- Ammonia and urea plant proves optimization.

(V) ENERGY CONSERVATION PLANS AND TARGETS

The company is committed to improve upon its energy performance further. The excellence in Energy consumption is not a destination but a continuous journey for the unit as a whole. '**All ideas are implemented In fulfillment of its commitment to ENCON, Babrala has set target for specific energy consumption at 5.0 Gcal/MT of urea by the year 2007'.** The statement reflects the spirit of the team as it has been committed by the management in **'Energy Management policy'.**

The following energy saving initiatives are in the pipeline for 2005-06 and onwards:-

- MP Process condensate stripping system instead of LP system in Ammonia Plant. ***Expected Savings Rs.336.71 Lakhs/year with an investment of 560 Lacs Rs.***
- Optimisation of Process parameters by installation of Advanced Control System. ***Expected Savings Rs.100 Lakhs/year with an investment of 333 Lacs Rs.***
- To provide control valve in Urea process condensate stripper (C-02) off-gas line. ***Expected Savings Rs.18.45 Lakhs/year with an investment of 2.02 Lacs Rs.***
- Blinding one stage of Boiler Feed Pumps in Ammonia Plant. ***Expected Savings Rs.2.58 Lakhs/year with an investment of 4.74 Lacs Rs.***
- Steam saving by providing the close loop to all the traps' outlet at CPP area. ***Expected Savings Rs.3.05 Lakhs/year***
- E-602 replacement with old one as the existing is having lower capacity than design. ***Expected Savings Rs.86.15 Lakhs/year***
- Installation of PME De-hydrator: **Expected saving of 261.7 Lacs per year with an investment of 500 Lacs Rs.**
- Change of High pressure steam (HS) line insulation. **Expected Savings Rs.35.09 Lakhs/year**.