



Indian Oil Corporation Limited Gujarat Refinery

1.0 UNIT PROFILE

Gujarat Refinery, the largest Public Sector Refinery in the country, where growth is the essence of life is the third of the seven Refineries of Indian Oil Corporation Limited. Pandit Jawaharlal Nehru laid the foundation stone of this Refinery on 10th May, 1963. Initially, the Refinery was set up with a capacity of million metric tonne per annum (MMTPA) for processing of Ankleshwar crude. The first crude distillation unit (AU –1) of 1.0 MMTPA capacity, was commissioned in October, 1965. The refinery since then has been expanded, revamped and modified from time to time and today it has crude refining capacity of 13.7 MMTPA. The following primary/secondary processing units for production of various petroleum products are in operation.

Atmospheric Distillation Unit(5nos),Catalytic Reforming Unit, Udex Unit, Vacuum Distillation Unit, Visbreaker Unit, Naphtha ATF / KERO Merox Unit, Bitumen Blowing Unit, FCC Unit, Feed Preparation Unit (2 nos), Pilot Distillation Facilities, FGH Unit, Hydrocracker Unit, Hydrogen Unit(2 nos), DHDS Sulphur Recovery Unit(2 nos) Nitrogen Unit, MTBE Unit,& Butene-1 unit.

Gujarat Refinery manufactures petroleum products/petrochemical feedstock/speciality products like LPG, Naphtha, Motor Spirit (MS) superior Kerosene oil (SKO), Aviation Turbine Fuel (ATF), High Speed Diesel (HSD), Light Diesel Oil (LDO), Xylene Feedstock, Benzene, Toluene, N-heptane, Food Grade Hexane, Fuel Oil, Low Sulphur Heavy Stock (LSHS), Bitumen and Sulphur.

The new Petro-chemical plant (Linear Alkyl Benzene) with production capacity of 120 TMT/year. was commissioned in Aug'04. This plant utilizes Kerosene as a feed stock and produces LAB products used for detergents manufacturing.

2.0 ENERGY CONSUMPTION.

Year	Crude T'put, MMTPA	Sp. Energy MBN	Fuel consumption (%oncrude)	Thermal Energy consumed per unit production Million Kcal/tonne of product
2002-03	12.4	104.0	6.51	0.4786
2003-04	12.7	101.4	6.27	0.4563
2004-05	11.7	102.7	7.10	0.5224

3. ENERGY CONSERVATION COMMITMENT, POLICY AND SET-UP:

Gujarat Refinery made significant efforts in the areas of Energy conservation right from the beginning and a dedicated Technical Audit Cell was formed in 1971 to over-view the energy consumption activities and control of the same. Besides the above, Energy Conservation Cell under Senior Manager was constituted in 1990 to act as a focal point for energy conservation activities. TA and Encon cell headed by a Chief Manager who reports to DGM (TS). There is total involvement and commitment of top management with regards to energy conservation and formal monthly reviews of Energy performance are done where the Executive Director chairs the meeting and the same is attended by all Head of Departments, Deputy General Managers and General Managers.

Groups of Operating, Maintenance and Process contact personnel of various processing units work in cohesion under the leadership of respective managers for optimising the energy consumption in day to day operation. Energy conservation group of Technical services department monitors the energy consumption and in turn work with the co-ordinator of operating group.

In addition to this, Weekly meetings are held in Refinery Shift Manager's (RSM) Office, wherein the areas that needs optimisation and loss control is reviewed and action plan drawn for immediate rectification. General Manager(T) of Refinery participates in these weekly RSM meetings and ensures acceleration in the ENCON efforts put in by every individual department.

To enable online monitoring of key parameters throughout the refinery, online monitoring formats have been provided on the network, which provides online data through Refinery-wide Real time Database Management System (RTDBMS).

Gujarat Refinery has a well defined Energy Policy as under :

To be a World Class performer in energy management

By

- Adopting energy efficient and environment friendly technologies.
- Benchmarking our performance with the best in the world and endeavoring to be ahead.
- Promoting use of renewable sources of energy.
- Fostering a culture of participation and innovation amongst stake holders for continual improvement in energy conservation.
- Propagating the message of avoiding wastage of energy to the community.

4. ENERGY CONSERVATION ACHIEVEMENTS :

Gujarat Refinery continuously attempts to identify and invest on various energy conservation projects. The specific energy consumption figures in terms of MBTU/BBL/NRGF reduced from 128 in 1995-96 to a level of 101.4 in 03-04. Unfortunately, due to FCCU accident during 2004-05, the performance of the Refinery got affected. Deatilas of schemes implemented in 2004-05 are enclosed as Annexure.

Various awards were conferred to Gujarat Refinery by Ministry Of Power & Ministry of Petroleum & Natural Gas with the "National Energy Conservation award " for last six years , i.e. Award –2004(2nd Prize), 2003(Special Prize), Award –2002(Special Prize), Award-2001(1st Prize), Award- 2000(1st Prize) & Award 1999 (2nd Prize) . 'Jawaharlal Nehru Centenary Award ' special prize for "Best Performance in Energy Consumption" amongst all Indian Refineries in the year 2003 was also won by Gujarat refinery

5. ENERGY CONSERVATION PLANS AND TARGETS :

For further improvement of energy performance of Gujarat Refinery, the following projects have been planned :

- Fuel additive trial in Thermal Power Station
- Hydrogen recovery from CCRU & CLPS offgas
- Flare gas recovery
- Installation of new Gas Turbine
- Installation of diesel coalescer
- Commissioning if new product pipeline (Koyali-Dahej and Koyali-Ratlam)

With the implementation of above major and other activities, Specific Energy Consumption of the Refinery is expected to come down to a level of 96.

Details of projects / modifications implemented during 2004-05

1. Project no. 1 (Commissioning of APH for process heater in VDU process heater)

As an Energy Conservation measure, Air Pre-heater with design heat duty of 1.4 Gcal/hr was erected and commissioned in Jan'05 for the process heater in Vacuum Distillation Unit during the last M&I shut down of VDU. Furnace efficiency improvement with new APH in operation was found to be 88.7% against 81-85 % achieved earlier without APH. The fuel oil saving achieved is about 1016 KL/yr equivalent to Rs 91.6 lakhs/year



2. Project no. 2 (Modification of VDU heater from refractory to ceramic module)

During the last turn around of VDU in 2004, the refractory bricks of the process heater were replaced with modern ceramic modules. This resulted in reduction heat loss from the furnace. The outside surface temperature of the furnace was reduced by more than 30 Deg C. The fuel oil saving achieved is about 116 KL/yr equivalent to Rs 10.5 lakhs/year.

3. Project no. 3 (Reduction in lighting Feeder current/voltage)

Separate lighting transformers are installed in electrical sub-stations. The tapplings for output voltage for lighting feeder reduced from 430 to 380 volts. The energy savings of around 2.5 lakhs KWH achieved savings of about Rs 3.32 lakhs per year.



4. Project no. 4 (Sustaining furnace operation using online furnace cleaning chemical)

The Residual oil fired in the process heaters. as fuel, have some degree of incomplete combustion which leads to formation of carbon deposits on heat transfer surfaces. The sticky deposits being strongly adherent are not easy to remove by soot blowing and over a period of operation resulting in High Arch Temperature, High Box temp & Increase of skin temperature .To arrest these problems and loss of T'puts, a specialty chemical Polarchem L2k (as an example, aqueous solution of Magnesium and Ammonium Nitrates) was sprayed in the box /arch section of the furnace The unique of the system is that it allows application on –line.

On line injection of specialty chemical (Polarchem L2K)was carried out in our furnaces (AU1, AU2, AU5,FPU-2 & CRU .

The fuel oil saving achieved in 2004-05 is about 154 KL equivalent to Rs 14 lakhs.

5. Project no. 5 (Commissioning CW pump internal painting)

The circulating water pump of cooling towers gets eroded on continuous use. Based on the recommendation of electrical audit carried out by PCRA, a special paint Belzona was applied on the inner surface of the pump casing. This coating helped in repairing the worn out portion of the casing at a much lower cost. This helps in resisting the damaging affects of abrasion, erosion, corrosion of the pump casing. The efficiency of the pump improved after the maintenance.

6. Project no. 6 (Implementation of control scheme by cascading temperature with pitch of fin fan coolers in Lab Plant)

The new LAB Plant was provided with over head fin fan coolers controlled by adjustment of fan pitch as per requirement. A new control scheme was implemented by cascading the cooler outlet temperature with pitch of fin fans of the coolers.This resulted in power savings and constant steady temperature of the products. The saving envisaged is about Rs 0.7 lakhs per year.

7. Project no. 7 (Six Sigma for slop reduction)

Loss Reduction is one of the key measure practiced in Refinery to improve on Energy conservation. Reduction of slop generation has been identified as one of the project under “Six Sigma”. Activities are in progress.

8. Project no. 8 (Steam leak survey of entire refinery along with external team members nominated by CHT)

Steam leak is one of the major component considered for energy loss. Although, continuous efforts are made to minimise the steam leak in the Refinery, the steam leak survey of the entire Refinery along with the external team members nominated by CHT helped in conducting a special drive on the subject.

9. Project no. 9 (Electrical Audit of Gujarat Refinery with the help of PCRA)

P.C.R.A. team carried out Electrical Energy Audit of Gujarat Refinery in August/September 2004 and report was submitted in December 2004. Recommendations with potential saving of about 93 lakhs KWH per year were indicated in the report. Installation of variable frequency drive controllers for AU-5 Cooling Tower fans, Reduction in lighting Feeder current/voltage and better maintenance of Cooling Tower Pumps for efficiency improvements were the general nature recommendations. Actions have been taken for implementing these recommendations and upto around 60 Lac KWH per year of electrical energy saved.

10. Project no. 10 (Replacement of 2000 Nos ordinary signalling lamp with LED in electrical sub-stations)

The Electrical sub-stations in Gujarat Refinery was having the conventional signalling lamps (10-15 W) on MCC panels.. In 2004-05, about 2000 no's of these signalling lamps were replaced with low watt LED lamps. This resulted in power saving in the tune of 1.75 Lakh KWH per year .

11. Project no. 11 (Commissioning of new pipeline from Refinery to Dumad)

New pipeline of 12" dia was layed and commissioned to despatch LDO and FO from Gujarat Refinery to near by Mktg. oil terminal (Dumad) . This is located around 11.5 KM away from the Refinery. This facility helps in reduction of tank truck loading in the Refinery resulting in lesser handling losses.

12. Project no. 12 (Commissioning of automated TTL facility for LAB products)

After commissioning of the new LAB Plant in Gujarat Refinery, facility was developed to dispatch the products of LAB plant through tank trucks. The facility provided with automated mass flow-meter loading.