

INDIAN OIL CORPORATION LIMITED

GUJARAT REFINERY

1.0 UNIT PROFILE

Gujarat Refinery, the flagship refinery of Indian Oil, was born after discovery of crude oil in Ankleshwar in South Gujarat. Late Pt. Jawaharlal Nehru, then Prime Minister of India laid the foundation stone of this Public Sector Refinery at Koyali, situated on the outskirts of Vadodara, on 10th May, 1963, with the technical assistance of the then USSR. Initially, the Refinery was set up with a capacity of 2.0 million metric tonnes per annum (MMTPA) for processing Ankleshwar Crude. The first Crude Distillation Unit (AU 1) of 1.0 MMTPA was commissioned in October 1965. Gujarat Refinery has been in the forefront of productivity, quality, safety, environment protection and its strong commitment to customer delight and national service since then. The Refinery has been expanded, revamped and modernized from time to time and today, the refining capacity of Gujarat Refinery stands at 13.7 MMTPA. Gujarat Refinery has 5 nos. of Primary Distillation Units, Secondary Processing facilities like Visbreaking Unit (VBU), Fluidized Catalytic Cracking (FCC) Unit, a Hydrocracking Unit (HCU). The refinery has also appropriate product treatment units like Diesel Hydro-De-Sulphurization Unit and associated Hydrogen and Sulphur Recovery Units etc.

Gujarat Refinery is designed to process i) Indigenous Crudes, viz., South Gujarat & North Gujarat crudes, Bombay High ii) High Sulphur Imported crudes and iii) Low Sulphur Imported crudes. The South Gujarat & North Gujarat crudes are received through a dedicated crude pipelines and the Imported and Bombay High crudes are received from Vadinar in Gujarat Coast through a countrywide crude oil pipeline.

Gujarat Refinery manufactures petroleum products / petrochemical feedstock / specialty products like LPG, Naphtha, Motor Spirit (MS), Superior Kerosene Oil (SKO), Aviation Turbine Fuel (ATF), High Speed Diesel (HSD), Light Diesel Oil (LDO), 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.

MS Quality Upgradation project for production of Euro-III grade MS was commissioned successfully in October, 2006.

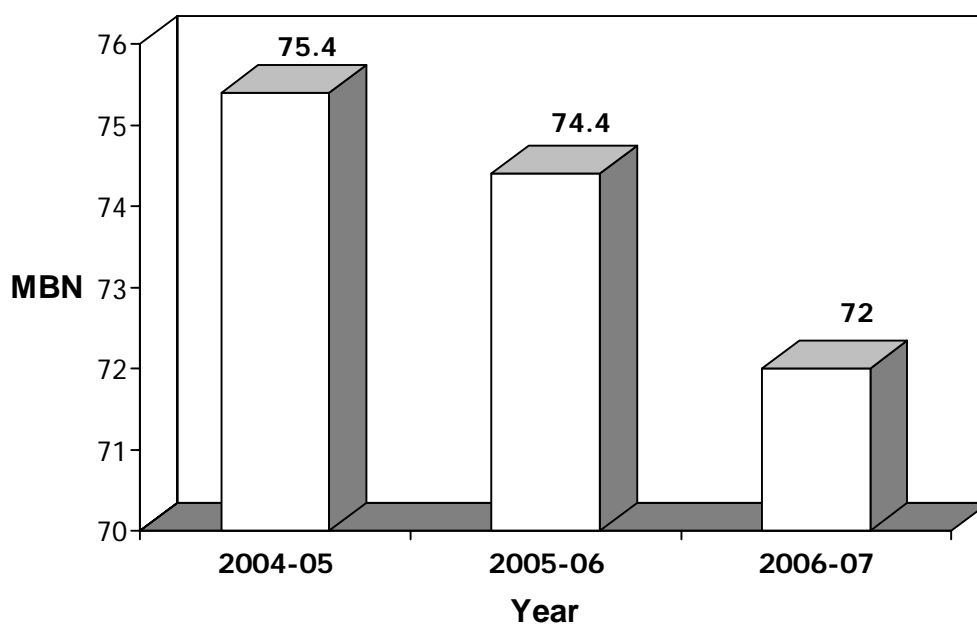
During the year 2006-07, Gujarat Refinery achieved the highest ever crude throughput of 12.95 Million Metric Tonnes surpassing the previous best of 12.76 Million Metric Tonnes in 2003-04.

The refinery also achieved the highest ever Gross Refinery Margin of Rs 3029 crores for 2006-07, highest amongst all IOC refineries.

2.0 ENERGY CONSUMPTION

2.1 Gujarat refinery, since its inception, has always accorded highest priority towards energy conservation. Sustained efforts are made for continual reduction in energy consumption in the refinery through various energy conservation measures and close monitoring.

The specific energy consumption in terms of MBN for the last three years are presented in the following graph :



3.0 ENERGY CONSERVATION COMMITMENT, POLICY AND SET-UP

3.1 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 overview 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. Currently, the TA and Encon cell of Gujarat Refinery is 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) / General Manager (TS) 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).

3.2 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.

4.0 ENERGY CONSERVATION ACHIEVEMENTS

4.1 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 75.4 in 2004-05 to a level of 72.0 in 2006-07., which has been the lowest ever for Gujarat Refinery. Various awards were conferred to Gujarat Refinery by Ministry Of Power & Ministry of Petroleum & Natural Gas with the "National Energy Conservation award" in 2004(2nd Prize), 2003(Special Prize), 2002(Special Prize), 2001(1st Prize), 2000(1st Prize) & 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.

4.2 The Energy Conservation schemes implemented during 2006-07 have yielded a saving of around Rs 844 lakh/year.

A brief description of the 3 major energy conservation measure implemented during the year 2006-07 are given below :

i) Routing of Hot RCO ex AU-V unit to VDU

Atmospheric distillation unit-V (AU-V) processes BH, Imported-LS and Imported-HS crudes. RCO generated during Imp-LS/BH processing is directly routed to vacuum units FPU-1/II for further processing. During Imp-HS run the RCO is required to be processed in vacuum unit VDU. However, there was no facility for direct routing of hot RCO to VDU and the same was routed to intermediate tanks via RCO run down coolers for processing in VDU. By implementing the facility for direct routing of hot RCO to VDU, the coil inlet temperature of VDU furnace was increased and substantial energy savings could be achieved with marginal investment of only Rs 3.6 lakh. The entire scheme was conceived and implemented in-house. The estimated savings works out to Rs 45 lakh

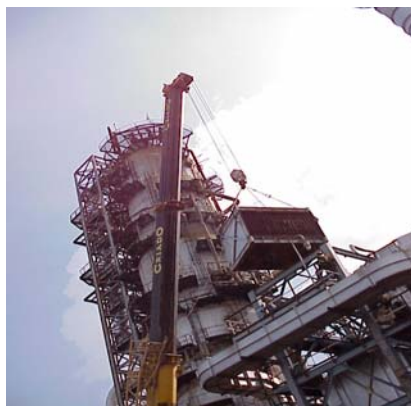
ii) Increasing availability of APH of LAB plant

LAB Plant Hot Oil heater is having a APH of 5 mmKcal/hr. Hot oil heater is having 40 numbers of soot blowers and it used to take ~ 2 hours and 15 minute for complete soot blowing in sequential manner. During the period of soot blowing the APH used to be in bypass condition. By continuously observing the soot blowing operation and brain storming it was observed that soot blowing time can be reduced by half by parallel operation of the two soot blower train each having 20 soot blowers.

The above procedure for soot blowing was implemented and this resulted in increased availability of LAB Plant APH by 1 hour daily and energy saving of around Rs 30.4 lakh/year

ii) Replacement of APH of Vacuum Unit FPU-2 with taking shut-down

Through innovative idea and team efforts, the fouled up APH of FPU-2 unit was replaced on line instead of waiting for almost 2 years for the planned shut-down of the unit. The resultant savings was around Rs 237 lakhs.



Installation of the new Module

5.0 ENERGY CONSERVATION PLANS AND TARGETS

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

	Scheme	Estimated Savings	Investment
		SRFT/year	Rs lakh
1	Flare Gas Recovery	5000	1644
2	Hydrogen recovery from CCRU	33000	4633
3	Condensate recovery in FGH/HGU-2 and DHDS block	126	10
4	Vapour absorption in control rooms	296	122
5	AU-5 revamp for building up AU-1/2 capacity in AU-5	30119	18900
6	VFD in LAB plant	310	3
7	Hydrogen recovery from CLPS offgas in HCU	7700	1500
	TOTAL	76551	26812

During the current year 2007-08, the specific energy consumption is expected to be around 69 MBN as against 72 during 2006-07. It is planned to bring down the MBN to 68 by 2008-09.

6.0 ENVIRONMENT AND SAFETY

Gujarat Refinery is having a dedicated department headed by Chief Manager for Environment and Safety. A continuous efforts to minimise and update the Refinery operation w.r.t latest norms and guidelines related to pollution and safety.

Online air monitoring facilities of all the major stacks and nearby areas are available. Total emission levels are always within the stipulated limits .

Entire effluent water generated from the Refinery are treated in CETP (Central Effluent Treated Plant) and are recycled back for fire water and cooling water make-up.