

Mr. R. K. Singh
Director – Refineries



During the year, efforts continued in making BPCL achieve the highest standards in the areas of health, safety, environment and security (HSES). Our refineries excelled in the area of safety: this year there were zero fatalities. Mumbai refinery achieved 5 million man- hours and Kochi Refinery achieved 8 million man-hours without any Lost Time Accident (LTA) during the year. Apart from extensive training to employees, concerted safety training of 14498 man-days imparted to contractual workers and supervisors played a significant role in achieving this milestone. Emphasis was also given through the year to security related preparedness at all locations across BPCL for enhanced industrial security. All operational locations were in a state of preparedness for dealing with security issues. We are committed to ensuring that people who work for us go back to their families safely each day.

On the environment front, a notable initiative was the commissioning of a Single Point Mooring (SPM) facility, located 19.4 km offshore, at Kochi refinery to facilitate crude transfer. This facility has allowed us to bring in very large crude carriers, thereby achieving freight economics. Being a closed system, the likelihood of oil spillage is also minimized. At Numaligarh too, we have invested in the development of a pipeline from the refinery to Siliguri which will reduce the leakages associated with transportation through rail and road. The Mahul refinery continues to maintain the same stringent emission limits inspite of employing heavier crude while increasing the refining capacity to 106.2%. In all these efforts, the concomitant environmental impacts have been reduced.

We are deeply aware of our carbon footprint and have been evaluating several options for alternate and non-renewable energy sources. BPCL has been one of the first Indian oil companies to successfully employ wind energy for generating 5 MW power. This project is expected to reduce nearly 80,000 tonnes of CO₂ emissions and is currently at an advanced stage of registration as a CDM project at UNFCCC. We are also exploring the possibility of availing 100,000 Verified Emission Reductions (VERs) from environment friendly projects. In recognition of the need to further strengthen and orient our sustainability efforts, we have plans afoot to recover hydrocarbons from oily sludge wastes and recover waste heat, in an effort to conserve energy where possible and minimize leakage losses through pipeline development.

BPCL is increasingly cognizant of water being the “next fossil fuel” and is seriously studying its water footprint. Rainwater harvesting is being undertaken at Mahul refinery and several SBU locations. We plan to extend this initiative across the country by next year.

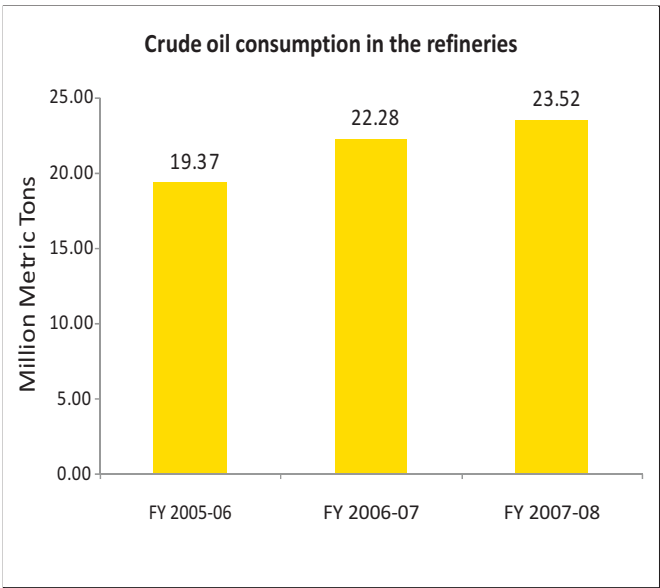
We continue to reinforce our steadfast belief that HSES issues should always remain at the top of our agenda with a single-minded focus on zero harm being BPCL’s constant objective.

Fossil fuel extraction, processing and usage has large and far-reaching implications on the environment which sustains life on Earth. We face the dual challenge of balancing environmental implications of our operations and product offering and our responsibility towards our shareholders and the communities that are directly dependent on us. We have very limited influence on the product usage by our customers, but since energy conservation and efficiency is embedded in our organization's policy we engage with our customers through various modes of communication to raise awareness regarding implication of fossil fuel usage and the need for conservation.

We are committed to achieve the highest standards of environmental performance within our control. The core objective of our R&D centre has been towards achieving greater energy efficiency in our processes and research on commercialization of available renewable energy technologies. Our establishments across the country continue playing an important role in Responsible Care, the chemical industry's global voluntary initiatives for continuously improving their health, safety and environmental performance and to communicate with stakeholders about their products and processes. Our refineries have received certifications for Environmental Management Systems (EMS) and many awards and accolades for excellence in environmental performance. We are all committed to continue making concerted efforts for excellence in environmental conservation.

Material Management

The global demand for oil has seen a significant increase due to the growing economies of China and India. In 2007-08, our crude throughput level increased to 23.52 MMT, a 5.5% increase from the previous year. Our methanol consumption at Mahul refinery was 6297 MT and key semi-manufactured goods or parts consumption for this year was 250.40 MT (excluding NRL), for our Refinery SBU. Semi-manufactured material consumption for the Lubes SBU was 16598 tons. Packaging material consumption was reduced at our refineries and lubes units to 24887 MT by 16945 MT from the previous year. Though we do not reclaim packaging materials of the products various products that we sell, however our approach towards reuse of LPG cylinders and strategy of increasing reticulated LPG has helped us to decrease our material footprint. We have so far connected 30148 households through the LPG Reticulated System. Technologies for reuse of oily sludge are being experimented with at our refineries to reduce crude consumption. Our refineries reuse slop oil in the crude refining process.



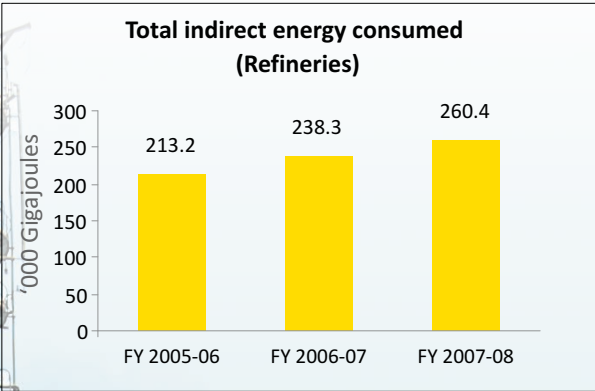
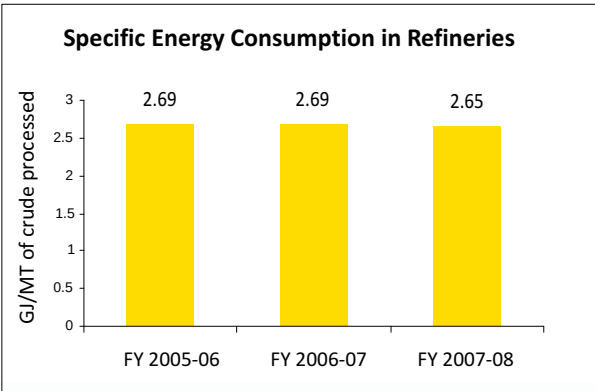
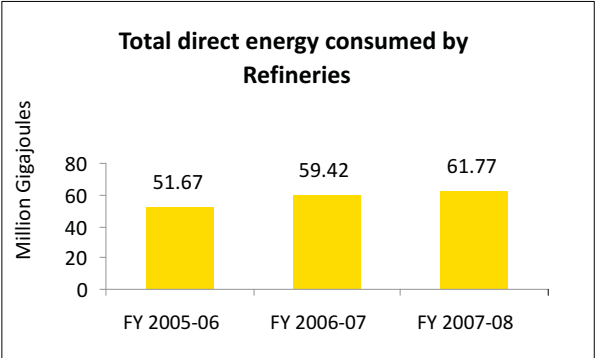
Energy management

BPCL is committed to decreasing its energy consumption in its processes and has adopted a two-pronged strategy to achieve this objective :

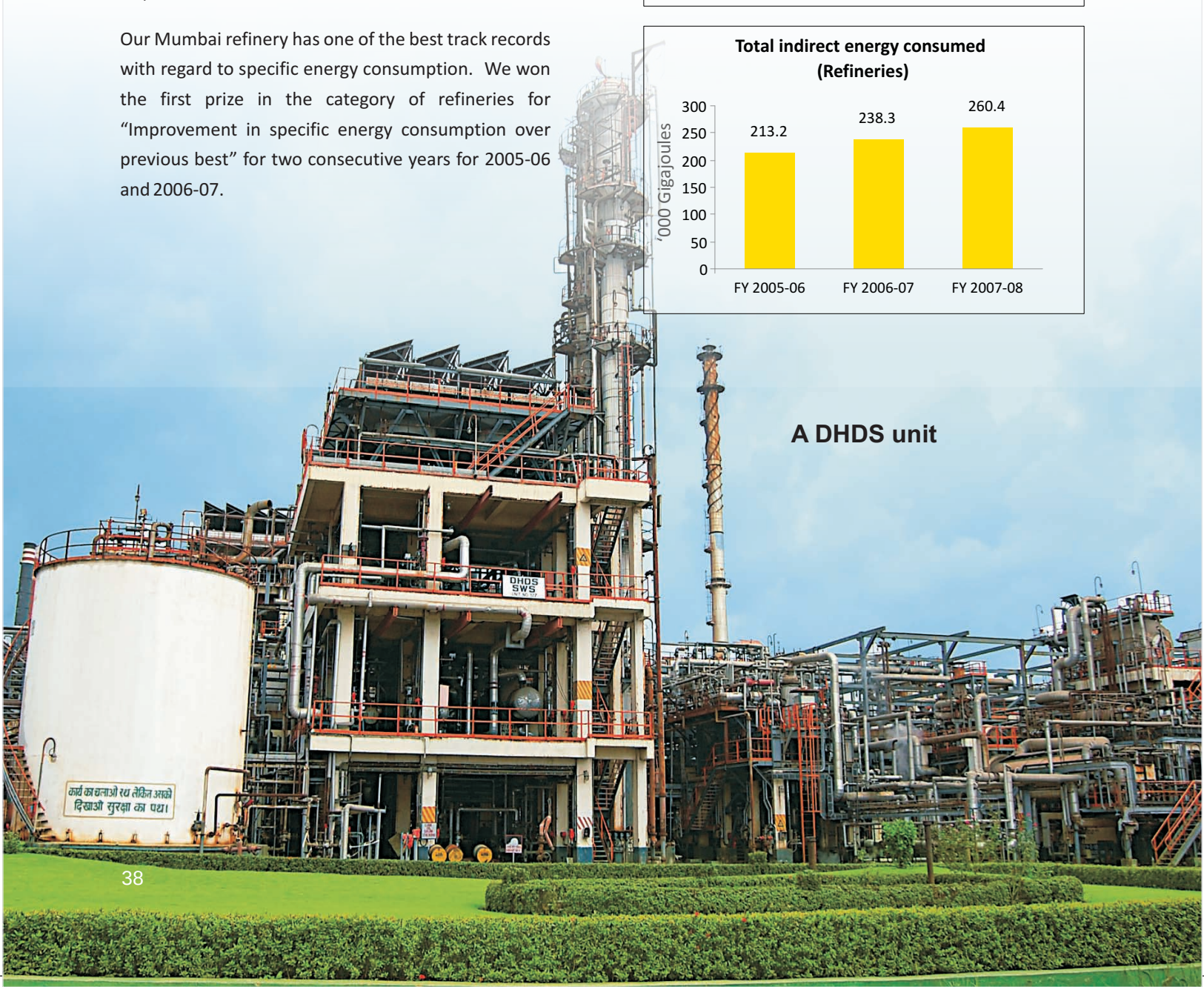
- By fostering innovation which will help to develop scientifically sound and practical solutions to achieve energy efficiency.
- By increasing the renewable energy percentage in our energy mix.

NRL achieved the lowest specific energy consumption this year at 66.1 MBN. The fuels used in the refineries and lubes plants to generate energy for consumption in various processes are *inter alia*, coke, fuel gas, refinery gas, naptha and HSD. We are also dependent on electricity providers to meet our total energy requirements.

Our Mumbai refinery has one of the best track records with regard to specific energy consumption. We won the first prize in the category of refineries for “Improvement in specific energy consumption over previous best” for two consecutive years for 2005-06 and 2006-07.



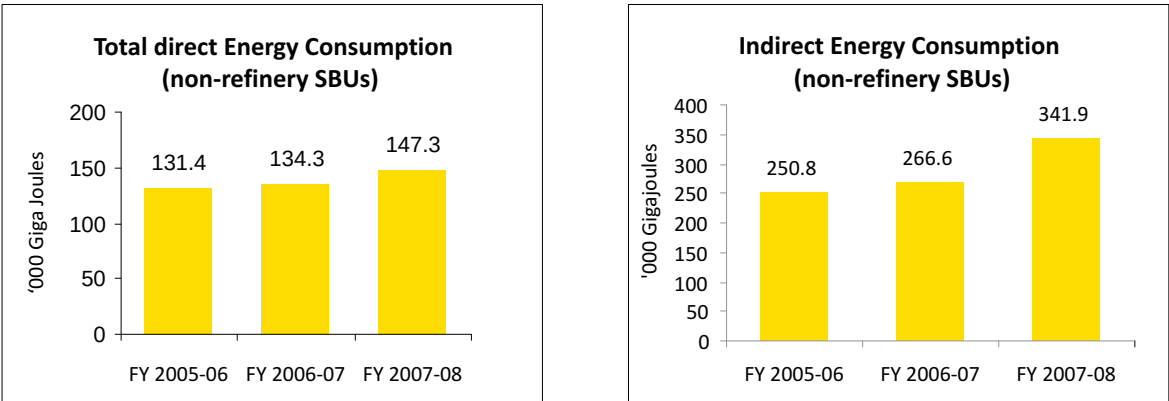
A DHDS unit



Wind based hydrogen fuel cell for yard lighting at LPG bottling Plant at Bangalore

Intense research is being carried out the world over to find effective ways to generate hydrogen from renewables. To stay on the vanguard of technology development we decided to test-bed a small wind based, hydrogen fuel cell technology concept. A prototype was developed wherein Hydrogen is produced by electrolysis of water. The energy required for electrolysis is generated by using a small 5 KW wind energy generation system. The electrolyser was developed locally by our engineers. The Hydrogen produced had a purity of 99%.This system is now used for yard lighting at the location. The benefits of such a standalone renewable system are that, it does not contribute to resource depletion, atmospheric pollution and that there is minimal noise generated from the wind energy generation system.

Total direct energy consumption for non-refinery SBUs was 1473245 GJ and the indirect energy consumption was 341945.3 GJ in the reporting year. The major fuel used in the non-refinery SBUs is diesel for power generation. Energy conservation at our refineries has been a major focus area this year. We have taken many energy conservation initiatives across our various units. In the refineries, energy conservation initiatives resulted in total energy savings of 1545232.7 GJ which is approximately 5 times the energy savings realized last year. We celebrate oil conservation fortnights every year at our refineries, retail installations, LPG bottling plants, AFS and many retail outlets. During this time we spread awareness on energy conservation and efficiency measures, conduct poster and slogan competitions and also give awards to innovative ideas.



Energy Benchmarking

The LPG SBU sets benchmarks for specific energy consumption at its sites on a yearly basis. The best practices are shared and the initiatives are adopted and phased in across the bottling plants. Our LPG bottling plants at Nashik and Loni have achieved the lowest specific energy consumption in their respective regions. Specific energy consumption at Nasik was 9.34 KWh/MT and Loni was 10.42 KWh/MT. The various energy saving interventions that these plants implemented include:

- Reducing idling time of air compressors and switching it off at lunch breaks.
- Effective leakage control in air compressors
- Timer based operations for borewell
- Automation of chain conveyors
- Seasonal regulation of lighting time of high mast towers and watch towers which are meant for visibility and security of premises at night time.

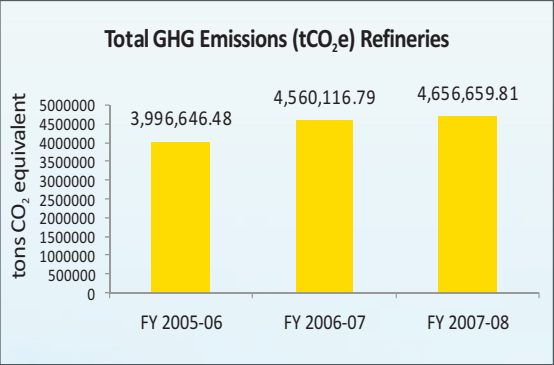
Climate Change and GHG emissions

Fossil fuel consumption is associated with a significant amount of Greenhouse Gas (GHG) emissions. It is estimated that around 60% of GHG emissions are from combustion of fossil fuel. We understand that apart from the reputational risk associated with it, climate change can affect our business through financial, operational and societal risks as well. BPCL is cognizant of the implications that climate change can have on the financial performance of the company. Therefore, being a forward looking company, we are working on realigning our businesses to meet this challenge. We have constituted Clean Development Mechanism (CDM) and Carbon Capture cells to look at ways of reducing GHG emissions and earning credits for it and also to evaluate possibilities for capturing carbon. We are aware of the limitations of fossil fuel availability in coming years as well as the sustainability risks associated with day-to-day businesses dependent on fossil fuels. We have adopted a multi-dimensional strategy to address challenges of energy security for the rapidly growing Indian economy and combating climate change. The strategies are:

- Continual improvement in our operational efficiencies
- Investments in R&D for commercial applications for renewable energy technologies and alternative fuels (explanation given in the innovation chapter)
- Forming strategic partnerships for developing renewable energy value chain (C&MD statement and JVs)
- Awareness raising with regard to efficient utilization of energy (energy audits, kitchen queen, website etc.)

GHG emissions reductions

- We have proactively started initiatives and undertaken projects to reduce the GHG emissions.
- Setting up of LPG/CNG terminals/stations
- Strengthening retail stations/positions/services
- Laying cross country pipelines
- Using Oil Industry common carrier cross country pipeline for supplies
- Increase refining position
- Venturing into renewable energy sources, eg. Windmills / solar cells
- R&D for alternate fuels (e.g. Bio-diesel, Hydrogen cells)
- NRL has got its 12 MW steam turbine generator project registered with the UNFCCC and the company stands to avail the benefits of carbon credits of 42 TMT per year for a period of 10 years starting 1st December 2008. It has also started a project for substitution of Naphtha by Natural Gas as fuel and feed in the refinery.



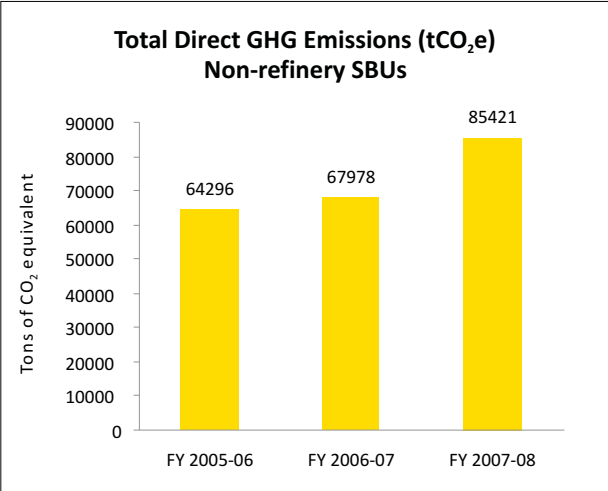
This graph includes emissions resulting from direct and indirect energy consumption for Kochi, Mumbai and NRL. The emission data also includes flare gas emissions for Kochi and Mumbai Refinery. Grid emission factor of 0.81 tonnes per MWH has been used for Mumbai and NRL and 0.72 tonnes per MWH for Kochi (CEA CO₂ Baseline Database ver 4.0, dated September 2008)



We have estimated our total direct GHG emissions based on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Our total GHG emissions for non-refinery SBUs was 85420.56 tons of CO₂ equivalent. We have been one of the first oil companies to utilize non-conventional energy sources. 454503 KWH of energy in the reporting period was generated through wind-mills located in the state of Tamilnadu.

Biodiversity Management

BPCL operates in a variety of ecosystems since the operations are spread across India. None of our plants are situated in any notified environmentally fragile area. Our subsidiary NRL, spread over an area of 1000 acres, is located approximately at a distance of 35 km from the world famous Kaziranga National Park. We diligently follow the rules set by the Government of India for setting up of industries in sensitive ecosystems. In addition to various environmental management initiatives, NRL has installed a twin flare system with non-illuminating ground flare so that it doesn't distract the animals in the Kaziranga National Park, particularly at night. This is unique to the country.



This graph includes electricity produced from wind-mills. Since the percentage of electricity produced by wind-mills is small when compared to BPCL's non-renewable energy footprint, separate treatment of electricity generated from wind-mills has not been done.

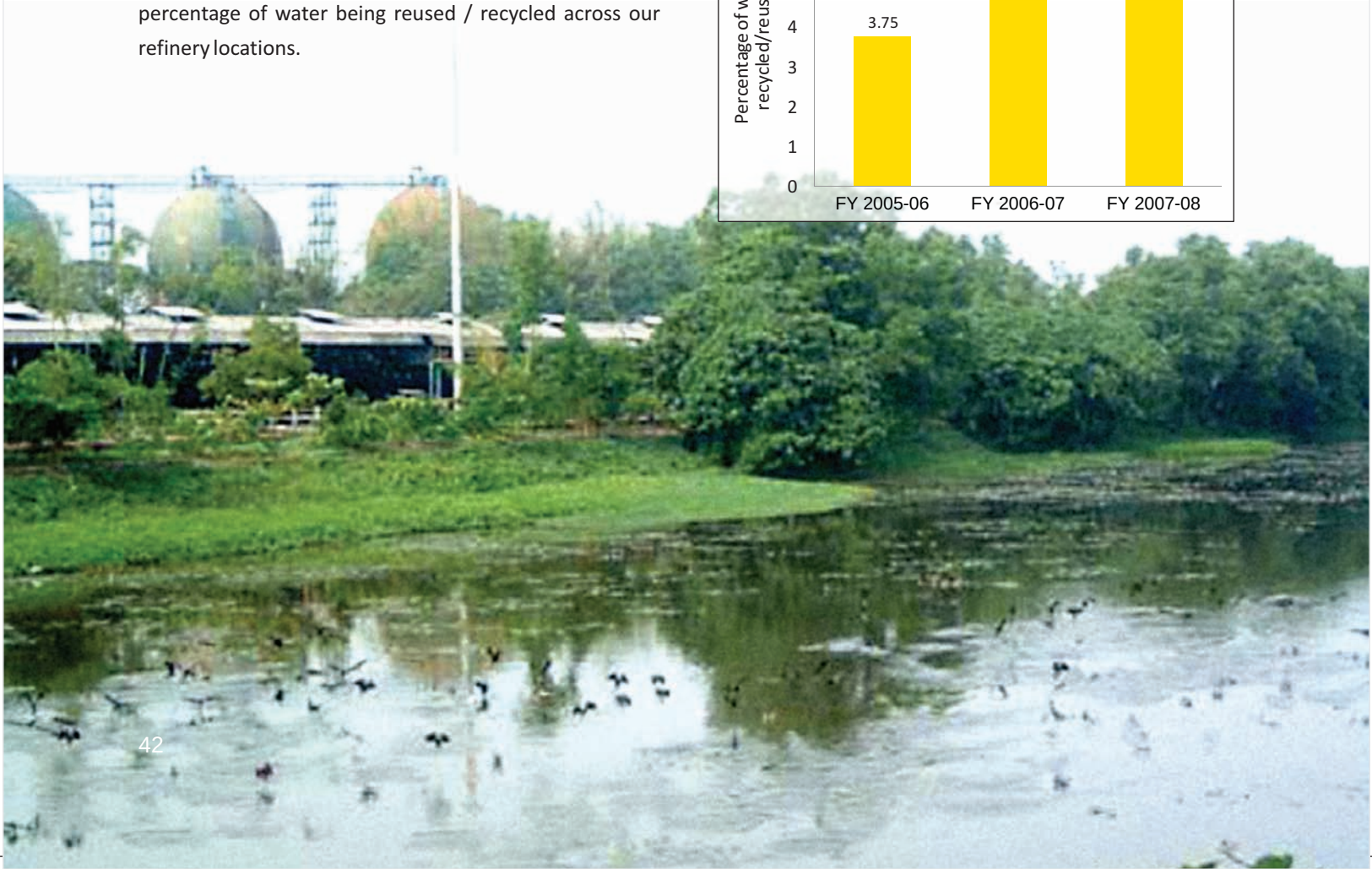
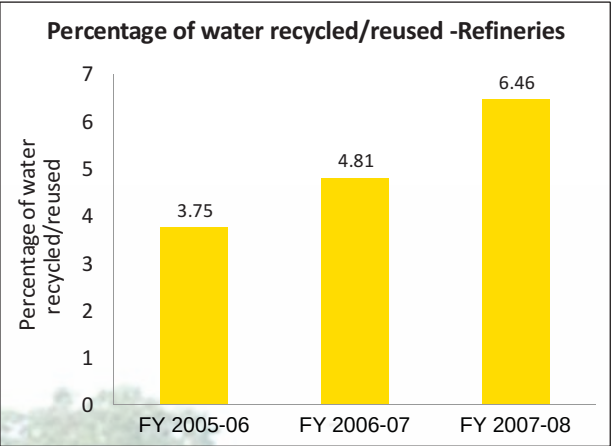
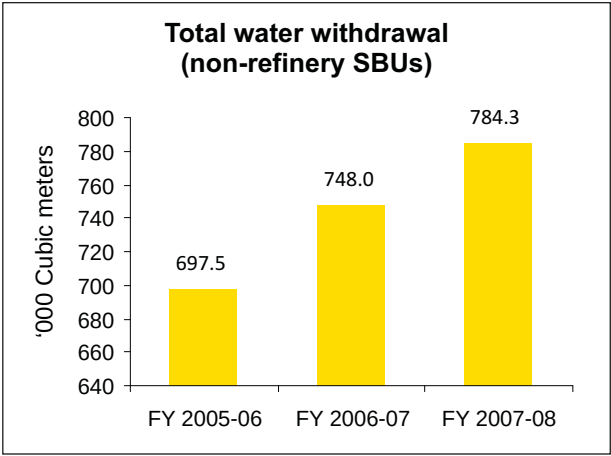
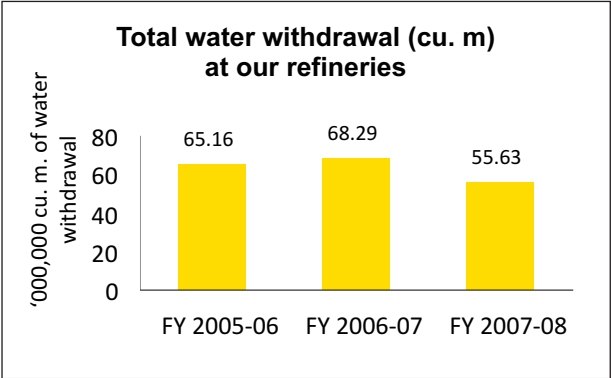
National Grid emission factor of 0.79 tonnes per MWH (CEA CO₂ Baseline Database ver 4.0, dated September 2008) has been used.

The data includes electricity consumed by Mumbai-Manmad-Manglya Multiproduct pipeline



Water Management

We are aware that freshwater is a scarce resource, and that water can be a limiting resource. In addition to the water supplied by the municipal authorities, we take surface water from rivers, seas and groundwater. We are committed to reducing our water footprint by increased operational efficiencies, timely detection of leaks and increasing focus on reuse and recycle. We also promote rain water harvesting at all our locations. Our Mumbai Refinery is located near the sea, and we withdraw water from the sea as per the amount set by the state pollution control board. Kochi Refinery and NRL, by virtue of their location near the rivers Periyar and Dhansiri respectively, are dependent on these rivers for their raw water intake. This year we were able to reduce total water intake at our refineries by 12.6 million cubic meters. At Mumbai refinery we have replaced one of the four sea water based cooling towers with a freshwater based one, effectively reducing water withdrawal. This initiative has significantly contributed to a decrease in the total water consumption. Our refinery at Kochi built a rainwater-harvesting pond spread over an area of 5 acres with a capacity to collect 25000 m³ of rainwater. This water is used for watering the green belt which consists of about 6000 trees and also for fire-water make up. Another contributing factor for the reduction in water consumption is the increase in the percentage of water being reused / recycled across our refinery locations.



Many of our plants, depots and installations use groundwater for their operations. However, many of these, excluding the refineries, currently do not have comprehensive monitoring mechanisms for measuring groundwater consumption accurately and reliably. In the near future we intend to implement systems to capture groundwater withdrawal and consumption. This year our water withdrawal (surface & municipal supplies) for the non-refinery SBUs has been 7,84,295.81 cubic metres*.

Air emissions

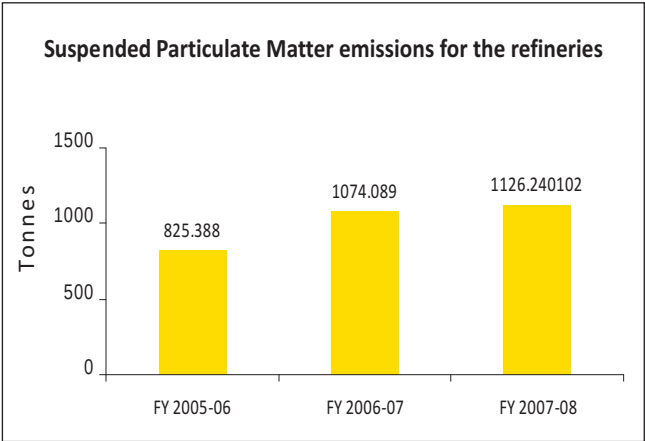
BPCL has implemented cost effective new technologies and adopted new operating practices to reduce air emissions and meet all regulatory requirements. We are working towards reducing the emissions of volatile organic compounds (VOCs), sulfur dioxide (SO₂), and nitrogen oxides (NO_x) from our refineries.

To reduce fugitive hydrocarbon emissions from equipments and pipelines in process units and offsite areas, a comprehensive monitoring and control program is in place. At Kochi Refinery, we commissioned a facility for desulphurization of vacuum column off gas this year. It is one of the few refineries in India that has taken this initiative. With this facility we were able to increase energy recovery from waste heat, reduction of SO₂ emission from the vacuum heater and corrosion prevention. A reduction furnace was also installed for converting ammonia generated in the sour water stripper in DHDS to Nitrogen, thereby reducing NO_x emission in the refinery. We have low NO_x burners installed in all our refinery furnaces to minimize pollution because of nitrogen oxides. NRL has provisions for continuous online stack monitoring for all its major stacks.

The systems of monitoring air emissions parameters uniformly across the refineries are currently in the process of upgradation. Hence, we are unable to present data pertaining to air emissions comprehensively. We will be reporting on these parameters in our future reports. We are also in the process of phasing out Ozone Depleting Substances (ODS) consumption as per the directives laid down by the GoI.

Gasoline Sulphur Reduction at Mumbai Refinery

The use of a Gasoline Sulphur Reduction (GSR) catalyst additive can significantly reduce gasoline sulphur levels in an FCC without the need of a separate unit for hydro-desulphurization. BPCL’s R&D unit identified a suitable GSR additive and dosage for Mumbai Refinery which has resulted in a reduction of 30% in gasoline sulphur emissions.



The values reported in the graph is for Mumbai and Kochi Refinery

* When compared to overall water footprint of the organization, water consumption that is not being reported here is less than 5% of the total water consumption that has been stated in this report.

Waste Management

The treated effluent from the treatment plants is discharged as per consent and the quality is monitored to ensure that it meets the regulatory requirements. At our refineries, of our total water withdrawal of 55.6 million m³, we discharged 37.10 million m³ of treated water conforming to the prescribed regulatory limits of effluent water quality. To ensure that effluent does not contain any traces of oil we run it through oil-water separator and the recovered oil is used back. We envision making all our units zero discharge units.

The wastes generated at our locations of operations are categorized into hazardous, non-hazardous, bio-degradable and non-biodegradable wastes. Some of our units also use bio-remediation for bio-degradable hazardous waste. The non-hazardous waste is disposed of as scrap. The bio-degradable non-hazardous waste is used to make manure or vermi-compost. The non-biodegradable hazardous wastes generated are disposed as per the rules and regulations prescribed by the respective State Pollution Control Board (SPCB) under the aegis of the Hazardous Wastes Management & Handling Rules, 1989 as amended in 2003. FCC catalyst fines, ETP chemical sludge, spent molecular sieves, spent catalyst (Cobalt-Molybdenum, Nickel), oil-contaminated soil, oily sludge from crude tanks, waste bituminous oil, waste transformer oil, lead acid batteries and oil barrels are the major types of hazardous wastes generated at our refineries. From our refineries, this year, we disposed a total of 638.81 tons* of hazardous waste and 306.9 tons of non-hazardous waste. The number of lead acid batteries and dry batteries disposed by Mumbai refinery were 135 and 250 respectively.

Lead acid batteries, waste containers, used oil & oily sludge form a substantial composition of hazardous wastes generated at non-refinery SBUs. In 2007-08 we generated 4055.59 MT of hazardous wastes. A total of 6901 waste containers & oil filters also constitute our total hazardous waste generated in this year. Apart from these 765.22 kilolitres of waste oil was also generated in 2007-08. Tank bottom sludge available at various locations is an area of concern for all of us. Hence, its disposal in an environmental friendly manner is very essential. Bio-remediation of this sludge has been permitted by certain SPCBs. Locations that have been granted permission have begun bioremediation of sludge. At other locations sludge is disposed of through incineration carried out by authorized/approved parties of respective SPCBs.



* The lead acid batteries disposed in Kochi refinery given in tonnage is included in the total hazardous waste disposed. The data includes solid and liquid hazardous waste.

Compliance

During the reporting period there were no significant monetary fines paid or non-monetary sanctions levied.

Spill Management

Our company is committed to the prevention of spills from our operations. We are continuously upgrading our systems with timely replacement of equipments and comprehensive inspection and surveillance programs. We have 24-hour monitoring of the cathodic protection systems and regular leak detection and repair. We periodically conduct acoustic emission testing technique for integrity assessment of high pressure critical pipelines. We have installed sluice gates and oil traps wherever required and applicable in storm water channel in our refineries and installations. This is a preventive measure to eliminate any possibility of oil carry over due to some accidental causes. We also follow the OISD guidelines with regard to construction of our sites to contain spills. To prevent spillage during tank lorry loading we have equipped the company owned vehicles with bottom loading arm. This prevents spills, VOC emissions and reduces static charge. We currently measure and report significant spills. There were only two significant oil spills in this year amounting to approximately 411 kilolitres of oil spill at Irumpanam installation (Kochi Refinery) and Hyderabad AFS. Apart from reporting to the regulatory authorities we have immediately carried out the salvage operations to avert any major damage to the environment.



Bottom loading arm

The new Single Buoy Mooring (SBM) facility that has been installed offshore near Kochi is a step towards reducing crude spills and leakages. Its salient features include:

- Reduced oil pollution risks and fire hazards near harbor area
- Eliminated risks of grounding of tankers due to siltation in channel / near berth
- Under buoy hoses are of double carcass eliminating chances of spillage by early detection of failure of any one carcass.
- Reduced probability of oil spillage due to less number of tankers.

Single Buoy Mooring (SBM) facility at Kochi

