

UNIT PROFILE

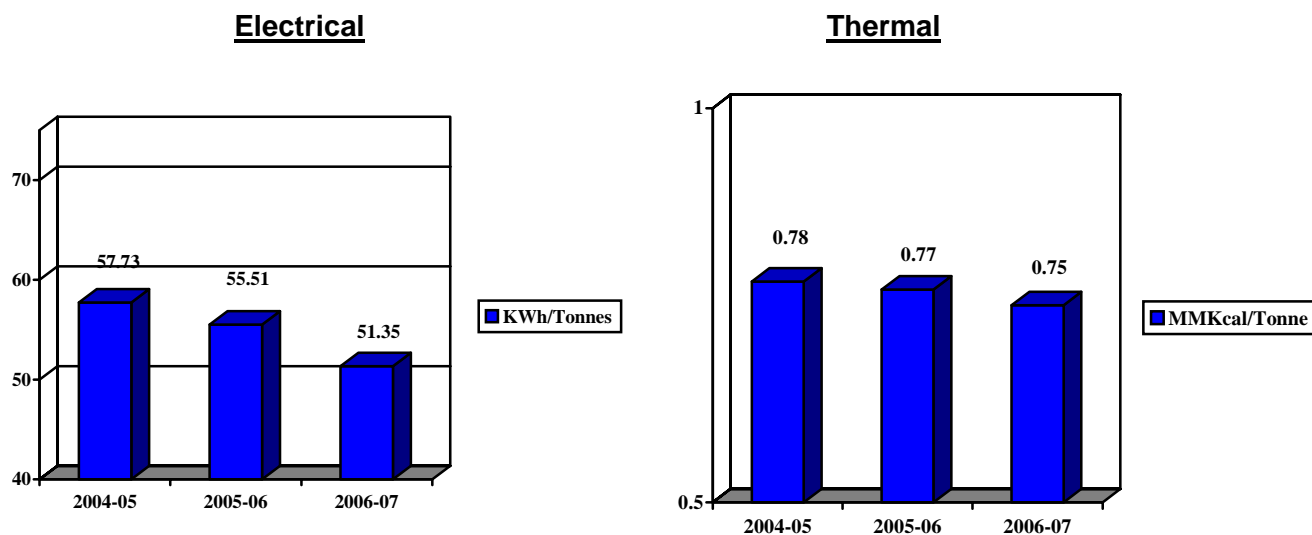
Haldia Refinery is the fourth in the chain of Seven refineries owned and operated by Indian Oil Corporation Limited, the largest commercial enterprise in the country and the leading Indian company in the “Fortune Global 500” listing of the world’s largest corporations.

Haldia Refinery was commissioned in January 1975 with an initial crude processing capacity of 2.5 Million Tonnes per Annum (MMTPA); the capacity was progressively increased to a level of 3.6 MMTPA through low-cost debottlenecking and innovative technology. A new crude distillation unit with a capacity of 1.0 MMTPA was installed and commissioned in March, 1997 for processing of low Sulphur imported crude to generate low sulphur internal fuel oil for burning in process furnaces/ TPS boilers for reducing SO₂ emission; capacity of New Crude Distillation Unit was also progressively increased to a level of 2.4 MM TPA through low-cost debottlenecking. Thus, the total installed capacity of the refinery is currently 6.0 MMTPA. Apart from normal fuel distillates like, LPG, MS, ATF, SKO, HSD etc. Haldia Refinery also produces the high valued Russian Turbine fuel (RTF) for use in fighter plane (MIG) & Lube oil base stock (LOBS).

Energy Consumption.

The Energy Scenario of Haldia Refinery in the past three years is given below:

DESCRIPTION	UNIT	2004 - 05	2005 - 06	2006-07
Annual Product Processing Rate	MMTPA	5.42	5.5	5.84
Total Electrical Energy Consumption / annum	Lakhs KWh	2849	2767	2644
Specific Energy Consumption - Electrical	KWh/Tonne	57.73	55.51	51.35
Total Thermal Energy Consumption/ annum	MMKcal	3825380	3863000	3968618
Specific Energy Consumption – Thermal	MMKcal/ Tonne	0.78	0.77	0.75
Total Manufacturing Cost	Rs. in Lakhs	815486	1088019	1343816
Total Energy Cost	Rs. in Lakhs	45631	65374	73508
Energy Cost as %age of Total Manufacturing Cost.	%	5.66	6.01	5.47



Specific Energy Consumption Over 2004-2005

Energy Conservation Commitment, Policy and Setup

Haldia Refinery has always accorded top-most priority for energy conservation and a dedicated Energy Conservation and Technical Audit Cell has been set up in the Refinery right from the time of commissioning of the Refinery. This cell is headed by a Chief Technical Services Manager and includes Energy Manager and experienced chemical engineer for monitoring, reviewing the refinery operations and implementing energy conservation measures in the refinery.

The engineers from Encon/TA cell review the energy consumption on a monthly basis. These are discussed monthly review meeting under the chairmanship of Executive Director.

Based on regular monitoring and periodical survey of the energy performance of the various process units, Thermal Power Station (TPS), heaters, heat exchangers etc., areas for further improvement in the energy efficiency are identified and are studied in details either through in-house efforts or external consultants. The outcome of these studies are discussed and reviewed with all the concerned departments before actually implementing the scheme.

Regular survey are carried out with regard to steam leaks, insulation effectiveness, HC loss survey (with Physical Acoustic Leak Detector, Fugitive Emission by GMI surveyors, product loading / despatch operations, energy balance etc. to identify potential areas of improvement.

Specialized studies are carried out through reputed process/energy consultants to compare the energy performance with the best practices adopted worldwide and new opportunities for energy conservation are explored/ identified. The outcome of these studies are reviewed and analyzed in details at various levels and energy conservation measures that are practicable / feasible are implemented at the earliest opportunity. Monthly energy performance of the Refinery vis-à-vis the targets are discussed in details in the Monthly Refinery Performance Review Meeting.

Energy Conservation Achievements

Haldia Refinery has incorporated and implemented number of major energy conservation measures based on in house studies and studies by reputed external consultants. Some of major energy conservation schemes implemented during the recent past by the refinery are given below:

- o Installation of 20 MW Co-generation Gas Turbine along with Heat Recovery Steam Generator (HRSG) with additional auxiliary gas firing facility.
- o Reduction in Steam consumption of Main Air Blower in FCCU.
- o Calcium Silicate Insulation in MP/LP steam header - Phase-II.
- o Installation of high efficiency furnace in Lube Hydro-finishing unit.
- o MP Steam condensate recovery in FCCU (Naphtha Splitter Reboiler).
- o Condensate recovery from TG Condensate pumps seal flushing line.
- o Installation of Balance Pressure Thermostatic Traps (BPT) in copper tube steam tracing line.
- o Control valves related to flare upgraded to higher-class valves.
- o Provision of fuel gas firing facility in Furfural Extraction unit furnace.
- o Improvement of VDU-II furnace efficiency through in-house modification.
- o Sick wagon unloading facility.
- o Replacement of Motor driven pump with Turbo-driven.
- o Provision of Insulation for tanks in 700 tank farms.
- o Provision of High Efficiency and High Capacity Centrifugal Air Compressor.
- o Reduction of HRSG Stack temperature through Optimization of HRSG Deareator Operation.
- o Single FD fan operation in VDU-II.
- o Calcium Silicate insulation in MP & LP steam header - Phase – III.
- o Ceramic Fibre Insulation in VDU-I Furnace – 31-F-01.
- o Installation of Mechanical trap (Float type) in steam outlet line of Boiler IV Steam coil Air preheater.
- o Installation of Flash Vessel in 11E111 (CDU-I Add. Naphtha Stabilizer reboiler) condensate line to recover MP steam condensate (1.5 MT/hr).
- o Upgrading FG control valve from Type IV to Type V.
- o Pre-heat improvement in CDU-I & CDU-II.
- o Installation of high efficiency Centrifugal Air Compressor at TPS.
- o Ceramic Fibre Insulation in FEU Furnace.
- o Installation of Packinox Heat Exchanger in CRU.
- o Optimization of VDU-I ejector steam.
- o Pre-heat improvement in KHDS.
- o Heat Recovery from VDU-II Tempered Water
- o GT-1 IGV with Temperature Control
- o BFW Injection in MSQ hot condensate to minimize generation & venting of Flash Steam
- o Replacement of Boiler-4 APH & VBU Economizer coil
- o Ceramic insulation in VBU Heater

Energy conservation Plan & Target

Refinery has time bound action plans to further bring down energy consumption and hydrocarbon loss from present level of operation. Some of the major schemes under implementation / planned are as under:

- o Waste Heat recovery from KHDS furnace (23-F-01).
- o Calcium Silicate Insulation in MP & LP Steam header of Offsite Area (Phase-IV).
- o Efficiency improvement in PDA Heater (32-F-01).
- o Installation of GT-II & HRSG.
- o Installation of Flare Gas Recovery System.
- o Recovery of Vent Gas from VDU-II.
- o Recycling of VDU-II overhead vapor to reduce stripping steam.
- o Heat integration of VDU-I & PDA by heating Asphalt mix stream with SR.
- o Recovery of Hydrogen from bleed-gases by Membrane Separator.

Total investment planned vis-à-vis energy saving targets are given as under:

ENCON Projects	Investment in (Lakhs)	Energy Savings in FO MT/annum
Under implementation & future Projection	11872.20	196653

Environment and Safety

Haldia Refinery has always taken the lead to undertake environmental improvement programmes with respect to the liquid effluent, air emission and solid waste management. Haldia Refinery has well-established Environmental Management System certified under ISO-14001. An investment of around Rs. 750 Crore has been made by Haldia Refinery towards environmental improvement. Haldia Refinery received Golden Peacock Environment Management Award given by World Environment Foundation, New Delhi during the year 1999 & 2000 (runners-up) and Indo-German Greentech Award for 2001 for outstanding achievement in the field of Environment management. Haldia Refinery also received the prestigious “ Millennium Business Award (2000) for Environmental Achievement” from International Chamber of Commerce, Paris.

Measures taken by Haldia Refinery to control Pollution

WWTP (Effluent Treatment Plant) – Augmented Capacity up to 790 M³/hr and modernized. Treated water reused as Make up in Cooling tower, Process area and as Fire Water make up. 5 nos. ambient air-monitoring stations and one continuous ambient air monitoring station are installed. HDPE lined pit for storing of residual sludge to prevent water & soil pollution. In addition to that an Incinerator has been installed.

Development of Green belt in and around refinery and Township.

Green Belt development has been a continual endeavour of Haldia Refinery. Year round plantation of tree had been carried out and saplings were distributed to township residents as well as surrounding locality. Haldia Refinery has scored an impressive Level 7 rating under the International Safety Rating System during the assessment audit conducted by M/S DNV during April 2005.

Haldia Refinery has also adopted the international standard on Occupational Health and Safety Assessment Series (OHSAS) in accordance with OHSAS-18001 and received the certification from M/s Det Norske Veritas, Netherland.

Encon Project Implemented in the year 2006 – 2007

1. Low level Heat Recovery from Tampered Water System of VDU-II to Pre-heat GT-1 Feed water.

In VDU-II, 450 m³/hr of Tamper water from 82B07(Tamper Water Vessel) is supplied to different rundown coolers in VDU-II and in FCCU. In VDU-II tamper is used in rundown coolers to cool Inter Oil (IO), Vacuum residue (VR), Light Oil (LO), Heavy Oil (HO) and slop rundown streams before routing the streams to rundown. In FCCU tamper water is used in DCO rundown cooler to cool DCO before routing it to rundown. After exchanging heat with different rundown stream in VDU-II and FCCU, tamper water (at around 850C) was collected in a common header (10") and send to air cooler (82E02). In the air cooler tamper water is gets cooled to 600C and then it is send to Tamper water vessel (82B07). From 82B07 it is pumped back to rundown coolers by tamper water pump (82P15A/B). The heat lost by the tamper water in the air coolers was equivalent to 11.25 MMKcal/hr.

Instead of cooling the tamper water, in an air cooler, now the heat available in the tamper water is used to heat the DM water, which is going to G.T – HRSG for steam generation. This is achieved by installing a Shell and Tube exchanger (DM water vs Tamper water) in the tamper water return header, before Air cooler.

Benefits :

GT-1 Deaerator steam savings	:	4 MT/hr
Savings in SRFT	:	2216 SRFT/annum
Total savings	:	358.04 Lakhs/annum.



2. Pre-heat improvement in KHDS by Pinch Modification.



Benefits :

Pre-heat improvement by	:	8 °C.
Equivalent SRFT	:	625 SRFT/annum.
Financial Benefit	:	100.98

3. Ceramic Insulation in VBU Heater.

Old castable refractory of VBU was replaced with Ceramic fibre insulation in December '06. This modification reduced the furnace wall temperature from 90 °C to 41 °C. Due to reduction in furnace wall temperature, setting loss of furnaces is reduced to 3.9% from a level of 6.5%.

Benefits :

Savings in SRFT	:	590 SRFT/annum
Financial Benefits	:	95.33 Lakhs/annum



Ceramic Insulation Inside Furnace

4. REPAIR and MAINTENANCE

- **Replacement of Boiler-4 APH & VBU Economizer coil in Jun'06 and Dec'06 respectively to save fuel saving of 1300 SRFT/yr.**

Benefits :

Savings in SRFT	:	1300 SRFT / annum
Financial Benefit	:	210.04 Lakhs/annum.



5. OPERATIONAL IMPROVEMENT

- Commissioning of Auto Temp control in GT-1 IGV helped in saving fuel equivalent of 890 SRFT/yr.

Benefits :

Savings in SRFT	:	890 SRFT / annum
Financial Benefit	:	143.80 Lakhs/annum.

- BFW injection in MSQ hot condensate to minimize generation and venting of Flash steam.



Benefits :

Savings in SRFT	:	1013 SRFT / annum
Financial Benefit	:	163.80 Lakhs/annum.

ENERGY POLICY

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 stakeholders for continual improvement in energy conservation.
- Propagating the message of avoiding wastage of energy to the community.



Indian Oil Corporation Limited.