



Refineries

製油所

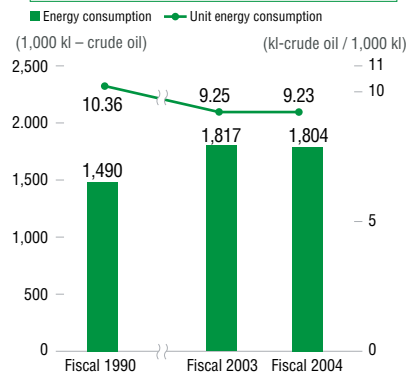
The refining process of crude oil produces industrial waste, air and water pollution, hazardous waste, and other factors that impact the environment. By faithfully implementing a multitude of measures, our refineries aim to reduce the impact on the environment on a daily basis.

Promoting Efficient Use of Energy

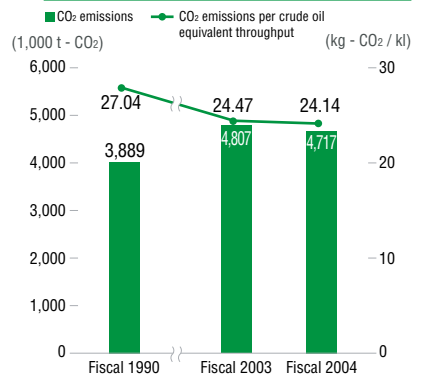
At our refineries, we are committed to energy conservation through introduction of high-efficiency equipment and improvement of operational management systems. In Fiscal 2004, we introduced high-efficiency equipment such as the world's first high-efficiency plate type heat exchangers (3 fluid heat exchanger*) and inverter control motors. With regard to the daily operation of the equipment, we have improved fuel and steam consumption by optimizing the temperatures of the atmospheric distillation tower furnaces, and reducing the amount of steam injection in gas turbine generators. As a result of these efforts, unit energy consumption level for Fiscal 2004 was 9.23 kl – crude oil/1,000 kl, and we achieved our goal to reduce unit energy consumption by 10.9% as compared to Fiscal 1990. This result exceeded the goal of the Voluntary Action Plan set forth by the Petroleum Association of Japan (10% reduction as compared to Fiscal 1990 by Fiscal 2010).

*1 We participated in PEC's (the Petroleum Energy Center) petroleum refinement upgrading technology development project and introduced this equipment.

Energy Consumption (at all 4 Refineries)



CO₂ Emissions (at all 4 Refineries)



Reference [Related Data p. 72, p. 81 - 88](#)

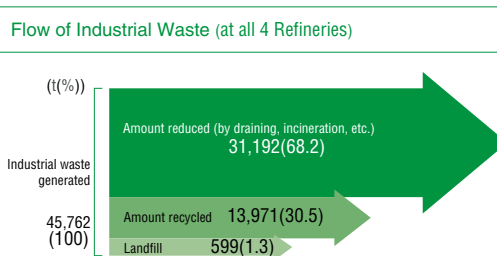
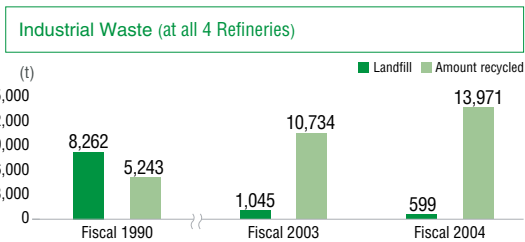
Reduction of Industrial Waste

The refineries generate industrial waste as a result of the oil refining process. By reducing and separating industrial waste, and by utilizing waste disposal methods conducive to recycling, our refineries are endeavoring to achieve zero emissions and reduce the amount of landfill.

For example, catalyst that was used during the oil refining process has been recycled and reused or used as raw material for cement, and the metals contained in the catalysts have been also recovered for recycling purposes. We also endeavor to decrease the excess sludge arising from the wastewater process by introducing new sludge decreasing technologies that we developed ourselves, and by reducing the volume of sludge by draining or incineration.

In Fiscal 2004, 3 of the refineries underwent major maintenance operations, and the waste that was generated from those operations were also separated and recycled.

As a result of these efforts, the total landfill for Fiscal 2004 was 599 tons, a 93% reduction as compared to Fiscal 1990. This result far exceeds the goal of the Voluntary Action Plan set forth by the Petroleum Association of Japan (a 67% reduction in the total amount of landfill as compared to Fiscal 1990 by Fiscal 2010). In order to make further improvements, we have set ourselves a voluntary goal: Zero emissions – landfill rate less than 1.5%. While we were able to reach 1.3% in Fiscal 2004, we are continuing our efforts to strive for further reductions.



Prevention of Air Pollution

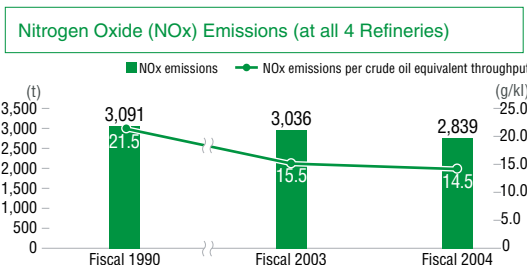
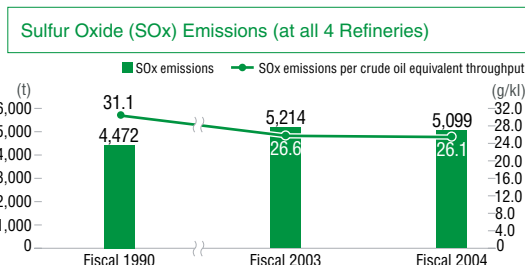
Sulfur Oxides (SOx) and Nitrogen Oxides (NOx)

The heating furnaces, boilers, and other equipment used during the refining process emit SOx and NOx. At our refineries, we use fuels which have low sulfur and nitrogen content for our heating furnaces and boilers so as to reduce the amount of SOx and NOx emissions. We introduce low NOx burners to reduce the generation of thermal NOx, a substance generated

Reference → Related Data p. 73, p. 81 - 88

when nitrogen reacts with oxygen at combustion. We also introduce flue gas desulfurization and denitrification equipment to remove generated SOx or NOx from exhaust gas. In addition, we remove small particles in exhaust fumes using electrostatic precipitators.

As a result of these efforts, all of our four oil refineries' emission levels are under the local legal limits.



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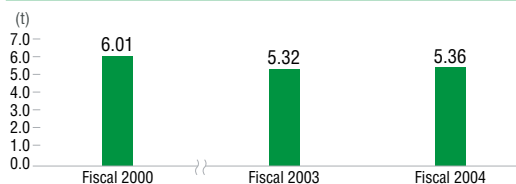
• Measures concerning Hydrocarbons and Benzene

Some petroleum products such as gasoline contain volatile components. In handling these products, we traditionally have stored them in a floating roof tank in order to control evaporation, and have also installed equipment that collects the hydrocarbons that evaporate when these petroleum products are shipped.

In May 2004, the Amended Air Pollution Control Act relating to emissions reductions of volatile organic compounds (VOC) was issued. The restrictions concerning emissions reductions will be applicable to the storage tanks at our refineries. As far as the Cosmo Oil refineries and oil depots, appropriate measures have already been implemented.

Benzene, specified as a hazardous air pollution substance, is a hydrocarbon. We are striving to reduce the benzene content in gasoline, controlling benzene emissions through such measures as described above.

Emissions of Hazardous Air Pollution Substance (at all 4 Refineries)



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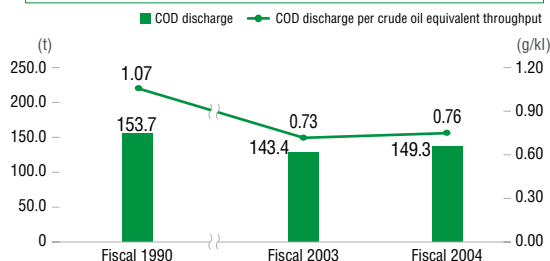
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✚ Prevention of Water Pollution

Seawater or industrial water is used in the oil refining process at our refineries. As oil content, odorants substances (such as ammonia or hydrogen sulfide), suspended matter, and organic matter may mix with wastewater that was used in the cleaning process in refining, we endeavor to prevent water contamination by appropriately treating the wastewater with the introduction of sour water treatment units, oil-water separation units, coagulation sedimentation unit (to extract suspended matter), and activated sludge process unit.

In April 2004 when the fifth water quality total pollutant control was put into effect, nitrogen and phosphorous were added to the list of substances subject to the total volume control such as chemical oxygen demand (COD). The refineries of Cosmo Oil use automated analyzers to conduct constantly monitoring and ensure that the regulation values are being adequately met.

Discharge of Chemical Oxygen Demand (COD) (at all 4 Refineries)



Reference

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✚ Management of Chemical Substances

• Management in accordance with the PRTR Law

Chemical substances used in our oil refineries include benzene and toluene in petroleum products and cobalt in catalysts used in the refining process.

We reported the amount of releases and transfers of these chemical substances for Fiscal 2004 to the government in accordance with the PRTR Law.

• Maintenance and Control of PCB (Polychlorinated Biphenyl)

Equipment containing PCB such as high voltage condenser which was used in refineries in the past is managed in an appropriate manner in a quarantined environment, and the maintenance status for those ballasts is reported to the government annually.

Reference

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Reference

Related Data p. 81 - 87

✚ Dioxin Emission Control at Waste Incineration Facilities

Strict controls are in place at our refineries that have waste incineration facilities, and we comply with relevant regulations.