Brief write-up about IFFCO-Kalol Unit

(i) Unit profile

Kalol unit - the oldest unit of IFFCO is located at 26 km from Ahmedabad on the Ahmedabad Mehasana highway. The Unit started commercial production in April, 1975 in an area covering 96 hectares. The unit consists of plants to produce 910 t/d ammonia based on MW Kellogg USA natural gas steam reforming process and 1200 t/d urea based on Stamicarbon's CO_2 stripping process. Urea feed stocks i.e. ammonia and CO_2 are supplied from ammonia plant. Capacity of ammonia plant at IFFCO Kalol was uprated from 910 tpd to 1100 tpd in August, 1997 with installation of Pre-reformer unit using naphtha as feed stock. R-LNG which is the main feedstock is presently supplied by GSPCL. The fuels natural gas (NG) and associated gas (AG) are supplied by ONGC/GAIL from nearby gas wells and LSHS & Naphtha are from ONGC. Water is supplied by GIDC from 15 borewells around the Unit. The unit also has plants to produce 6 tpd Dry Ice and 12 tpd Liquid CO2 along with necessary offsite facilities.

(ii) Energy consumption

Kalol unit has produced 560201 MT of urea and 345663 tonne of ammonia during the year 2006-2007 attaining a capacity utilisation of 102.88 % and 95.22 % respectively. The ever lowest specific energy consumption of 5.981 Gcal/MT and 8.702 Gcal/MT was achieved in the year 2006-07 for Urea and Ammonia production respectively.

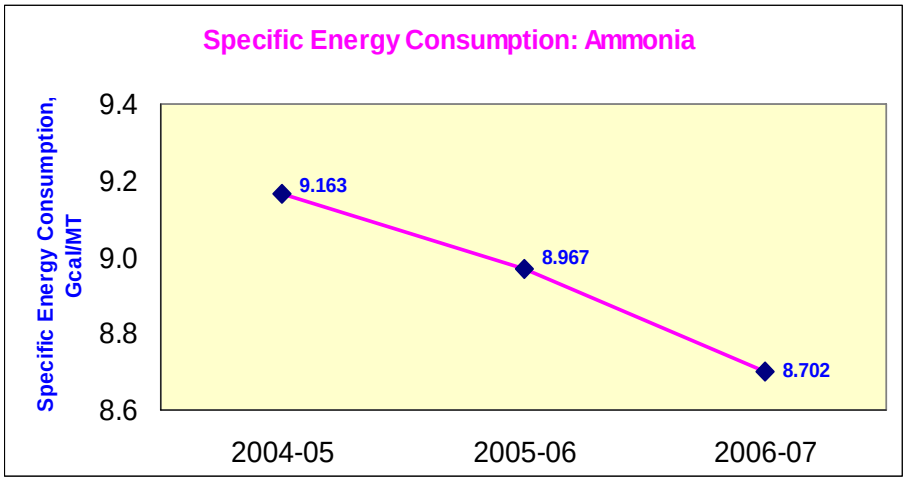
Energy Saving Project

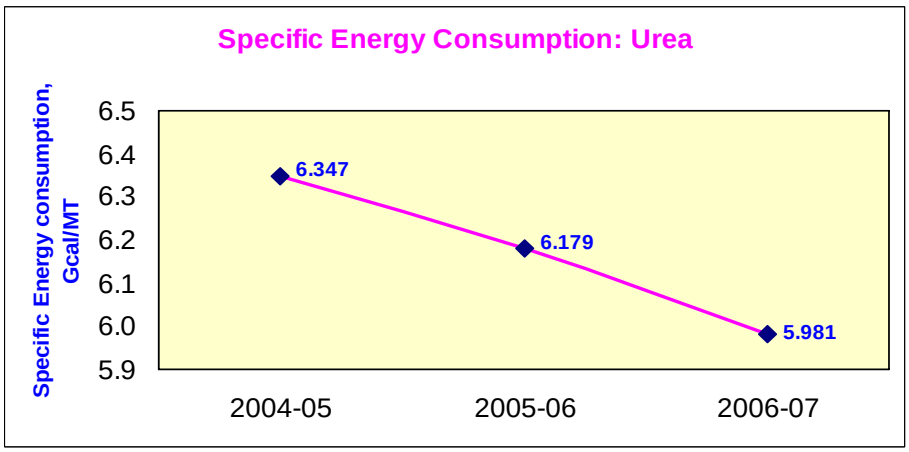
IFFCO Kalol Ammonia plant is of early 70's Kellogg technology and has limitations in implementing new technologies. Space availability is another major problem. In spite of these constraints Kalol unit is continuously putting efforts to reduce specific energy consumption.

Energy Saving Project (ESP) was one such measure which targeted to reduce specific energy consumption by 0.915 Gcal/t of ammonia at an estimated cost of Rs. 125.30 crores. ESP Phase-II was implemented and commissioned in April-May 2006.

There is considerable reduction in Specific Energy Consumption of Ammonia and in turn, Urea as a result of implementation of schemes under ESP.

The reduction trend in Specific Energy Consumption for the last three years is shown below.





Energy cost in terms of percentage of manufacturing cost.

With continuous efforts in energy conservation, there is tremendous reduction in energy consumption per tonne of Ammonia and Urea. However the total percentage of energy over manufactured cost of bagged Urea is higher in 2006-07 due to exponential increase in energy cost. The comparison is illustrated in the table below.

Particulars	2004-05	2005-06	2006-07
Sp. energy per t of Ammonia	9.163	8.967	8.702
Sp. energy per t of Urea	6.347	6.179	5.981
Energy cost (a) (Rs. Lakhs)	35008.76	32692.84	48613.47
Manufacturing cost of Bagged Urea (b) (Rs. Lakhs)	44594.19	42123.72	58621.68
(a)/(b)*100	**78.51**	**77.61**	**82.93**

(iii) Energy Conservation Commitment, Policy and Organizational Set-up

Process Engg. Section, IFFCO Kalol carries out energy audit on regular basis. Plant operations are studied in detail to identify the areas for reducing specific energy consumption and minimizing losses.

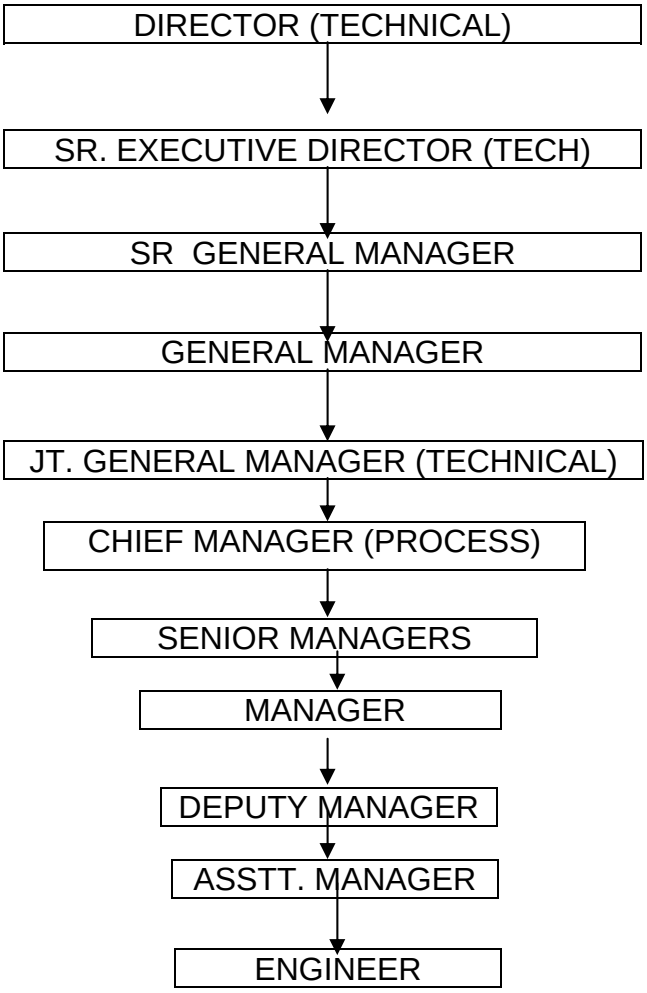
Energy conservation is a continuous process with constant scope for further improvement. With this objective and based on detailed study of energy audits, Ammonia plant Energy Saving Project – Phase II and other energy saving schemes were successfully commissioned in May-2006.

Energy Policy:

At IFFCO Kalol, optimum utilization of energy and the total energy management are the part of corporate mission and IFFCO is fully committed to reduce the specific energy consumption in the production of nitrogenous fertilizer through:

- Conducting in-house energy audit and monitoring the energy consumption norms.
- Carrying out various minor and major modifications.
- Adoption of technological advancement befitting to the old plant.
- Development of human resources.
- Creating safe, healthy and energy conscious working environment.
- Better housekeeping in the plant.

Organisation Chart of Process Engineering Section



(iv) Energy Conservation Achievements

- The lowest yearly specific energy consumption of 8.702 Gcal/ t of Ammonia achieved during the year 2006-07.
- The lowest yearly specific energy consumption of 5.981 Gcal/ t of Urea achieved during the year 2006-07.
- The lowest monthly specific energy consumption of 8.253 Gcal/ t of Ammonia achieved in December-06.
- Ever lowest monthly specific energy consumption of 5.672 Gcal/ t of Urea achieved in December-06.

Important schemes implemented for performance improvement during the year 2006-07

1 AMMONIA PLANT

Several Schemes in phased manner under Energy Saving Project (ESP) were implemented in the year 20005-06 and 2006-07 to reduce specific energy consumption by 0.915 Gcal/t of ammonia at an estimated cost of Rs. 125.30 crores.
ESP Phase-I was implemented and commissioned in May-June 2005.
ESP Phase-II was implemented and commissioned in April-May 2006.

1.1 S-50 Synthesis Converter and MP Syn. loop Boiler.

For energy reduction in the ammonia synthesis loop, S-50 Ammonia Synthesis Converter has been installed at downstream of the existing Synthesis Converter (105-D). With S-50 converter, ammonia conversion has increased and resulted into reduction in circulation rate in the synthesis loop. This has resulted in power saving in the synthesis gas compressor.
To reocver the heat generated in S-50 converter (because of conversion of N2 & H2 into NH3), a Medium Pressure Waste Heat Boiler at downstream of the S-50 converter is installed. About 30 t/h MP steam is produced from the MP Waste Heat Boiler and is used as process steam. The total LNG saving works out to be 123.76 Lakhs Sm3/Annum and annual monetary benefit is Rs. 1687 Lakhs.

1.2 Ammonia Wash Unit and Syn. Loop Piping modifications.

In Original process, Converter effluent gases (including Ammonia & unconverted gases) were recycled through Synthesis Gas Compressor. Ammonia separation was at downstream of Synthesis Gas Compressor. By modification in Synthesis Loop piping, ammonia is being separated from Synthesis converter effluent gases and then recycled through compressor. It has resulted in reduction in volumetric flow through Synthesis Compressor and thereby saving power. It has also resulted in power saving in Refrigerant Compressor. Total LNG saving works out to 30.94 Lakhs Sm3/Annum and monetary saving is Rs. 422 Lakhs. To take care of oxides in the make-up gas, Ammonia Wash Unit has been installed.

1.3 Revamp of Syn. Gas Compressor.

The syn gas compressor circulation load has reduced substantially with installation of S-50 converter, ammonia wash and syn loop repiping.

The internals of LP and HP cases are revamped to meet the new operating conditions with better compression efficiency based on modern 3-D design rotor by Dresser Rand, France. Power saving in compressor is about 2200 kW. Total LNG saving works out to 69.62 Lakhs Sm3/Annum and annual saving of Rs. 949.18 Lakhs.

1.4 Installation of additional BFW Coil in LT convection zone in Primary Reformer.

With installation of additional offsite BFW coil in LT convection zone in Primary Reformer, flue gas stack temperature has reduced from about 200 deg C to 165 deg C. Boiler Feed Water is heated from 103 deg C to 196 deg C to recover the heat. It has resulted in fuel saving on Offsite Boiler. Annual saving works out to 11.60 Lakhs Sm3 and Rs. 158.20 Lakhs.

2.0 UREA PLANT

2.1 Performance improvement of LP absorber.

Performance of LP absorber at downstream of HP Scrubber is improved by providing additional cooler to supply lean ammonia water at 40 deg C to lower bed of LP absorber. Provision for DM water to upper bed of the LP absorber is made.

As a result of this modification, there is saving of about 15 kg/h ammonia.

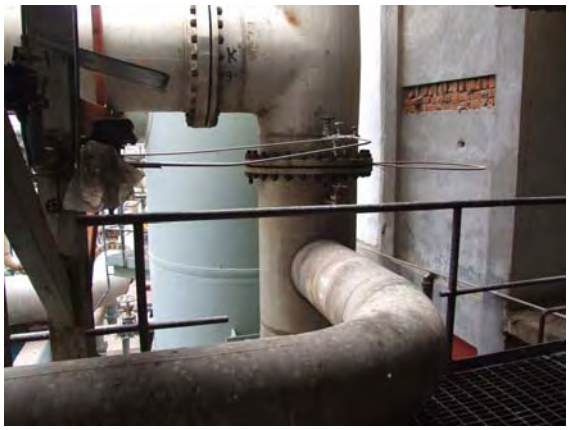
Monetary benefit corresponds to about Rs. 15.77 lakhs/annum.

2.2 Utilization of surface condensate instead of steam condensate for CCS-I make up.

To reduce cooling water load in CCS-I cooler, about 1.0 m3/h surface condensate at temperature of 40 deg C is used as make up water instead of steam condensate at 100 deg C. With this modification, heat load on cooling water is reduced by about 0.06 Gcal/h which is equivalent to 100 kg/h LP steam in deaerator. Equivalent monetary saving works out to be Rs. 4.70 lakhs per annum.

2.3 Isolation of idle CO2 suction header of NP/PB CO2 compressor

Urea Plant has a set of old compressor known as NP.PB Compressor. During normal plant operation, NP/PB CO2 compressors are not in line. The NP/PB CO2 compressor suction header was remaining charged as there is no isolation valve. To reduce CO2 losses through seal ejector, casing drains, vents etc., a blind is provided to suction line of NP/PB CO2 compressor. This has saved CO2 losses from compressor. Total monetary saving works out to be 78.74 Lakhs/Annum.



3.0 UTILITY-OFFSITES PLANT

3.1 Pre heating of LNG fuel in BHEL boiler

About 6000 Sm3/h LNG is used as fuel in BHEL boiler. The R-LNG pre heater to heat LNG with LP steam from ambient temperature to 100 deg C is installed in plant turn around May-2006. There is fuel saving of about 11 Sm3/h LNG equivalent to monetary benefit of Rs.11.88 lakhs per annum.

(v) Energy Conservation Plans and targets

IFFCO Kalol unit is committed to further improve its energy performance by finding out new avenues on continuous basis. Kalol unit is working on the following proposals as a part of its future plans for energy conservation.

Energy Conservation Measures	Anticipated Savings		Investment (Rs. Lakhs)	Project completion year
	GCal/Annum	Rs.lakhs/Annum		
Retrofit of Steam nozzle of Synthesis gas compressor turbines and higher rating coupling	142613	1853.49	126	2007
Installation of preheater for Auxiliary Boiler fuel.	637	9.72	3	2007
Plate type heat exchangers for Hydrolyser & Desorber feed in Urea plant.	6222	80.86	102	2007
Installation of two stage atmospheric scrubber in Urea plant.	818	10.63	98	2007
2.5 MGD Water supply from Narmada Canal.	--	470	2600	2007

(vi) Environment & Safaty

Environment:

Kalol Unit has also been certified for ISO 14001 for environmental management system adopted since August-2000. The system was upgraded to meet the requirements of ISO 14001 -2004 version and the same was audited and certified by BVQI during October 2005 audit.

There is highly evident “continual improvement” on EMS front at Kalol as the scrap disposal has become an ongoing exercise with optimum realization of residual value of items disposed off and clean and orderly scrap yards. Not only the environmental parameters are well maintained in the plants there is a sizeable reduction in the consumption of natural resources, quantifiable in terms of specific consumptions like energy, water and other process inputs.

House keeping of the plants is appreciated by all the visitors and the unit has received running trophy for the best maintained gardens, institutional category from Gujarat Horticultural Association for the third year in succession.

Safety:

Several Motivation measures are adopted for safe practices. Some of them are as under:

- Awards for Safety suggestion scheme & Good House Keeping scheme are distributed to the winners on the eve of **National Safety Day** and various competitions are being conducted for Employees & their family members such as Safety Essay, Safety poster, safety slogan, Safety Quiz etc. during safety week celebration.

- Shop Floor Safety Committee, Plant Safety Committees, Central Safety Committee & Joint Management Council are constituted for monitoring safety performance involving employees' participation.

- Employees are motivated to take part in the State & National level Safety competitions every year. Our employees get the prize in such competitions. Management also encourages workers by suitably rewarding them.

- Employees are encouraged to participate in Viswakarma Awards of state and National level.

- Corporate Policy for using Personal Protective Equipments is strictly enforced

Gujarat State Safety Awards

- **"Gujarat State Safety Award: 2005"** and the **"Certificate of Lowest Disability Injury Index"** in the category of Chemical, Petrochemicals and Fertilizer Industries of Gujarat State.

- **"Rotating Shield (Winner Award)"** with certificate for the **"lowest Disability Injury Index (DII)"** from Gujarat Safety Council for the year 2004.

- **"Certificate of Honor"** for working more than one million man-hours without lost time accident during the year 2004 (Manufacturing of Chemicals & Fertilizer Industries Group) from Gujarat Safety Council.

The unit also achieved the longest accident free period of **1533** days (from 19th January 2003 to 31st March 2007) and the record continues.