IndianOil

Leading the way through Health, Safety & Environment

Health, Safety & Environment

The three pillars to ensure safe communities and happy stakeholders

The world of IndianOil –

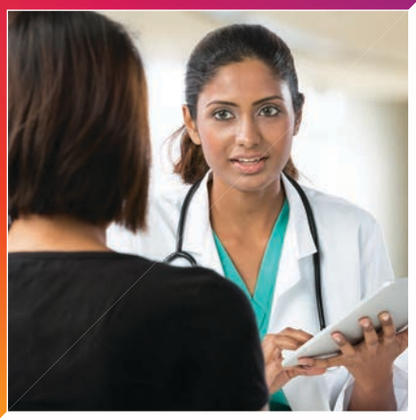
Welcome to the world of IndianOil, an integrated energy major with presence in almost all the streams of oil, gas, petrochemicals and alternative energy sources; a world of high-calibre people, state-of-the-art technologies and cutting-edge R&D; a world of best practices, quality-consciousness and transparency; and a world where energy in all its forms is tapped most responsibly and delivered to the consumers most affordably.

Welcome to IndianOil, The Energy of India.

At IndianOil, we believe that it is possible to fuel the energy needs of the nation while also protecting people and the environment. We are committed to conducting business in a

manner that is compatible with the environmental and economic needs of the communities in which we operate, and that protects the safety and health of our employees, those involved with our operations, our customers and the public.

IndianOil accords topmost priority to conducting its business with a strong environment conscience, ensuring sustainable development, safe workplaces and enrichment of the quality of life of its employees, customers and community at large. All its refineries are certified to ISO:14064 standards for sustainable development as well as for the Occupational Health & Safety Management System (OHSMS/OHSAS-18001), besides having fully equipped occupational health centres. Compliance with safety systems, procedures and environment laws is monitored at the unit, division and corporate levels. As India's leading oil & gas corporate, IndianOil remains steadfast in its commitment to excellence in Health, Safety and Environmental (H,S&E) performance. This publication showcases how IndianOil people are relentlessly pursuing multiple commitments – at the operational, social and environmental levels – to fully realise IndianOil's potential as the prime mover of a resurgent India.



Health, Safety & Environment Policy

IndianOil is committed to conduct business with strong environment conscience ensuring sustainable development, safe workplaces and enrichment of quality of life of employees, customers and the community. We, at IndianOil, believe that good H,S&E performance is an integral part of efficient and profitable business management. We shall:

- Establish and maintain good standards for safety of the people, the processes and the assets.
- Comply with all rules and regulations on safety, occupational health and environmental protection.
- Plan, design, operate and maintain all facilities, processes and procedures to secure sustained Health, Safety and Environmental Protection.
- Remain trained, equipped and ready for effective and prompt response to accidents and emergencies.
- Welcome audit of our H,S&E conduct by external body, so that stakeholder confidence is safeguarded.
- Adopt and promote industry best practices to avert accidents and improve our H,S&E performance.
- Remain committed to be a leader in Occupational Health, Safety and Environment protection through continuing improvement.
- Make efforts to preserve ecological balance and heritage.

ENVIRONMENT

In the course of refinery operations, waste water, flue gases and fugitive emissions and solid wastes are generated. Refineries are also significant consumers of water and energy. Thus, pollution control and resource conservation activities are a priority area for environment management at IndianOil. Effective treatment of waste water and recycling, energy conservation and pollution abatement are examples of integrated activities that result in both pollution control and resource conservation.

Our refineries continuously strive to –

- Minimise adverse environmental impact from refinery activities, products and services by using processes, practices and material that avoid, reduce or control pollution;
- Conserve scarce natural resources and ensure that their consumption is continually optimised.

The different aspects of environment management at IndianOil are detailed below:

Waste Water Management

Use of water and quality of effluent discharged are carefully monitored. Our refineries are equipped with a network of underground sewers for segregated collection of various wastewater streams, which are subjected to precise treatment in well-designed effluent treatment (ETP) facilities involving physical, chemical and biological processes.

State-of-the-art equipment has been provided in the ETPs like Tilted Plate Interceptor (TPI), dissolved air floatation (DAF), Bio-tower, Activated Sludge Basins, Dual Media Filters for treating oily waste water and hydrogen peroxide / wet air oxidation treatment for spent caustic streams etc. These treatment facilities are backed by sophisticated instrumentation and real-time monitoring systems for close and precise monitoring. In Marketing and Pipelines locations, effluent water is routed through oil water separators.

Water Conservation

- Treated effluent streams are reused / recycled for various purposes in refineries like make-up for fire water, cooling towers, coke cutting in Delayed Cokers, etc.
- Sour water generated in various units is stripped of contaminants such as ammonia and H_2S and recycled in de-salters besides using it for process flushing requirements.
- Advanced treatment systems like Ultra Filtration, Reverse Osmosis, etc., are used to convert treated effluent to de-mineralised water or for use in cooling towers as make-up water.
- Rainwater harvesting structures have been put up in all refinery townships, Marketing and Pipelines installations and R&D Centre for recharging groundwater.

These steps have led to 80-95% waste water being reused in our refineries, which has resulted in substantial reduction in fresh water consumption.

Prevention of Air Pollution

Utmost attention is given to control / reduce emissions in our refineries. Major sources of air emissions are flue gases from boilers and heaters, FCC Regenerators and Sulphur Recovery Units. Hydrocarbon leaks and evaporation during storage, handling and transportation of petroleum products and crude oil are sources of fugitive emissions.

IndianOil has adopted the following measures to control emissions & effectively disperse pollutants from flue gases.

- Tall stacks for effective dispersion of pollutants.
- Use of low-sulphur fuel oil / sweet natural gas / desulphurised refinery gas in boilers and heaters to minimise SO_2 emission.
- Use of low NO_x burners.
- Hydrogen Sulphide generated during desulphurisation of refinery gas is converted to elemental Sulphur in Sulphur Recovery Units.
- Sulphur dioxide emissions from Catalytic Crackers are controlled by effective feed Sulphur management.
- Flue gas scrubbing at FCC units at Haldia & Barauni Refineries for arresting emission of sulphur dioxide and particulate matters.
- Carbon monoxide from FCCU regenerator is incinerated in CO Boilers and the resultant energy is utilised for steam generation.
- Use of floating roof tanks for crude and other light product services & mechanical seals in pumps for minimising fugitive emission of hydrocarbons.
- Use of closed blowdown vessels & safety release to flare system for arresting any emission of hydrocarbons during all situations, normal, abnormal as well as emergencies.
- Continuous reduction in fuel consumption by ENCON measures, heat integration and increased use of hot-feed in downstream processing units.
- Flare gas recovery systems.

For careful monitoring of emissions, continuous online analysers have been installed in all the refinery stacks. Online connectivity is also being provided to Central and State Pollution Control Boards.

Mobile vans and fixed monitoring stations equipped with sophisticated instruments for monitoring ambient air quality have also been provided in our refineries. In marketing installations, all vehicles under contract are required to have Pollution Under Control certificates that are checked routinely.

Solid Waste Management

'Prevent, Reduce, Reuse and Recover' are the fundamental principles that govern all our activities, more so in case of solid waste management. Oily / chemical / biological sludge generated from storage tanks during refinery turnarounds or from the basins & storage tanks of our effluent treatment facilities are mechanically handled. Melting pits with skimming pumps, sophisticated hydrocyclones, centrifuges, etc., are employed for de-oiling the sludge.

After de-oiling, residual sludge is recycled in Coker units or bio-remediated in well-designed environmentally safe sites. Bio-remediation in confined bio-reactor developed in-house by IndianOil R&D is the latest innovation in bio-remediation of residual oily sludge. Called Oilivorous-S, this environmentally safe and clean technique was called to the fore to manage the oil spill at Ennore near Chennai in Jan-Feb. 2017, validating IndianOil's focus on environment protection.

Spent catalysts and other wastes are sent to approved recyclers for gainful use in their manufacturing processes; for instance FCCU catalyst in cement kilns. Vermicomposting is practiced in our refineries to process domestic waste from industrial canteens.

Oil Spill Response Facilities

Accidental oil spills, whether on land or water (including both sea and fresh water) have the potential to cause serious problems for coastal and marine wildlife, especially corals, fish, birds, mammals and reptiles.

IndianOil's business largely depends on crude oil imports through VLCC and other tankers which are unloaded through Single-Buoy Mooring (SBM) systems. Thus concern for marine life ensures that IndianOil has a well-structured

system in place to plug / handle all possible sources of oil leaks, including oil tanker spills, non-tanker ship spills, pipelines from SBM to onshore tanks and tank farms or may be cross-country crude oil and product pipelines.

IndianOil's Tiered Preparedness and Response enables a structured approach to both establishing oil spill preparedness and undertaking a response. It helps categorise potential oil spill incidents in terms of their potential severity and the capabilities that need to be in place to respond.

Considering the regulatory framework under which this offshore marine oil spill is managed, other than the Environment Protection Act-1986, which is the basic act for all environmental activities in India, the most important and direct help comes from the National Oil Spill Disaster Contingency Plan, briefly known as NOS-DCP. The NOS-DCP is the only national plan dealing with oil spill response, which delineates the responsibilities of various resources. Indian Coast Guard is the nodal agency for NOS-DCP (for handling oil spills in Indian waters).

e-Waste Management

In accordance with the "E-Waste (Management and Handling) Rules, 2011, IndianOil ensures that e-waste is disposed of by way of buy-back against new procurements or through Government-approved trading agency, M/s. Metal Scrap Trade Corporation (MSTC).

Noise Pollution Control

Major sources of noise pollution are engines, compressor houses, turbine halls, furnaces, etc. IndianOil's units and installations have adopted the following measures to control noise at its source.

- Regular maintenance of machines
- Use of low-noise machines
- Suitably designed enclosure for both source and receiver
- Use of sound-absorbing material

Personal Protective Equipment (PPEs) like ear-plugs, ear-muffs, etc., are also used in identified high-noise areas.

Green Belts and Ecological Parks

IndianOil regards ecological balance and environment protection as the focal point of its environment conservation programmes. To give back to the nature, large-scale tree plantation activities are carried out at all its installations.

Scientifically designed green belts have been developed, which serve as pollution sinks and

enhance aesthetics. Over 18 lakh trees already adorn our green belts. Ecological Parks have been developed at refineries with lush green cover that serve as a natural habitat for a large number of birds. More than 300 species of resident and migratory birds thrive in these Eco Parks. Over 285 species of native and exotic plants and trees grow there.

Further, as a green initiative, e-portals have been launched and payments and data transfer are done using electronic media. This results in considerable saving of paper, thereby preventing cutting of trees.

Mangrove plantation has been carried out in 100 hectares of Marine National Park and Marine Sanctuary area near Vadinar, Gujarat. Villager awareness programmes are also conducted in the villages along the Right-of-Way (RoW) of pipelines to sensitise the villagers regarding the environmental impact of oil leakage from pipelines due to pilferage activities as well as about collateral damage in such incidents.

Energy-Efficient Petroleum Refining

Energy conservation is at the heart of IndianOil's decisions regarding technology selection for refinery processes and operation cycles. Improvements have been made possible through implementation of various energy conservation measures coupled with operational improvement by adopting advanced technology and best operating practices.

Since 2010, benchmarking studies are carried out once every two years under the aegis of the Centre for High Technology (CHT), MoP&NG to rank performance of IndianOil refineries with peer groups and the best-in-class refineries worldwide. Identified gaps are bridged through implementation of suitable ENCON (Energy Conservation) measures.

In addition, profitability improvement and optimisation studies are regularly carried out by external agencies such as KBC, Mckinsey, NTPC, etc. as well as by in-house Process Design and Engineering Cell (PDEC) of IndianOil .

Auto Fuels Quality Improvement

IndianOil has progressively upgraded the quality of auto fuels in terms of emission-related parameters and to meet the quality requirement of new-generation vehicles. Our refineries have implemented various projects for meeting this objective.

The past few years have seen a rise in green innovation and increasing importance of capital investment in green projects, with India being rated as one of the most attractive countries for green project investments.

Green fuel initiatives of IndianOil started in the 1990s and auto fuels quality has been progressively upgraded in terms of emission-related parameters and to meet the quality requirements of new-generation vehicles. Between 2000 and 2010, an investment of approx. ₹20,000 crore was made on various fuel quality upgradation projects in IndianOil refineries.

In addition, we are also working to emerge as a major player in Natural Gas business, which is a less polluting fuel. We are targeting quantum growth in LNG imports, infrastructure and marketing, besides taking up city gas distribution to replace other polluting fuels in these cities. Natural gas is being supplied to industrial, commercial, transport and domestic consumers. Also, sale of Auto LPG has considerably increased over the years.

IndianOil is gearing up to meet the challenging deadlines of making available 100% BS-VI quality auto fuels by 1st April 2020. For this, the Corporation is investing approx. ₹15,400 crore in major refinery upgrades, changes in supply logistics and other related transitions.

Fuelling India's Green Energy Quest

IndianOil has ambitions plans to broaden its energy basket with alternative energy options; the Corporation envisages setting up 260 MW of renewable energy (wind and solar) over the next five years. Wind-power systems totaling 168 MW have been installed in Gujarat, Andhra Pradesh and Rajasthan. The total installed capacity of solar PV is 20 MW, which includes 9.5 MW grid-connected solar projects and 10.5 MW off-grid projects.

The Corporation has so far converted about 6,600 of its fuel stations to operate on solar energy as a major initiative to reduce carbon emissions. Their cumulative capacity is about 26 MW. About 560 rain-water harvesting systems have been installed at various refineries, terminals, depots and housing complexes of IndianOil. With a total catchment area of 950 hectares, about 3 billion litres of water is being harvested annually.

India has committed to cut carbon emissions by 33-35 per cent by 2030 and has set an ambitious target of 175 GW of renewable energy-based capacity by 2022. It is also putting up 2G-ethanol & waste-to-energy projects. IndianOil has also committed to reduce its carbon footprint by 18 per cent and water footprint by 20 per cent by the year 2020.

Clean Development Mechanism (CDM)

Climate change and global warming arising out of human activities is the biggest concern all over the world. Meeting this challenge requires new ways to assess the scale of economic activity and its impact on environmental systems. Carbon footprinting of all our refineries has been done.

As a responsible corporate citizen, IndianOil is aware of its responsibility towards not only mitigating environmental pollution due to its operations but also the role it can play in improving the environment by making products which cause least pollution. Towards this end, it has made massive investments in setting up necessary infrastructure.

SAFETY

IndianOil is committed to safety and demonstrated leadership in the field of Health, Safety & Environment. The H,S&E policy of IndianOil demonstrates this commitment. IndianOil has a well-defined Health, Safety & Environment (H,S&E) Policy that gives direction for various safety, occupational health and environment protection related activities.

The safety & fire protection measures at IndianOil encompass a well-sensitised management, focus on imparting regular training and a culture of safety throughout the organisation.

Well-sensitised Management

- **Employee Participation:** To boost safety consciousness, all the employees and others related to our operation are involved in the safety culture. Safety Committees play a vital role in this regard. Representatives of the workmen and officers work together in the Zonal Safety Committees. Safety awareness is enhanced by observance of Safety Day every month; safety performance is encouraged through Safety awards.
- Safety is reviewed in the Local Management Committee meetings chaired by Unit Head/Installation Head. Functional Directors on the Board of IndianOil review safety performance in the monthly Performance Review meetings.
- The Board of Directors is apprised on safety performance with regard to implementation of recommendations of External Safety Audit (ESA) and Internal Audits on a regular basis. Major incidents and corrective actions taken are also apprised to the Board.

Culture of Safety

- Process hazards are reviewed at all phases of project life by multidisciplinary teams. Hazard and Operability (HAZOP) study and Risk Analysis are carried out to identifify, assess and control process hazards. Quantitative Risk Analysis (QRA) is carried out for any new unit or facilities and actions are taken to mitigate or minimise the hazards. For new projects, pre-commissioning checks and audits are carried out by multi-disciplinary teams and deviations, if any, are corrected before start up. Also pre-commissioning audit is carried by the Oil Industry Safety Directorate (OISD) for new plants.
- Mechanical integrity of equipment/system is ensured through condition monitoring, periodic inspection and preventive/predictive maintenance for reliable and safe operation.
- All incidents are investigated with the objective of learning and to avoid repetitive shortcomings.Recommendations

are implemented in a time-bound manner. All jobs in the plants are carried out through a systematic Work Permit System to ensure that safety precautions are taken in line with the norms of Oil Industry Safety Directorate (OISD).

Keen focus on training

IndianOil has a keen focus on training. Regular training is imparted not only to company employees but also to contract workmen and security personnel in various locations through experts. All people concerned with safe operations are trained – employees, contract labour and security personnel. Considering the socio-economic conditions and high turnover of contract personnel, major thrust is given to training of contract personnel.

- Operating manuals are updated periodically to ensure integrity of procedure. Use of proper Personal Protective Equipment (PPE) is enforced. Strict supervision is maintained by fire & safety personnel/site supervisors regarding compliance of permit conditions and use of PPE.
- Before award of any job, a commitment is taken from the contractor to comply with all H,S&E parameters during execution of any work.
- Inclusion of guidelines on safety in the tendering stage itself like General Conditions of Contract (GCC)/Special Conditions of Contract (SCC) ensures high safety standards during execution of the contract.
- It is ensured that the contractor provides adequate means and establishes a suitable programme on safety & health for his workers consistent with national/State laws and regulations. OISD guideline OISD-GDN-192 on "Safety Practices During Construction" forms a part of the tender document. The objective of this guideline is to provide guidance on technical and educational framework for safety & health in construction.

Fire-figting

- IndianOil has an elaborate fixed as well as mobile fire-fighting equipment and system backed by dedicated fire-fighting crew to take care of emergencies/eventualities. A well-structured Emergency Management Plan is in place at each location to meet these requirements. System effectiveness is ensured through regular mock drills.
- Fire fighting/protection facilities are designed as per Oil Industry Safety Directorate (OISD) norms, which are based on reputed international codes like American Petroleum Institute (API), USA, National Fire Protection Association (NFPA), USA, Institute of Petroleum (IP), UK, etc., as well industry experience.
- Water spray system/sprinklers are provided

in vulnerable areas like storage tanks, columns and hot pumps. Semi-fixed foam system has also been provided in storage tanks storing crude/petroleum products. Hydrocarbon detectors are provided in vulnerable areas of all installations, including LPG locations for early leak detection.

- Emergency Response Disaster Management Plans (ERDMP) as per PNGRB guidelines are in place for all installations. Agreements are in place with neighbouring industries and district authorities for mutual aid. On-site and off-site disaster drills are conducted as per calendar.
- To ensure effectiveness of all the components of our safety system and activities, the following audit systems are in place:
  - Internal Safety Audit by multi-disciplinary teams
  - External Safety Audits by OISD
  - Surprise Safety Checks by OISD.
  - Surprise inspections by senior IndianOil officials

HEALTH

At IndianOil, focus on employee health is a priority. All programmes are designed with an eye to improve the health status, well-being and productivity of employees by creating a work-place environment that actively and consistently reinforces, promotes and supports healthy behaviour.

All IndianOil refineries are certified to Occupational Health & Safety Management System (OHSMS/OHSAS-18001), besides having fully equipped occupational health centres. Doctors and paramedics are specially trained to monitor the health of employees working in hazardous areas. The healthcare personnel regularly interact with shopfloor managers and staff. Various media of communication such as house journals, posters, e-bulletins, films, etc., are extensively used for creating awareness.

In addition, personnel working in hazardous areas are subjected to periodical medical examination to study the effect of hazards. Theme-based preventive health programmes are regularly being organised to protect the health of the employees. Some of these programmes include well person screening, hearing conservation programme, etc.

The employees are regularly imparted training on work-related hazards and ways & means to protect from such hazards. Some of these programmes are:

- Awareness on occupational health hazards
- Management of fatigue at workplace
- Control of lifestyle disorders
- First-aid

- Art of living
- Cancer prevention & detection programme
- Heartcare programme
- IndianOil is the first PSU to launch Project '*Happiness and Well-being*'. Under this project, questionnaires on various topics are sent to all employees through e-mails. A book on *Happiness and Well-being* has been published. Workshops on *Happiness and Well-being* have also been conducted.
- Corporate Occupational Health Manual developed and is being periodically reviewed, for strengthening and uniform working of Occupational Health services across the Corporation.
- In-house compilation and publication of two health manuals as an attempt to create awareness about key issues on prevention of work-related stress, to improve employees' physical health and prevention of lifestyle disorders with the help of balanced & nutrition:-
  - "Managing Stress and Health at Workplace"
  - Guidelines on Healthy Lifestyle, Nutrition and Occupational Health

In addition, several active programmes are regularly conducted to boost good health -

- Blood donation camps are periodically organised at various locations.
- Drinking water portability tests are carried out at various locations.
- Periodical auditing of systems, procedures and facilities relating to Occupational Health and Hygiene in Refineries by qualified persons, including a member from other units at least once in two years.
- Guidelines in place for maintenance and upkeep of foodcourts / canteens across the Corporation.
- Nutritional Evaluation Audit (Health & Hygiene) of canteens and guest house kitchens of IndianOil. As a part of *Swachh Bharat Abhiyaan*, Hygiene Index of all canteens/kitchens of IndianOil establishments is being maintained and prominently displayed.
- Workshops on Management of Food Safety, Health & Hygiene are organised for Administration/HR Officers, In-charge of canteens and guest houses.

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