

Indian Farmers Fertilizer Co-operative Limited 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 CO₂ stripping process. Urea feed stocks i.e. ammonia and CO₂ 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.



AWARDS AND ACHIEVEMENTS:

IFFCO-Kalol's commitment in the field of Energy Conservation, protecting Environment and promoting Health and Safety is highlighted in the following Awards won till date:

- ❖ Kalol Unit has bagged National Energy Conservation Award twice and "Letter of appreciation by Government of Gujarat for outstanding work done in the field of Energy conservation.
- ❖ It has bagged FAI awards for "Best Overall Performance" and "Technical Innovation" eight times.
- ❖ It has bagged "Productivity Council Awards" once.
- ❖ Indo-German Greentech Environment one time.
- ❖ In the field of Safety, IFFCO kalol has bagged "National Safety Award" four times and "Gujarat Sate Safety Awards" eighteen times. Besides getting Letter of Appreciation.
- ❖ Kalol Unit has also received "Gujarat Horticultural Awards" five times.
- ❖ Its employees have been awarded "Vishwakarma Rashtriya Puraskar" two times.

(ii) Energy consumption

Kalol unit has produced 544501 MT of urea and 317531 tonne of ammonia during the year 2007-2008 attaining a capacity utilisation of 100 % and 87.47 % respectively. The ever lowest specific energy consumption of 5.956 Gcal/MT and 8.597 Gcal/MT was achieved in the year 2007-08 for Urea and Ammonia production respectively.

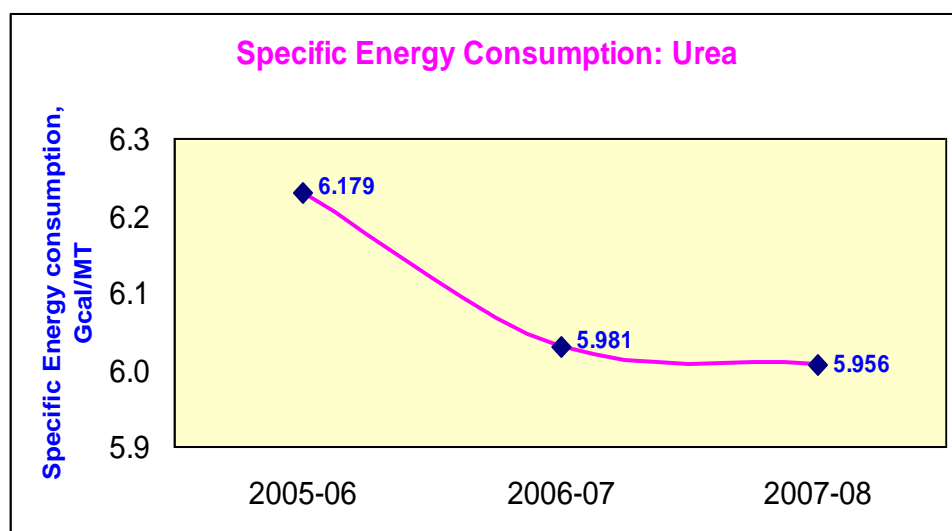
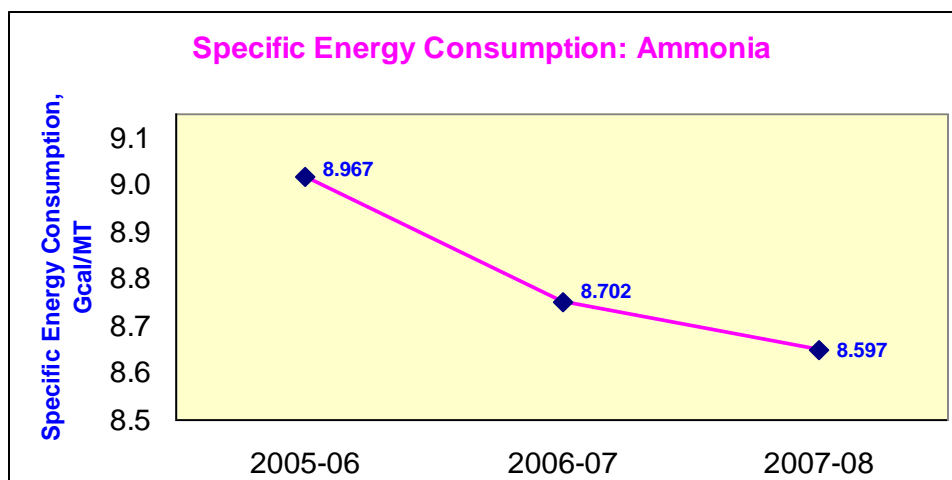
Energy Saving Project and schemes

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. Other energy saving schemes were also implemented during the year 2007-08 to bring down the energy level of Kalol Unit despite being such a old plant.

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

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	2005-06	2006-07	2007-08
Sp. energy per t of Ammonia	8.967	8.702	8.597
Sp. energy per t of Urea	6.179	5.981	5.956
Energy cost (a) (Rs. Lakhs)	32692.84	48613.47	77270.61
Manufacturing cost of Bagged Urea (b) (Rs. Lakhs)	42123.72	58621.68	87988.68
(a)/(b)*100	77.61	82.93	87.82

(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.

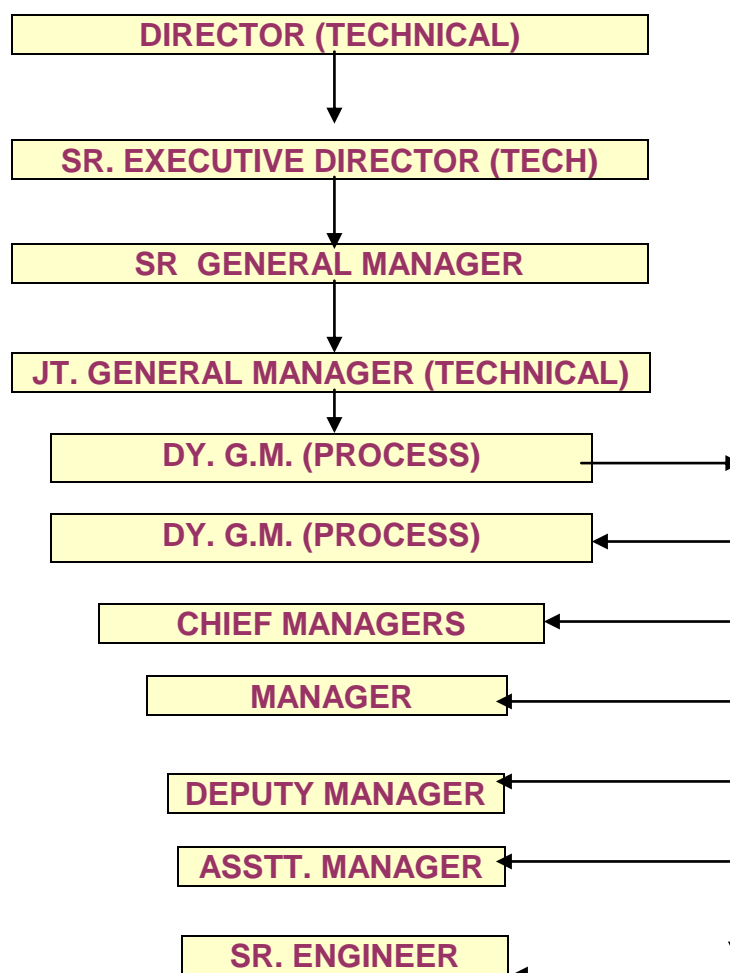
Energy conservation is a continuous process with constant scope for further improvement. With this objective and based on detailed study of energy audits, Ammonia plant Energy Saving Project – Phase II and other energy saving schemes were successfully commissioned in May-2006 and 2007. The efforts for further reduction in energy by executing small schemes by in-house resources is a continuous process.

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.

Organization Chart of Energy Saving Cell



(iv) Energy Conservation Achievements

- ❖ The lowest yearly specific energy consumption of 8.597 Gcal/ t of Ammonia achieved during the year 2007-08.
- ❖ The lowest yearly specific energy consumption of 5.956 Gcal/ t of Urea achieved during the year 2007-08.
- ❖ The lowest monthly specific energy consumption of 8.234 Gcal/ t of Ammonia achieved in March-08.
- ❖ Ever lowest monthly specific energy consumption of 5.672 Gcal/ t of Urea achieved in December-06.

Energy Conservation Achievement of IFFCO Kalol has also been recognized by being awarded National Energy Conservation Award-2006 by Beureau of Energy Efficiency (BEE), Ministry of Power.

Important schemes implemented for performance improvement during the year 2007-08

1 AMMONIA PLANT

1.1 Bigger size Steam nozzle of Synthesis Gas Compressor Condensing Turbine



To close the 40 ata steam balance of Ammonia Plant after Energy Saving Projects, bigger size nozzle in condensing turbine of Syn. gas compressor has been installed. This has facilitated use of 40 ata steam upto 28 t/h instead of its maximum capacity of 20 t/h. As a result, load on Auxiliary Boiler of Ammonia plant has reduced. For enhanced torque, old coupling had been replaced with new one of higher rating. This has reduced steam consumption in Ammonia plant from 4.6 to 4.4 t /t NH₃.

1.2 Bigger size inter/after condenser for surface condenser (101-JCA).



To avoid uncondensed steam coming out from after condenser of surface condenser (101-JCA) along with the inerts, redundant bigger size inter/after condenser of NG booster compressor with more than double heat transfer area has been installed in place of old inter-after condenser. Vacuum of surface condenser has improved by 2 mm WC after this modification.

1.3 Installation of redundant preheater for Auxiliary Boiler fuel.



Redundant Lube oil cooler of GHH CO₂ compressor has been installed in ammonia plant to preheat auxiliary boiler fuel i.e. LNG fuel with LP steam upto 100⁰C. This has saved about 9 Sm³/h R-LNG.

2.0 UREA PLANT

2.1 Plate type heat exchanger for Desorber feed in Urea plant.

To improve operating flexibility of desorber and to reduce LP steam consumption, welded plate desorber feed pre-heater has been installed to heat ammonia water feed to first desorber from 55° C to 130° C in place of existing shell and tube heat exchangers from 55° C to 113° C.

This has reduced about 1000 kg/h LP steam consumption. This has also improved operational flexibility of hydrolyser system.



2.2 Installation of two stage atmospheric scrubber in Urea plant.

Single bed atmospheric scrubber was replaced with new two ring bed scrubber with about 30 m³/h ammonia water at 40° C to top bed and about 80 m³/h ammonia water at 40° C recirculation to lower bed. The liquid outlet from atmospheric scrubber is sent to strong ammonia water tank for recovery in Hydrolyser system.

As a result of this modification, the ammonia emission from atmospheric scrubber has reduced from about 100 kg/h to 6 kg/h.



(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		
*KBR Option-II Selected Schemes	85668	900	6280	2010

* KBR Option-II Selected Schemes proposed by M/s KBR, USA, includes:

- ❖ Optimization of S/C ratio in Primary Reformer.
- ❖ Improvement in efficiency of Primary Reformer furnace by various modification / replacement or addition of coils in convection zone.
- ❖ Feed Gas saturator system.
- ❖ HTS and LTS converters retrofitted with radial / axial-radial flow catalyst baskets.
- ❖ Optimization of CO₂ removal system.
- ❖ Retrofiting of Syngas compressor HP-MP turbine.
- ❖ Retrofiting of Ammonia Synthesis loop with high grade waste heat recovery.
- ❖ Add-on small Purge Gas Recovery Unit.

(vi) ENVIRONMENT & SAFETY

ENVIRONMENT:

IFFCO Kalol unit was the first in co-operative sector in fertiliser industry, to get ISO-9000 certificate for its quality system by BVQI (Bureau Veritas Quality International) in August-1996. The same was recertified by BVQI in August-1999.

During August' 2002 audit, the unit was recertified by BVQI for its quality system as per new ISO Standard Version **ISO 9001: 2000** .and recertified in October, 2005.

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.

In February-2007 Kalol Unit adopted Integrated Management System comprising of QMS &EMS as per ISO 9001-2000 & ISO 14001-2004 and the same was recertified in December-2007.Kalol has been the first fertilizer unit to integrate the QMS & EMS.

The scrap disposal has become an ongoing exercise with optimum realization of residual value of items disposed off and clean and orderly scrap yards. There is highly evident "continual improvement" on QMS- EMS front at Kalol. 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 consumption 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 in institutional category from Gujarat Horticultural Association for the fourth year in succession.

No major system non-conformities were observed during the recertification audits. Suggestions received from auditors towards value additions in the system were implemented. System functioning at Kalol is highly appreciated by the auditors.

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.

Kalol Unit has been recognized of its impeccable safety record, by bagging prestigious awards at the national level as well as state level.

NATIONAL SAFETY AWARDS:

- ❖ Kalol Unit has been selected as a Joint Winner under Scheme No. I (**Lowest Average Frequency Rate of Accident**) of the **National Safety Award - Performance Year 2006**. This is considered to be the highest award in Industrial Safety in India. The award is to be presented by the Hon'ble Union Minister for Labour & Employment. This award is in appreciation of the operation of Kalol Unit with the Longest Accident-free Period. The unit has achieved the longest accident free period of **1899** days (**from 19th January 2003 to 31st March 2008**) and the record continues, surpassing the previous best record of 899 days (from 28th June 1998 to 12th December 2000).
- ❖ Kalol Unit has also bagged the prestigious "**Suraksha Puraskar**" (Bronze Trophy and Certificate) from **National Safety Council, Mumbai** for the Award Year 2007. The award is in recognition of the distinguished **Occupational Safety & Health (OSH)** record of Kalol Unit in the implementation and effective management of OSH Systems & procedures.

GUJARAT STATE SAFETY AWARDS:

- ❖ "**Gujarat State Safety Award: 2006**" and the "**Certificate of Lowest Disability Injury Index**" in the category of Chemical, Petrochemicals and Fertilizer Industries of Gujarat State.
- ❖ "**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.