We are reducing environmental impacts arising from production while working for ever better safety.

The greatest environmental impacts incurred during the life cycle of petroleum products arise from the CO_2 emitted when they are consumed, but many environmental impacts also arise during the process of refining crude oil.

The process of refining oil requires various types of equipment, such as furnaces and boilers. CO_2, sulfur oxides (SOx), nitrogen oxides (NOx) and other materials are emitted when fuel oil is burned to supply energy needed for the refining process, and also when petroleum gas is burned off during that process. Our company is endeavoring to reduce its emissions of CO_2 through efficient energy use, and to reduce the volumes of its SOx and NOx emissions as well. We are also actively working to reduce our production of industrial waste, and to prevent air, water and soil pollution from occurring by the use of preventive measures. The purchasing department and other offices are also actively promoting activities to reduce environmental impacts.

Maintaining safe operations is important not only for environmental protection, but also for fulfilling our responsibilities to society. Our company actively pursues safety management in order to prevent accidents and disasters before they happen, and to keep damage to the minimum in the rare case that an accident does occur.

* We measure energy efficiency for oil refineries in terms of "unit energy consumption," a figure obtained by dividing a refinery's total energy consumption (expressed in kiloliters of crude oil equivalent) by its crude oil equivalent throughput (in thousand kiloliters of crude oil equivalent). (See also note *2 on next page)

Preventing climate change

● Efficient energy use

As a measure to combat climate change, Japan's petroleum industry is working to make oil refineries 10% more energy efficient in 2010 than in 1990.*

In 1997, Cosmo Oil's head office and its four refineries organized an "Energy Conservation Task Force" to study and implement measures likely to be effective in conserving energy, and to apply the successful strategies at all the refineries.

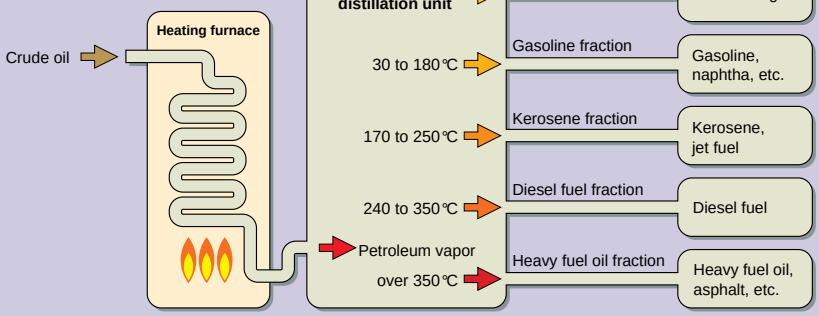
Co-generation unit at the Chiba Refinery

One of the main measures taken so far has been the introduction of co-generation units. We use the co-generation equipment to produce electricity on site, thereby reducing transmission losses. Meanwhile, steam is produced using the waste heat from electrical power generation and used in refining processes, also boosting overall energy efficiency of the refinery. Co-generation units are in operation at Cosmo Refineries in Chiba (39,500 kW), Yokkaichi (17,500 kW) and Sakai (17,000 kW). A second co-generation unit (17,000 kW) started operation at the Yokkaichi refinery in April 2003.

CO_2 emissions can be even further reduced by improving existing equipment, and by fine-tuning its operation. Cosmo Oil has been sharing energy conservation strategies among its refineries, and during fiscal 2002 reduced energy use by improving the efficiency of rotating equipment and by upgrading or improving heat exchangers, while at the same time improving operating methods by reducing the volume of steam used, etc.

These measures have helped us achieve unit energy consumption for the four Cosmo refineries combined of 9.35 kiloliters energy (crude oil equivalent) per thousand kiloliters of throughput (crude oil equivalent), a reduction of 9.7% compared to the fiscal 1990 figure.

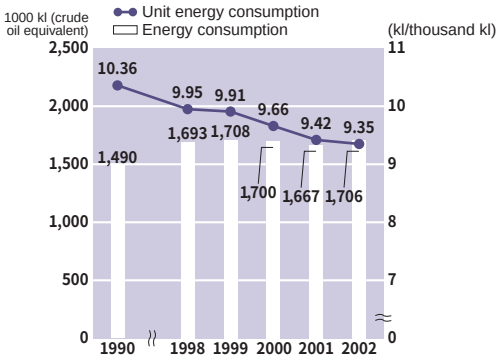
Mechanism of atmospheric distillation unit



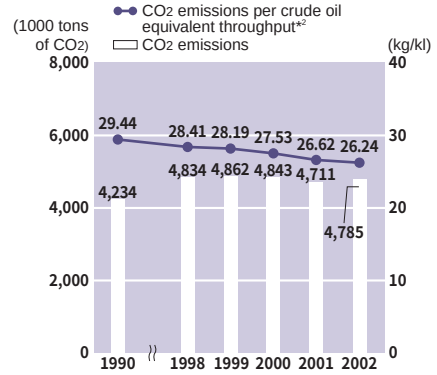
Petroleum refining process

1. Crude oil is heated to boiling point of the desired product (gasoline, kerosene, diesel fuel, heavy fuel oil, etc.) and separated into "fractions."
   ⇨ Distillation (atmospheric distillation unit, vacuum distillation unit, etc.)
2. Fractions are purified by eliminating sulfur, nitrogen and metals.
   ⇨ Desulfurization (hydro-desulfurization unit)
3. Further processing of purified fractions provides added value.
   ⇨ Conversion (catalytic reformer)
   ⇨ Cracking (fluid cat cracker)
4. The fractions (base materials) are blended according to market needs.
   ⇨ Blending (separate blending units for gasoline, fuel oil and lubricating oil)

Energy use



CO_2 emissions*1



●Energy conservation at offices

During fiscal 2001, companies in the Cosmo Oil Group replaced 2,600 desktop computers with energy-conserving models, and since then all new replacements of office equipment have been with energy-conserving models. The offices of the Cosmo Oil head office paid 6% less for electricity in fiscal 2002 than in the previous year.

Efficient resource use

●Reducing industrial waste

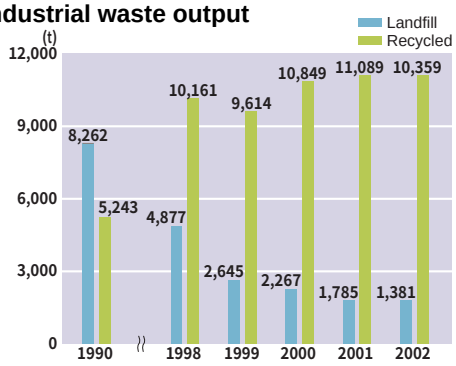
Spent catalysts produced during the refining process and sludge left over from wastewater treatment processes account for a large proportion of the industrial waste produced by refineries.

Spent catalysts are re-used as catalysts after undergoing a recycling process. Spent catalysts can also be processed to yield metals, or recycled for use in making cement.

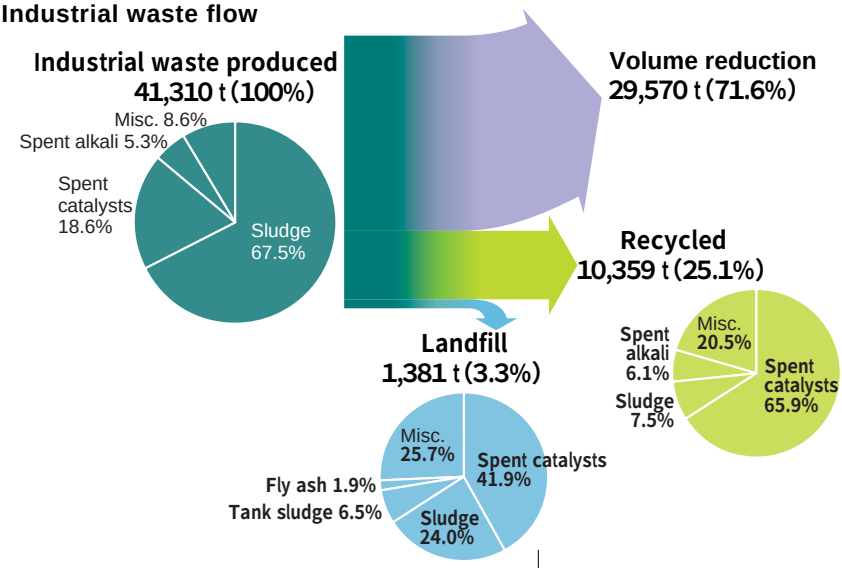
Excess sludge is dehydrated and its volume further reduced by burning in incinerators that comply with dioxin-related regulations, before it is discarded in an appropriate manner. At the Sakaide refinery, an excess sludge reduction system*3 utilizing biotechnology has now come fully on stream, and has succeeded in reducing the amount of excess sludge by 50%.

As a result of these measures, the total amount of landfill from all four Cosmo Oil refineries has been reduced by 83% compared to fiscal 1990 levels, and 23% from fiscal 2001 levels.

Industrial waste output



Industrial waste flow



●Paperless offices and paper recycling

From the points of view of both effective management and efficient use of paper resources, the Cosmo Oil Group was early to install computer networks with the goal of creating paperless offices.

Paper waste produced by Cosmo Oil head office and branch offices are sorted into bins placed on every floor.

Offices of the oil refineries also recycle paper, and have achieved 100% recycling of newspapers, magazines and cardboard boxes. Used paper recovered from our four refineries in fiscal 2002 amounted to 92 tons.

***1.** CO_2 emissions are calculated using a CO_2 emissions factor for crude oil, after converting fuel and electricity consumption volumes into crude oil equivalents in accordance with the method defined under Japan's Law concerning the Rational Use of Energy.

***2.** Crude oil equivalent throughput. This is a measure of processing activity at a refinery, normally expressed in thousand kiloliters of crude oil equivalent. Throughput here is not simply the total amount of crude oil processed at the refinery, but the weighted sum of the amounts (converted into equivalent amounts at the atmospheric distillation unit) of oil processed during each separate process at each processing unit.

***3.** See page 16.

Pollution prevention

• Controlling chemical substances

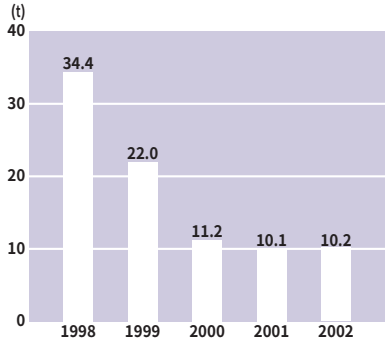
Oil refineries handle chemical substances found in petroleum products, such as benzene, xylene and toluene, as well as those found in catalysts used in the refining process, such as cobalt and molybdenum. To reduce atmospheric emissions of these substances during storage and shipping, we store petroleum products containing volatile chemicals such as benzene in anti-evaporation tanks at refineries and oil storage depots. Vapor-recovery equipment has also been installed to prevent atmospheric release of hydrocarbon vapor when gasoline is being loaded into tanker trucks. We also recover the metals from catalysts. In compliance with Japan's PRTR Law*, Cosmo Oil monitors the amount of designated substances released and transferred, and reported its 2002 figures to the government in June 2003.

With respect to polychlorinated biphenyls (PCBs), appropriate storage measures have been taken in accordance with the Law Concerning Special Measures against PCB Waste, and a report was submitted to the government.

*** The PRTR Law**

PRTR is short for Pollutant Release and Transfer Register. Under Japan's PRTR Law, businesses must monitor the amounts of designated chemical substances that they release into the air, water and soil, as well as the amounts transferred off their premises, and submit reports to the government. This law was enacted in 1999 and went into force in 2001.

Benzene emissions to air†



† Include emissions from storage depots

Flue gas denitrification unit removes NOx emissions

Releases and transfers of PRTR-controlled substances

Releases to air	(kg/year)
Ethyl benzene	1,340
Xylene	5,500
1,3,5-trimethylbenzene	115
Toluene	20,500
Benzene	5,590
	(mg-TEQ/year)
Dioxins	2.027
Releases to water	(mg-TEQ/year)
Dioxins	49.15
Transfers	(kg/year)
Cobalt and its compounds	7,600
Nickel compounds	97,500
Molybdenum and its compounds	171,000
	(mg-TEQ/year)
Dioxins	0.009853

●Preventing air pollution

The furnaces and boilers used during the refining process emit both SOx (sulfur oxide) and NOx (nitrogen oxide) gases. Cosmo Oil works to reduce emissions of these gases from its refineries' furnaces and boilers by using fuels low in sulfur and nitrogen. We also use low-NOx burners to eliminate thermal NOx, which forms during combustion when nitrogen in the air reacts with oxygen, as well as flue gas denitrification and desulfurization units*1, introduced to remove SOx and NOx from smoke. The fine particulate matter contained in exhaust gases is removed by electrostatic precipitators. Thanks to these measures, SOx and NOx emissions for all four Cosmo Oil refineries fall below the levels required by local regulations.

●Reducing dioxins*2

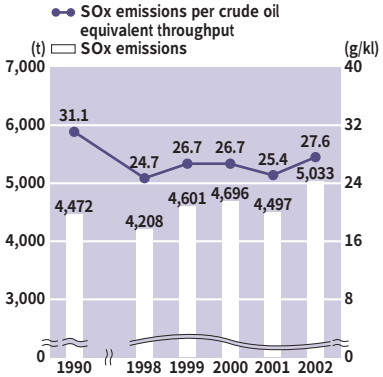
Those of our refineries that have waste incineration facilities managed to reduce their release of dioxins to levels well below emission standards some time ago. However, we decided to close some of these facilities, while tightening control over the ones still in operation.

●Preventing water pollution and using water resources efficiently

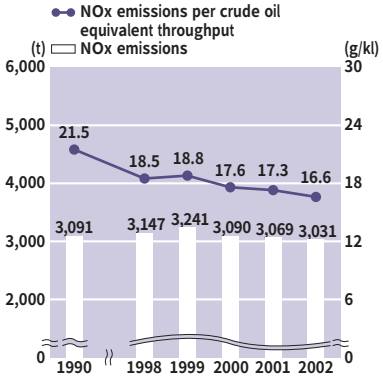
Seawater and industrial-grade water are used in the oil refining process. Because oil and other substances become mixed in with process wastewater*3, the oil is removed by an oil-water separation unit, and the water is processed further, such as through activated sludge treatment, in order to prevent water pollution. When industrial water is used for cooling, it is recycled in order to conserve water.

Wastewater treatment facility

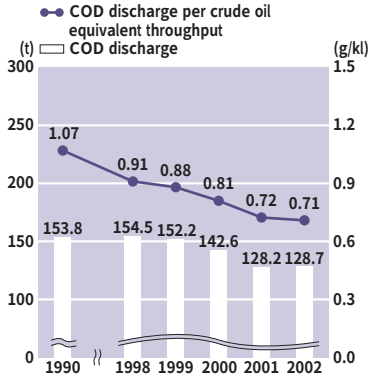
Sulfur oxide (SOx) emissions



Nitrogen oxide (NOx) emissions



COD*4 discharge



***1. Flue gas denitrification unit**
A device that removes NOx from exhaust gases. NOx gases are either reduced by ammonia and a catalyst, or absorbed by absorption solutions.

***2. Dioxins**
Polychlorinated dibenzo-p-dioxins (PCDDs), polycholorinated dibenzofurans (PCDFs) and coplanar PCBs are classified as dioxins under the Law Concerning Special Measures against Dioxins. They are generated during waste incineration, etc., and are toxic and carcinogenic.

***3. Process wastewater**
Wastewater discharged from oil refineries that contains oil.

***4. COD**
Chemical Oxygen Demand—A measure of water purity. COD is the amount of oxygen consumed when oxidizable substances (organic matter, etc.) in water are oxidized.

Green purchasing

• Green purchasing guidelines to be established

Cosmo Oil has for some time promoted the purchase of recycled paper and environmentally friendly goods in all corporate departments. During fiscal 2002 we considered making this a company-wide practice, and in fiscal 2003 we will be establishing company guidelines for green procurement. Plans call for successively expanding the types of items to be covered by the guidelines to include not only office supplies and equipment, but also materials used in the construction of buildings and manufacturing process.

Safe operations

• Systems and action to ensure safe operations

Oil refineries handle large quantities of combustible materials. The head of each refinery serves as the chairman of the committee that oversees health and safety. Our employees work together with the employees of other cooperating companies on mutual safety concerns.

To prevent operational and work accidents, we conduct risk analysis and look for ways to apply lessons gained from accidents in one refinery to prevent the same type of accident elsewhere. We work to raise the safety awareness of every employee, and to ensure that safety measures are in place for every phase of every work procedure. Besides carrying out continual, organizational safety management through establishment of annual safety goals, we have been carrying out enhanced safety management activities at all four refineries since January 2001, and are working to upgrade our company security system.

• Safety and emergency response measures

Early detection of abnormal conditions is crucial in preventing accidents. Our oil refineries are equipped with systems to monitor for abnormalities, employing fire alarms, gas sensors and other equipment, and we also conduct meticulous patrols in order to swiftly detect any abnormal conditions.

In preparation for fires and other emergencies at our refineries, heavy-duty chemical fire engines are on standby and an internal fire brigade has been established. Comprehensive disaster drills and emergency communication training are regularly carried out. To strengthen local lines of communication in the event of an emergency, joint emergency systems have been established with neighboring companies in the industrial complexes where our refineries are located, and joint trainings carried out with local authorities.

Company fire brigade at oil refinery

Comprehensive emergency drill

As a precaution against the spread of oil on the water in the event of any spillage during loading and unloading from ships, oil booms* are stored at our wharves and deployed during these operations. As measures against marine pollution from major oil spills, Cosmo Oil participates in the Petroleum Association of Japan's Oil Spill Cooperative Organization (POSCO). Cosmo Oil has set up and maintains a base for oil spill prevention equipment and materials at its refinery in Yokkaichi as part of its contribution to the POSCO mutual support system.

Oil boom (stored)

• Promoting health

We arrange routine health checkups of our

* Oil booms are used to prevent oil from spreading on the water surface. They are stored on wharves, and deployed by tugboat or other vessel before loading and unloading.

Accident prevention and response

	Equipment-related ("hard") measures	Institutional ("soft") measures
Accident prevention	**Consideration of safety in facility planning and construction** • Maintenance of facilities • Installation of safety equipment • Monitoring devices	**Organizational structure for safety management** • Organization-based committee system • Training systems • Operation management system • Construction management system • Facility management system
Accident response	**Fire fighting equipment and supplies** • Emergency communication equipment • Safety and protective equipment	**Organizational structure for emergency response** • Emergency communication system • Fire-fighting training and education • Mutual support system in industry

employees and follow up when necessary, and also arrange visits to the workplace by industrial physicians.

●Results of health and safety measures

In fiscal 2002, we had one operational accident, one worker accident that required time away from work, and four worker accidents that did not require time away from work. Our Chiba Refinery succeeded in maintaining its number one position in the industry for its record of continuous hours of operation without accident.

Number of accidents

	2001	2002
Accidents requiring time away from work	0	1
Accidents not requiring time away from work	1	4
Injury frequency*1	0	0.43

Number of hours without accident at Cosmo Oil's four refineries and Cosmo Matsuyama Oil Co.

Site	Total hours (1,000 hours)
Chiba	14,963
Yokkaichi	6,148
Sakai	781
Sakaide	254
Cosmo Matsuyama Oil Co.	6,389

(As of December 2002)

●Awards

Sakaide Refinery was awarded the Secretary General's Prize of the Japan Energy Conservation Center for Successful Cases of Energy Conservation. Cosmo Matsuyama Oil Co. was awarded the Secretary-General's Prize of the Shikoku Bureau of Economy, Trade & Industry for outstanding energy management in the electrical sector.

Secretary General's Prize from the Japan Energy Conservation Center

Secretary-General's Prize from the Shikoku Bureau of Economy, Trade & Industry

●Environmental management systems at our refineries

All four of our refineries and Cosmo Matsuyama Oil Co., which also produces and stores petroleum products, have obtained certification under ISO 14001*2, an international set of standards for environmental management systems. As called for under these standards, the head of each refinery establishes environmental policies, and is responsible for setting goals, conserving energy, reducing waste, and carrying out implementation and training programs, while working toward ongoing improvements in environmental protection policy and action.

Apart from external audits by certification bodies, regular internal audits are carried out in accordance with audit standards set by each refinery to confirm progress toward their specific goals, in an effort to achieve continuous improvement.

Status of ISO 14001 certification

Site	Prefecture	Certification body	Certification date
Chiba Oil Refinery	Chiba	JQA	Mar. 13, 1998
Yokkaichi Oil Refinery	Mie	JQA	Mar. 20, 1998
Sakai Oil Refinery	Osaka	JQA	Mar. 20, 1998
Sakaide Oil Refinery	Kagawa	JQA	Jun. 18, 1997
Cosmo Matsuyama Oil Co.	Ehime	JQA	Dec. 28, 1998

Employees with environmental qualifications (4 refineries and Cosmo Matsuyama Oil)

Air pollution control manager	81
Water pollution control manager	89
Noise pollution control manager	13
Vibration pollution control manager	7
Dioxin control manager	3
Hazardous materials officer (Class A & B)	1,779
High-pressure gas production safety manager (Class A & B)	1,064
Qualified person for heat management of type1 designated factory	84
Qualified person for electricity management of type1 designated factory	25
Specially controlled industrial waste manager	17
Engeneering manager for disposal facilities of industrial wastes	17
Environmental Certified Measurers	6
Boiler operator (Special grade)	24
Boiler operator (First & second grade)	1,154

(As of March 2003)

***1.** Number of incidents requiring time away from work, per million man hours.

***2. ISO 14001**
An international set of standards for environmental management systems, presented by the International Organization for Standardization (ISO). It identifies criteria for establishing measures to reduce environmental impacts arising from business activities, goods and services.