

# NATIONAL ENERGY CONSERVATION AWARD 2004



## Indian Oil Corporation Mathura Refinery

### i) Company Profile :

**Indian Oil Corporation Limited (IndianOil)** is the largest commercial enterprise in India with a sales turnover of Rs. 1, 30, 203 Crores (US \$ 29.8 Billion) and profit of Rs. 7,005 crore ( US \$ 1,603 million) for fiscal 2003.

**IndianOil** is India's no. 1 company in Fortune's prestigious listing of the world's 500 largest corporations, ranked 189 based on fiscal 2003 performance. It is also the 19th largest petroleum company in the world and adjudged no. one in petroleum trading among the 15 national oil companies in the Asia-Pacific region, and is ranked 325th in the latest Forbes 'Global 500' listing of the largest public companies.

As India's flagship national oil company, **IndianOil** alone accounts for 51.2% petroleum product market share among PSU companies, 42% National refining capacity and 67% downstream pipeline throughput capacity.

The **IndianOil** group owns and operates 10 of India's 18 refineries with a current combined rated capacity of 52.8 Million metric tonnes (MMTPA) or one million barrels per day (bpd). These include subsidiaries Chennai Petroleum Corporation Ltd and Bongaigaon Refinery & Petrochemicals Ltd. It owns and operates the country's largest network of cross-country crude and product pipelines, with a combined length of 7,575 km with a combined capacity of 56.85 MMTPA. With sales of 48.60 MMTOF petroleum products including export of 1.81 Million tonnes in 2003-2004, **IndianOil** holds over 51.2% petroleum products market share in India. Its extensive network of over 22,000 sales points is backed for supplies by 162 bulk storage points and 87 Indane Bottling plants, 94 aviation fuel stations caters to the Aviation industry, defence as well as civil. IBP co. limited, a stand alone marketing company and subsidiary of **IndianOil** has a nationwide network of over 3000 retail outlets.

### UNIT profile:

**Mathura Refinery**, commissioned in 1982, current rated capacity is 8.0 MMTPA crude processing and is meeting the product demand of Northwest region of the country including the National Capital Delhi. The Refinery processes low sulphur crude from Bombay High, imported low sulphur crude from Nigeria, and high sulphur crude from Middle East Countries. In the original refinery configuration, there was one primary Atmospheric Vacuum unit coupled with Vis-breaker Unit, Fluidised Catalytic cracking Unit, Bitumen Unit and Sulphur Recovery unit as secondary units. Subsequently, in order to meet the stringent product specification arising out of environmental considerations secondary units viz. Catalytic Reforming Unit (CRU), Diesel hydro de-sulphurisation Unit (DHDS), Once Through Hydro-cracker unit (OHCU) and high efficiency Sulphur Recovery unit (SRU) were incorporated in the refinery configuration. The process configuration of the Refinery employs state-of-the-art technologies with minimal impact on the environment. Mathura Refinery has taken many initiatives to produce more and more clean fuels in stages in the interest of environment, public health and preservation of national monuments around Mathura region. As a result Mathura refinery has been able to supply highly eco-friendly petrol and diesel to NCT, NCR and Agra region in phase manner. By April 2005, Mathura Refinery will be the first refinery in India, which will be capable of producing 100% auto fuels meeting Euro – III norms.

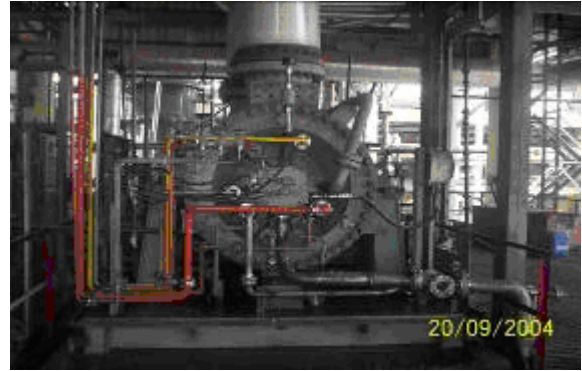
Various steps have been taken by Mathura Refinery to monitor and control the emission of Sulphur Dioxide. The refinery has taken extra-ordinary initiatives to provide green cover to the archeological heritage sites especially the Taj Mahal by planting 1,15,000 trees in Agra region including Taj Reserve Forest. Action has also been initiated for tree plantation in the Mathura region. Under this programme, 9,000 saplings of selected plant species have been supplied to the Director (Social Forestry), Mathura for plantation in Govardhan region of Mathura. Further,

9,000 saplings are being planted along NH-2 from Mathura (Krishna Nagar) to Farah through Social Forestry Deptt., Mathura. Tree plantation amongst the local populace is encouraged by giving assistance in the form of saplings, etc

## Brief Write-up on Major Schemes Implemented in 2003-04

- a) **CCRU RGC Spill back reengineering for steam savings:** At normal load of RGC compressor spill back of compressor used to open (~20%) on continuous basis. Opening of compressor antisurge in normal conditions is undesirable and leads to the higher amount of steam consumption in turbine.

Reengineering of spillback software and relocation of flow element were the major modification. With this modification spillback remains closed in normal operation and annual savings equivalent to ~ 200 SRFT is being achieved.



RGC Compressor

- b) **Innovative idea of increasing the diameter of LP burner tips size from 1.5 mm to 3.0 mm:** Low pressure refinery fuel gas is generated during the operation of visbreaker unit and this LP gas is used for firing of visbreaker furnace burners. During normal operation it was found that due to low pressure of LP gas, instead of going to furnace the gas was getting flared to the atmosphere due to high pressure drop across burners.

The problem was studied and it was observed that orifice size of LP burner gas tips was 1.5 mm and due to high pressure drop across the orifice LP gas was getting flared. To solve the problem the LP burners tip size was increased to 3 mm and as a result of low-pressure drop across burner orifice total gas could be fired in the furnace itself and flaring could be avoided. Annual savings equivalent to ~ 700 SRFT has been achieved with this modification.

- c) **Installation of special steam traps for instrument steam tracers:** Field instrument tapping in various process units are provided with copper tubing steam tracer in order to maintain fluidity. These tubes were releasing steam ~ 2 kg per hour per tracer continuously and making unpleasant sound in the plant. 100 nos. of copper tubings releasing highest amount of steam to atmosphere were identified and special type of steam traps were installed in these instrument tracers copper tubing.



Steam Traps for Instrument Steam Tracers

This has helped in reduction of steam consumption and annual savings of 110 SRFT is achieved.

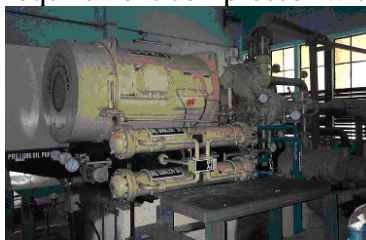
- d) **Preheat improvement in VBU by exchanger cleaning sequence:** Visbreaker unit uses very heavy material (bottom of vacuum column) as its feedstock, which is highly fouling in nature due to high wax, asphaltenes and metal content. In normal operations preheat exchangers get fouled up very fast and the preheat temperature goes down by ~ 50°C.

To solve the problem, periodical swapping of cleaned preheat exchangers with identified fouled exchanger has been scheduled along with the LCO soaking of fouled up exchangers. This arrangement helped to maintain preheat at desired level on sustainable basis and annual savings of ~ 2000 SRFT achieved.



**Pre-heat Exchanger Train in VBU**

- e) **Replacement of reciprocating air compressor:** There were 4 reciprocating air compressors, out of which 2 used to run to cater instrument air and service air requirement in the original refinery configuration. With the addition of more secondary units, air requirement had increased. To meet increased air requirement compressor with higher energy lower energy efficient and obsolete in nature and had problems of frequent breakdowns and maintenance.



**New Centrifugal Air Compressor**

efficiencies have been installed. Thus, new Centrifugal Air Compressors of capacity 5000 NM<sup>3</sup>/ Hr, 650 KW each were provided replacing four numbers of old reciprocating compressors. With the provision of this centrifugal compressor savings of ~ 100 SRFT per compressor has been achieved.

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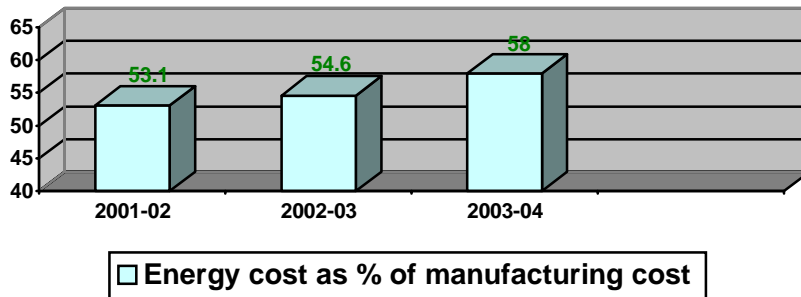
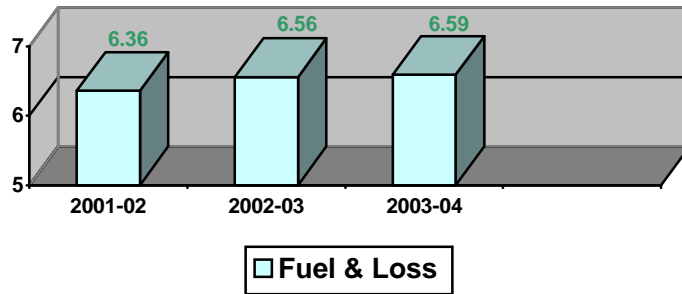
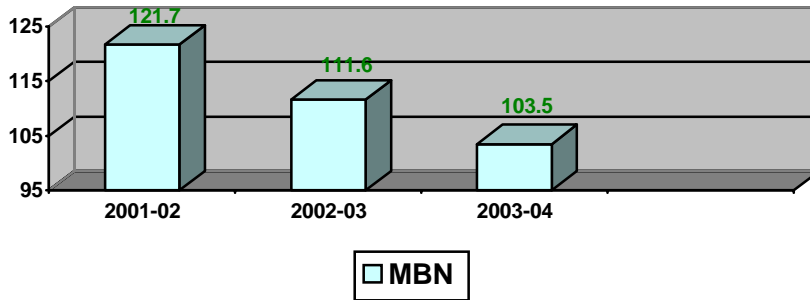
Various steps have been taken by Mathura Refinery to monitor and control the emission of Sulphur Dioxide. The refinery has taken extra-ordinary initiatives to provide green cover to the archeological heritage sites especially the Taj Mahal by planting 1,15,000 trees in Agra region including Taj Reserve Forest. Action has also been initiated for tree plantation in the Mathura region. Under this programme, 9,000 saplings of selected plant species have been supplied to the Director (Social Forestry), Mathura for plantation in Govardhan region of Mathura. Further, 9,000 saplings are being planted along NH-2 from Mathura (Krishna Nagar) to Farah through Social Forestry Deptt., Mathura. Tree

plantation amongst the local populace is encouraged by giving assistance in the form of saplings, etc

ii) **Energy Consumption**

Mathura Refinery consumes various types of fuels viz. Natural gas, refinery fuel gas and low Sulphur internal fuel oil (IFO) in furnaces / boilers. Natural gas, which is about 50% of total fuel consumed at MR is supplied by M/s GAIL whereas all others fuels are generated in the refinery itself. The IFO is fired as alternate fuel in old furnaces only.

The energy consumption in refinery is reported in terms of % Fuel & Loss on crude and MBTU/BBL/NRGF (MBN), where the term MBTU refers to total heat value of fuel & loss in thousand BTU, BBL refers to barrel of crude processed and NRGF is a derived factor that depends upon actual intake in both primary and secondary processing units. The % fuel & loss, MBN and energy cost as % manufacturing cost for last three years is as given below:



The % fuel & loss of refinery has gone up in last two years because of higher secondary unit throughputs in an effort to produce clean and higher value ecofriendly products. However, the specific energy consumption in terms of MBN (the real yard stick for energy performance) has come down by ~ 15% in last three years.

iii) **Energy Conservation Commitment, Policy and Set-up (please include a photocopy of unit's Energy conservation policy, if decided)**

**IndianOil** is having strong Energy Conservation Commitment, which is also reflected in its Energy Management Policy. The policy consists of all points related to adopting & nurturing Energy Efficient and environment technologies. The policy is approved by the board of directors of the company and adopted by Mathura refinery. The Policy is reproduced below:

### **Energy Management 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.”

Mathura Refinery is highly committed for energy conservation, as the management has set up an exclusive energy conservation cell headed by a chief manager who is a qualified chemical engineer right since inception in 1982. Mathura refinery by its continuous endeavor has reduced its specific energy consumption level despite increase in complexity, which has been duly recognized by various agencies including Ministry of Power. In last ten years MR has bagged six prizes given by Ministry of Power (MoP) in different years including certificate of merit last year in Dec'2003.

Dy. General Manager (Technical Services), a top management representative is the pivotal person to oversee the activities of “Energy Conservation Cell” at Mathura refinery. This cell consists of highly experienced engineers with operational background and multi-unit experience. The energy consumption parameters prepared on a day-to-day basis are analyzed in daily, weekly and monthly forums for keeping constant focus on commitments on energy conservation. Some of the major steps taken by Mathura Refinery for energy conservation are:

- Air pre-heater in furnaces.
- Optimization of heat exchanger train network.
- Provision of high efficiency burners.
- Use of low-pressure gas in AVU / VBU which otherwise was being flared.
- Hydrocarbon loss reduction by way of strict control and monitoring of flare (use of Physical Acoustic Leak Detector for monitoring safety valves and control valves), handling losses, tank farm operation monitoring etc.

- Soaker technology in Visbreaker Unit.
- Process optimization using advance process control.
- Steam turbine for Boiler feed pump and use of turbine exhaust in deaerator
- Two nos. energy efficient Gas Turbines of 20 MW each alongwith Heat Recovery Steam Generation.
- Servo / Radar gauge in storage tanks.
- Use of LP steam for reboiling in PRU etc.
- Replacement of Metallic Fans with FRP blades in process units.
- Heat integration between different process units.
- Change of service in crude pre-heat circuit from SR to LVGO for pre-heat improvement
- Additional heat exchanger in bottom circuit of FCC for pre-heat improvement De-bottlenecking of main column 19-C-1 & Debutanizer 20-C-4 overhead circuits of FCC for reduction of flare in summer months.
- VBU feed pump with higher efficiency.(16P1A/B, 2 Nos.)
- Use of LP steam in VDU for stripping purpose.
- Provision of secondary seal in one crude & 3 MS/ Naphtha tanks.
- Re-insulation of MP steam header with high efficiency insulation
- Tank wagon gantry automation.
- Generation of MP steam in place of HP steam in CRU steam generator.
- Chemical treatment of CW system, thereby improving exchanger's fouling factor.
- Increasing the LP burners diameter in VBU from 1.5 mm to 3.0 mm
- VBU preheat exchanger cleaning management

The details of Energy Conservation Cell set-up in the refinery are given at item no. 13 (c) above.

#### **iv) Energy Conservation Achievements**

**The portion should include one paragraph write-up on each major energy conservation project implemented during the year 2003-04 only.**

The Various energy conservation projects implemented during the year 2003-04 are. -

- Replacement of second reciprocating air compressor in water block with centrifugal ones
- Installation of 100 nos of special steam traps on instrument tracer copper tubings
- Steam trap audit by external agency M/S Forbes Marshall
- Preheat improvement in VBU by exchanger cleaning management
- Closing of undesirable continuous spill back by re-engineering spill by software by modification in flow element installation
- Innovative idea of increasing the diameter of LP burner tips size from 1.5 mm to 3.0 mm

**Annual Energy savings to the tune of 3110 SRFT which is equivalent to Rs. 3.11 crores** were achieved with the implementation of these projects. However, the major savings were achieved by optimizing the energy consumption thru existing infrastructure by very stringent monitoring and control on day-to-day basis.

Brief description of the schemes implemented in 2003-04 is as per point no. 16.

The benefits of energy conservation measure implemented earlier were sustained during the year 2003-04 also. Refinery has used extensively Physical Acoustic Leak detector for detecting gas loss to flare by regular survey of safety valves and control valves connected to flare. Encon audit of furnaces, steam leak, heat exchanger, crude oil receipt, Natural gas receipt, custody transfer operation etc were carried out by Internal Energy Audit group. A Joint Energy Audit by CHT team comprising members of other refineries was conducted in August'2002. The short-term recommendations given by the JEA team were implemented promptly and actions are initiated for implementation of long-term recommendations.

**v) Energy Conservation Plans and Targets**

Mathura Refinery is committed to further reduce energy consumption by finding out new avenues on continuous basis. Refinery has planned for revamp of primary unit AVU for yield & energy improvement at an investment of 44 crores which will bring a saving of 20,000 SRFT/year. The list of major proposals as a part of its future plans for energy conservation is as under:

S. No.	Energy Conservation Measures (Planned)	Anticipated Savings Rs. Lakh	Investment (Rs. Lakh)	Completion Year
1	AVU yield & energy improvement	2000	4400	2004-05
2	Condensate recovery from PRU	13	1.9	-do-
3	Installation of coalescer in Nap. / SK streams	27	70	-do-
4	Pre-heat improvement of NSU feed (Additional feed / product exchanger in NSU / CRU).	144	-	-do-
5	Installation of special traps in instrument tracer line	16	4.5	-do-
6	Routing of VDU off-gas to furnace	360	11	-do-
7	APH in VBU	195	690	2005-06
8	Provision of sec. Seal in storage tanks ( Naphtha / MS tanks and one crude tank)	10	26	-do-
	<b>Total</b>	<b>2765</b>	<b>5203.4</b>	

vi) **Environment & Safety**

**Environment:**

Mathura Refinery is located in the sensitive Taj Trapezium Zone (TTZ) in Uttar Pradesh on the National Highway No.2 connecting the capital city of Delhi with the historic city of Agra.



**Mathura Refinery – Clean & Green**



**Mathura Refinery – Night View**

It is the first industry in India for which a scientific Environmental Impact Assessment (EIA) study was carried out and recommendations were implemented even before commissioning of the refinery, thus laid a strong foundation of the Environmental Management System right since inception.

The process configuration of the refinery employs the state-of-the-art technologies with minimal impact on the environment. Besides, a number of steps have been taken by Mathura Refinery for preservation of the ecological balance.

The various Environment Protection Measures taken by Mathura Refinery are given below:

**i) Environment Protection – Air**

Various steps taken by Mathura Refinery to monitor and control the emission of Sulphur Dioxide are summarised below:

- Use of low sulphur liquid fuel derived from low sulphur crude oil of Bombay High and Nigerian origin.
- Desulphurisation of fuel gases.
- Provision of Sulphur Recovery Unit along with stand-by.

- Use of Natural Gas in boilers and furnaces.
- Tall chimneys for better dispersion of pollutants so that the Ground Level Concentrations are kept at the minimum.
- Continuous Sulphur Dioxide Analysers in all stacks of the refinery.
- Four nos. of Ambient Air Monitoring Stations at Farah, Keetham, Sikandra and Bharatpur far beyond the work area to continuously monitor Sulphur Dioxide in the ambient air.
- Three Ambient Air Monitoring Stations in refinery premises for AAQ monitoring.
- A sophisticated mobile van for Ambient Air Quality (AAQ) monitoring.
- Installation of low NOx burners in all the new furnaces and NOx analysers in the stacks.
- CFC free air conditioning system based on Vapour Absorption Machines have been provided in offices and control rooms.
- The use of Halons in fire fighting equipment has been completely stopped.

As identified under the Kyoto Protocol, the emission of greenhouse gases mainly Carbon Dioxide is of great concern because of their potential role in global warming. All processes burning fuels contribute to emissions of Carbon Dioxide. Lower fuel consumption means lower emissions from refinery furnaces. The various energy conservation schemes have been implemented which results into substantial fuel savings and in turn reduction of emissions of Carbon Dioxide to a great extent.

### **Eco-Friendly Products**

Keeping in view the fact that vehicular emission is one of the biggest sources of air pollution, Mathura Refinery has taken many initiatives to produce more and more clean fuels in stages in the interest of environment, public health and preservation of national monuments around. Its noteworthy efforts are stage-wise implementation of various projects like Catalytic Reforming Unit, Diesel Hydrodesulphurisation Unit and Hydrocracker for quality upgradation of automobile fuels. The chronology of Eco-friendly products produced by Mathura Refinery is as follows:

- Unleaded Petrol (ULP) to Delhi since Mar'95.
- Low Sulphur Diesel ('S' 0.25% max) to TTZ (Taj Trapezium) since July'96.
- Entire Unleaded Petrol (ULP) with 'S' 0.05% max since July'98.
- Entire Low Sulphur Diesel ('S' 0.25% max) since Aug'99.
- Petrol with 1% vol. Max Benzene to NCT and NCR since Nov'2000 and Mar'2001 respectively.
- Ultra Low Sulphur Diesel ('S' 0.05% max) to NCT since Mar'2001, to NCR since June'2001 and to Agra since Apr'2003.

Besides above, Mathura Refinery has also started production of a new generation premium grade Petrol of 91 Octane under the brand name of 'Xtra Premium Hi-Octane Petrol' from Aug'2002. The new fuel doped with Multifunctional Additive (MFA) has better anti-knocking characteristics, thus gives better mileage, smoother running of vehicles and in turn lower emissions.

Two mega projects viz. MS Quality Upgradation (MSQU) and Diesel Hydrotreatment (DHDT) are on the anvil for producing still cleaner automobile fuels meeting BS-III/ IV norms.

### **Environment Protection - Water**

- Mathura Refinery has a full-fledged Effluent Treatment Plant (ETP) consisting of physical, chemical and biological treatment facilities. This is a unique system, which not only removes hazardous pollutants, but also converts them into environmentally acceptable forms.
- The chemical wastewater containing predominantly Sulphides is treated by enhanced oxidation process using H<sub>2</sub>O<sub>2</sub>. The state-of-the art facility converts toxic Sulphides in the wastewater to non-toxic Sulphates besides eliminating generation of chemical sludge.
- Part of the treated effluent is recycled for various uses in the refinery resulting in conservation of fresh water. The remaining quantity is let in the river Yamuna or Barari Minor Canal.
- The treated effluent is being gainfully used by local farmers for irrigation purpose. It has been conclusively proved through the 'Experimental Farming Project' conducted in association with the Aligarh Muslim University that there is no adverse impact of the treated effluent on the soil and crop productivity.
- An independent agency, National Environmental Engineering Research Institute (NEERI) periodically checks the treated effluent and confirms that it is well within the limits of standards prescribed for discharge into inland surface water.
- At present, the ETP of the refinery is being modernised followed by incorporation of Reverse Osmosis (RO) System to provide manifold improvements like better recycle of effluent water, better sludge management, minimisation of emission of VOCs, etc.

### **iii) Environment Protection - Land**

- Mathura Refinery has adopted environmentally sound solid waste management practices based on the philosophy of minimisation of generation of solid waste and safe disposal of residual waste.
- Implementation of H<sub>2</sub>O<sub>2</sub> based enhanced oxidation process in ETP for treatment of Sulphide bearing streams has completely eliminated generation of chemical sludge which was otherwise being generated in conventional treatment based on Ferrous Sulphate and Lime.

- The biological sludge generated in ETP is used as bio manure in the green area of the refinery thereby avoiding the use of chemical fertilizers.
- For reducing volume of oily sludge, hot gas oil circulation is carried out before cleaning of crude oil storage tanks. Melting pits have also been provided for recovery of oil.
- An impervious PVC lined secured landfill site having proper leachate collection facility has been constructed for disposal of residual sludge.
- The Research & Development (R&D) Centre of Indian Oil Corporation Ltd. in association with Tata Energy Research Institute (TERI) has developed a microbial mix of five selective naturally occurring organisms called 'Oilivorous-S' which converts organic constituents of oily sludge into non-toxic compounds viz. Carbon Dioxide and water. The technology has been successfully developed at Mathura Refinery from experimental stage to commercial stage.
- For 'Resource from Waste', Mathura Refinery has installed an anaerobic digester for treatment of canteen waste to produce bio gas which is being used in canteen resulting in saving of cooking gas.
- Groundwater monitoring is also periodically carried out to ensure that there is no impact of refinery operations on the groundwater quality.

#### **iv) Cleaning through Greening**

- In the vicinity of the Effluent treatment Plant, thriving on treated effluent, a beautiful ecological park with lush green cover has been developed in an area of 4.45 acres. Water bodies in the park are receiving water from ETP. Thousands of migratory birds visit this park every year between October and February. The park is a testimony to Eco-friendly operations in Mathura Refinery. Dkkf
- As tree plantation provides long-term far-reaching benefits, Mathura Refinery has done extensive tree plantation in and around the refinery. Besides serving as a pollution sink, this green cover also enhances the aesthetic look. The refinery has so far planted about 29,000 trees/ shrubs in the refinery premises and more than one Lac trees/ shrubs in the surrounding area and township. Mathura Refinery, as a responsible corporate entity, is committed for upkeep of the environment beyond its boundaries as well. The refinery has taken extra-ordinary initiatives to provide green cover to the archeological heritage sites especially the Taj Mahal by planting 1,15,000 trees in Agra region including Taj Reserve Forest. Action has also been initiated for tree plantation in the Mathura region. Under this programme, 9,000 saplings of selected plant species have been supplied to the Director (Social Forestry), Mathura for plantation in Govardhan region of Mathura. Further, 9,000 saplings are being planted along NH-2 from Mathura (Krishna Nagar) to Farah through Social Forestry Deptt., Mathura. Tree plantation amongst the local populace is encouraged by giving assistance in the form of saplings, etc

## v) Environmental Training & Concern for Community

Environmental awareness amongst employees is created through articles published in in-house bulletins, structured training programmes and observance of the World Forestry Day, Earth Day & World Environment Day. Employees are imparted training, induction as well as refresher, on responsible practices to be followed for protection of the environment. Mock drills are periodically conducted to ensure emergency preparedness. Contractors' personnel are educated on environmental safety on a continual basis.

The agenda to protect the environment also includes recognising and responding to concerns of the community about environmental safety. Environmental awareness amongst the local populace is created by involving them in the activities like observance of the World Environment Day. Pollution control checks are organised for vehicles free of cost as a part of the agenda of the World Environment Day. In addition to the environmental awareness, awareness about safety from fire, disaster, etc. is also created amongst the nearby habitats. Apart from this, as a part of on-going awareness programme in the refinery, tank truck drivers are educated on safe transportation of petroleum products and to deal with emergency situations on road.

In our efforts to preserve the ecology, a campaign has been launched in the township on 'Non-use of Polythene Bags' for our common benefit and well being.

Besides above, to improve the quality of life of the community, Mathura Refinery has initiated various community development activities viz. clean drinking water, health & medical care, welfare of women, etc. Mathura Refinery has established a 50 bedded hospital known as 'Swarna Jayanti Samudayik Hospital' on NH-2 near township for the benefit of the neighbouring community. The refinery is also operating two mobile dispensaries and serving the community.

### Safety

Safety being an integral part of refinery operation, best practices on safety is in place at Mathura Refinery. The safety is accorded the highest priority. To make the refinery a safe place for its employees, environment and nearby community, the high standard of safety is maintained. Latest equipments on safety are introduced time to time. Safety system is continuously monitored and upgraded through monthly shop floor safety meetings, Management Review and through Internal/ External safety audits.

Following are the highlights of MR safety system/programme:

- A well laid fire water network spread over the refinery is able to cater the need of fire water with adequate pressure to tackle simultaneous two major fires in the refinery.
- Modern fire fighting equipment are available in the refinery with trained fire fighting crew.
- Vast communication in the refinery includes fire telephones; microprocessors based fire alarms system with talk back facility and walkie-talkies with base stations all over the refinery.

- For immediate detection of any incidental release of gases during refinery operation, gas detectors with audio-visual alarm have also been provided.
- This elaborate fire fighting and communication system is maintained in trim condition by daily review of fire fighting system in Refinery Shift Manager meetings and conducting regular Mock Drills. Emergency drills for on-site and offsite are conducted at stated frequency with dedicated teamwork and emergency organogram.
- Updated 'On-site Emergency Plan', 'OISD Standards', 'Material Safety Data Sheets', status of ESA / SSC recommendations and 'status of Statutory Licenses' has been put on the INTRANET of Mathura Refinery for easy access by end users.
- Adequacy check of firewater network of Mathura Refinery was carried out by an external agency in March'2004. The study was carried out in view of implementation of new Projects like MSQU and DHDT as well as new off site facilities like additional storage tanks, new flare etc. The recommendations are under implementation.
- Comprehensive Risk Analysis study was carried out by M/S EIL in March'2004. The study was carried out in view of implementation of new Projects like MSQU and DHDT alongwith associated facilities. The recommendations are under implementation.
- Daily Safety Tour by Sr. officers introduced in Jan'2004. The entire refinery is divided in 27 zones officers record their observations in the prescribed check list for compliance.
- In addition, security rounds by a multi-disciplinary team are conducted regularly beyond normal working hours.

**21. Whether any dispute pertaining to statutory requirements of safety and pollution control is pending with the government agency. If yeas, please give details:**

NIL

**ENERGY CONSERVATION AWARD-2004**

**SUMMARY SHEET**

**Unit Name – Mathura Refinery**

**Sector – Petroleum Refining**

**1. Implementation of energy conservation measures & investments  
{S.No.16 and S. No. 9.3 (i)}**

**a) No. of measures implemented, investment made & savings achieved**

Year	No. of measures implemented (S.No.16) (i)	Investment (S.No.16) (Rs. Lakh) (ii)	Savings (S.No.16) (Rs. Lakh/yr.) (iii)	Energy Cost S.No.9.3(I) (Rs. Lakh/yr) (iv)	% savings of Energy Cost (iii / iv * 100)
2001-02	4	3944.5	602.2	30699.5	1.96
2002-03	6	92.48	279.3	30960.6	0.91
2003-04	5	80.73	311	29511.2	1.05
<b>Remarks (if any):</b>					

**2. Energy Savings (S.No.16 and S.No. 9.1C(a), S.No. 10 R(k))**

**a) Absolute Savings**

Year	Elect. Savings (Lakh kWh) (S.No.16) (i)	Thermal (Fuel) Saving (MkCal) (S.No.16) (ii)	Elect. Consumption (Lakh kWh) S.No.9.1 C(a) (iii)	Thermal (Fuel) Consumption (MkCal) S.No.10R(k) (iv)	% Elect. Savings (i / iii* 100)	% Thermal Fuel Savings (ii / iv* 100)
2001-02	--	40440	2843.80	4061355	--	0.99
2002-03	--	34470	2869.69	4025681	--	0.85
2003-04	--	31100	2910.04	3904724	--	0.80

Remarks: As per the refinery accounting system, savings in fuel consumption for power generation is included in thermal energy. Therefore only savings in thermal energy is shown above.

**2b) Specific Energy Consumption (SEC) Reduction during the period 2001-2004 (S.No.11)**

Year	Product	Kwh / Tonne	% reduction over 2001-02	MK Cal / Tonne	% reduction over 2001-02
2001-02	Petroleum products	36.55	-	0.5220	-
2002-03	-do-	36.44	0.30	0.5112	2.07
2003-04	-do-	36.69	(-)0.38	0.4922	5.70
<b>Remarks (if any):</b> Specific Electrical Energy is marginally higher in 2003-04 because of higher production of premium grade products viz. Xtra premium, PGMS and UL HSD which requires higher t' puts of secondary and tertiary units.					

2c) **Specific Energy Consumption Comparison with National & International Best Values (S.No.12, Page-10 & 11)**

Product	Figures for the current Year (2001-2003)			National / International Best	
				National	International
	Year	MBN	EII	MBN	EII
Petroleum Products	2001-02	121.7	90.7	123.7	65
	2002-03	111.6	83.8	117.5	65
	2003-04	103.5	80	116.0	65

3 **Annual Energy Savings and Annual Sales Turnover (Refer S.No.17)**

Year	Annual Energy Savings achieved in Rs Lakh(i)	Annual Sales Turnover Rs Lakh (ii)	Annual savings achieved/Annual Sales turnover (in %)
2001-02	602.2	798214	0.075
2002-03	279.3	1113220	0.025
2003-04	311	1122250	0.027

4 **Specific Energy Consumption Planned targets as achieved during 2003-04 (Refer S No. 19(a))**

Specific energy consumption or use actual units						
Planned target for 2003-04(a)		Actual for 2003-04(b)		% Reduction		Money saved during 2003-04
KWh/tonne	Mkcal/tonne	KWh/tonne	Mkcal/tonne	Electrical	Thermal	Rs Lakh
36.40	0.500	36.69	0.492	(+) 0.79*	(-) 1.6	311

\* The actual electrical sp. energy consumption during 2003-04 was higher than the planned target due to higher processing in secondary units viz. FCCU & OHCU than the planned. However, the specific energy consumption in terms of MBN (the real yard stick for energy performance of refineries) for 2003-04 is 103.5, which is ~ 9% lower than MOU target of 114.

**5 Planned Specific Energy Consumption target for the year 2004-05 & 2005-06  
{Refer S. No. 19(b)}**

Year	Electrical Kwh/Ton	Thermal MMkCal/Ton	Reduction over the year 2003-04	
			Electrical %	Thermal %
2003-04 (base year)	36.69	0.492	-	-
2004-05	50.8	0.52	(-) 38.5	(-) 5.7
2005-06	62.7	0.67	(-) 70.9	(-) 36.2

**Note:** The specific energy consumption for 2004-05 and 2005-06 are expected to be increased because of addition of new secondary processing units viz. MSQ/ DHDT for the quality up gradation of the fuels Euro-III norms.

**DOCUMENTS ATTACHED:**

- I. Copies of Certificates (with year wise marking) pertaining to statutory requirements such as safety and pollution control fro the period 2001-04 are enclosed
- II. One copy each of the audited annual reports for the years 2001-02, 2002-03 and 2003-04 are enclosed.
- III. A brief write up of the unit as mentioned at S.No.20 along with photographs depicting equipment / locations where energy efficiency activities have been undertaken and a Floppy Diskette in Word are enclosed.

(Signature of the Chief Executive)

Name & Designation of the Chief Executive

**(B. M. Bansal)**  
**Executive Director**

Date: 23.09.04

Place: Mathura

Organisation Seal