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Editorial Policy

- This environmental report describes the environmental protection and social responsibility activities of Cosmo Oil Group for FY 2001 (from April 1, 2001 to March 31, 2002).
- For clarity, the GRI Guidelines* were used as a reference for reporting on the triple bottom line—the environment, society, and the economy. Cosmo Oil Group provides products that have less environmental impacts through their entire life cycle, and places great importance on environmental protection and social responsibility in its activities; such as the provision of a stable supply of petroleum and the prevention of accidents. In this report, issues related to the environment and society are reported together in one section, “Environmental and Social Performance”. In addition, the Environmental Reporting Guidelines released by the Japanese Ministry of the Environment were followed to ensure systematic disclosure of information about our business processes.
- While actively participating in environmental protection activities, Cosmo Oil is also promoting the efficient use of oil and developing multi-energy technologies. This report emphasizes our efforts to develop environmental technologies and our new energy businesses.

*The GRI (Global Reporting Initiative) Guidelines are a global framework for comprehensive sustainability reporting, which includes environmental reporting. The Guidelines emphasize the triple bottom line—the environment, society, and the economy.

Scope of Report

- This report mainly covers FY 2001; however, some of our activities in FY 2002, such as case examples and organizational structure for environmental management, are also included.
- The scope of the data in this report is the Cosmo Oil Group. See page 44 for the outline of the Cosmo Oil Group.
- The data on “Reduction of Environmental Impacts” contained in this report mainly cover oil refineries and other related businesses. The data on “Environmental Accounting” and “Recognition of the Environmental Impacts from Business Activities” cover the Research and Development Center and Cosmo Matsuyama Oil Co., Ltd., etc. as well as the above.

Fiscal Year 2001 Highlights

New Targets and Performance Indicators

- **Medium-term Environmental Plan for the Period FY 2002-2004: Blue Earth 21**

Cosmo Oil aims to be an "environmentally preferred company" by fulfilling our environmental, social, and economic responsibilities. →page 7

- **Quantitative Assessment of the Environmental Impacts from the Entire Business Activities**

We assessed the environmental impacts from our entire business activities based on a life cycle assessment (LCA). →page 27

- **Introduction of New Performance Indicators into Environmental Accounting**

As part of environmental accounting, we calculated integrated environmental indicators and environmental productivity on a trial basis. Different types of environmental impacts arising from business establishments and those generated when customers use the products are evaluated comprehensively. The environmental productivity was calculated based on this evaluation. →page 26

- **Integrated Evaluation of Environmental Impacts from Oil Refineries and Customer Use of Products**

In order to reduce environmental impacts occurring at the time of product use by increasing the quality of petroleum products, a large amount of energy is required during the refining process at oil refineries thereby increasing the environmental impacts generated. We conducted, on a trial basis, an integrated evaluation of the increase in environmental impacts from oil refineries and the reduction in the impacts from customer use of products.

→page 22

Environmental Protection Activities

- **Launch of the Zero-Flare Project**

This project has resulted in a CO_2 emissions reduction of approximately 200,000 tons per year. This reduces the environmental impacts of products in terms of life cycle assessment (LCA).

→page 29

Activities Involving Customers and Society

- **Introduction of "Cosmo the Card Eco" Credit Card**

"Cosmo the Card Eco" credit card has been introduced to invite consumers' participation in our environmental protection activities. →page 37

- **Cosmo Earth Conscious Act**

The Act, which is a partnership between Cosmo Oil along with Tokyo FM and other JFN (Japan FM Network) stations, has been spreading the message of environmental conservation and working on various environmental conservation activities. →page 39

- **Conservation of Tropical Rain Forests in Papua New Guinea**

We are providing assistance for local people to make the transition from slash-and-burn farming to settled farming in order to help conserve the tropical rainforest and solve the food problem. →page 39

External Recognition

- **The Grand Prize for the Global Environment Award**

Cosmo Oil received the "Award for Excellent Companies Chosen by the Global Environment Council" in the "11th Grand Prize for the Global Environment Award". →page 42

- **Third Prize in the "5th Green Reporting Award"**

Cosmo Oil was awarded third prize in the "5th Green Reporting Award" for its Environmental Report 2001.

→page 42

- **Minister of Health, Labor and Welfare Commendation**

Chiba Oil Refinery received the Minister of Health, Labor and Welfare Commendation for its activities to improve occupational safety. →page 18

- **Director-General of Fire-Defense Agency Award**

Yokkaichi Oil Refinery received the "Director-General of Fire-Defense Agency Award" at the Convention on Hazardous Materials. →page 18

- **Inclusion of stocks in SRI Funds**

Cosmo Oil's stocks have been included in two SRI funds. →page 43

Striving to Be an Environmentally Advanced Company as a Member of Society and a Global Citizen

The 20th century was an era of economic growth, and also an era when human beings, for the first time in history, acknowledged the fact that the Earth was approaching its carrying capacity. Today's environmental problems, which include global warming, destruction of the ozone layer, deforestation, desertification, acid rain, and the loss of biological diversity, are all warning alarms issued by the Earth. They are, without exception, the consequences of activities by human beings, who have been enjoying the Earth's resources and petroleum in particular. It is also true, however, that only through these consequences could human beings be reminded of the finiteness of the Earth. Cosmo Oil is promoting innovative solutions by interweaving environmental concerns with every single aspect of our business. We recognize that we are part of an industry that has supported economic development through exploiting petroleum and delivering oil-based products and thus, we have undoubtedly caused negative impacts on the environment. We are striving to contribute to the protection of the environment on a global scale, acknowledging that we are indeed, global citizens.

Possible Actions as a Petroleum Company

Japan currently relies upon oil-based products for more than half of its energy consumption, and thus it is hard to imagine that society's dependence on oil-based energies could radically change in the near future. We therefore believe that the efficient use of petroleum products—producing more valuable products from crude oil—is crucial. Cosmo Oil refines crude oil and produces and sells various kinds of oil-based products including gasoline, jet fuel, kerosene, diesel oil, and heavy fuel oil. We are now trying to raise the proportion of products other than heavy fuel oil through more sophisticated refining processes to respond to the fall in demand for heavy fuel oil. The reduction of sulfur content in diesel fuel is an area in which the oil industry as a whole is exerting great efforts. The oil industry is going to start providing low-sulfur diesel fuel in September 2002 in response to the Tokyo Metropolitan Government's plan to strengthen its regulations on emissions from diesel vehicles in October 2003. The Metropolitan Government gave the Petroleum Association of Japan the "Environmental Grand Prize (Governor Prize)" for the industry's active involvement. The oil industry, which consumes energy through refining crude oil, has also set the target of reducing crude oil energy consumption units by 2010 to 10 percent below 1990 levels. Cosmo Oil had achieved a 9.1% reduction by the end of 2001.

Cosmo Oil Tackles Global Warming on a Global Scale

Among environmental problems, most of which are global by nature, global warming is the one that many countries are addressing. South Pacific island countries are in danger of being submerged due to the rising sea level, which is caused mainly by the gradual melting of the Antarctic icecaps and Alpine glaciers. There is also concern that climatic changes may trigger a food crisis. The main cause is the increasing emissions of CO_2 (carbon dioxide), which is one of the major greenhouse gases.

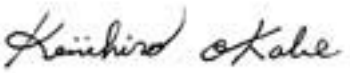
CO_2 is generated through the burning of gasoline and diesel fuel when our customers drive a car, as well as in the process of refining crude oil. The CO_2 that has been emitted can no longer be turned into petroleum again. Cosmo Oil, which emits a sizeable amount of CO_2 in its business processes, is committed to contributing to the prevention of global warming, through our activities implemented on a global scale.

For example, in the Zero-Flare Project at Abu Dhabi Oil, a subsidiary of Cosmo Oil, the gases that emerge during crude oil drilling are not burned off but instead returned to the ground, thus reducing CO_2 emitted in the host country. In Papua New Guinea, we are consistently supporting local people in refraining from slash-and-burn farming, where forest is burned to develop land for farming, and we are encouraging settled farming. We also seek possibilities of CO_2 emissions trading in view of hedging the risks associated with the reduction of greenhouse gases, enhancing business opportunities in future, and contributing to forest conservation and afforestation in host countries.

To Become an Environmentally Advanced Company

We have declared our resolve to become “environmentally advanced company”, but we are still in the process. In order to reach this ultimate goal, it is necessary to continuously improve our business processes, through a close combination of environmental protection activities, employee training and enlightenment, and social communications. We therefore set up the Environment Affairs Office and Public Relations Office within the Corporate Planning Department, and prepared our medium-term environmental plan for the period FY 2002-2004, replacing our previous action plan. It is also important to develop environmental technologies such as for VOC (volatile organic compounds) absorption, wastewater treatment and soil improvement, and new energy technologies including GTL (Gas to Liquid) and fuel cell systems. We incorporated our research and development arm into Cosmo Oil in FY 2001 and decided to focus on three research subjects: support for the oil-based primary business, environmental technology development, and new energies.

We published our first environmental report in 2001, in the belief that it is crucial, as a corporate citizen, to disclose our business activities and to listen to the voices of society. This report, which has been reviewed by an independent party to ensure the correctness and transparency of the information contained, provides detailed information on our approach to our social responsibilities. To help us to continuously improve our environmental protection and social responsibility activities, we welcome your opinions and comments.



Keiichiro Okabe
Chairman and Chief Executive Officer
Cosmo Oil Co., Ltd.

Strengthening Management Bases and Improving the Corporate Value of Cosmo Oil Based on the Triple Bottom Line: the Environment, Society, and the Economy

As a Member of the Energy Industry

Cosmo Oil, as a member of the energy industry, has been working hard to fulfill its social responsibilities to provide a stable supply of petroleum-based products for many years. With the increasing public recognition of the importance of environmental protection, there also is a demand from the market for enterprises not only to fulfill environmental regulations and meet their social responsibilities but also to take the lead in environmental protection and to disclose related information.

This trend has been accelerated by the increasing number of green consumers who are willing to selectively purchase environmentally friendly products and green investors who invest into those companies that are advanced in their environmental protection.

Becoming an environmentally advanced company is one of the goals of our two-year business plan from 2001 called “Value Creation 21”. We have set this goal based on the awareness that, in order to become a sustainable company while meeting social responsibilities in today’s changing business world, Cosmo Oil must strike a balance between the environment and the economy.

Establishment of a New Organizational Structure for Environmental Management

Cosmo Oil set up the Global Environment Committee and was promoting the development of basic policies and environmental activities in each department with the initiative of the Action Group. Each division made these efforts separately, but we now believe they must be implemented as coordinated company-wide activities.

In view of the current demand from society and the company’s circumstances, we recognize that environmental issues should be tackled from a managerial viewpoint and thus, in order to expand our environmental protection activities, we will introduce a

Basic Policy on Safety and the Environment

The mission of Cosmo Oil, as a member of the energy industry, is to make local and global efforts for environmental protection. The Basic Policy on Safety and the Environment, which was created by the Global Environment Committee in February 2001 in order to clarify the existing policy, defines our consensus and commitment to society.

Basic Policy on Safety and the Environment

Recognition

Cosmo Oil is a major energy supplier providing Japan with energy through petroleum refining and sales; it recognizes the importance of providing a safe and stable product supply while protecting the regional and global environment.

Safety Policy

Cosmo Oil sees safety and the development and maintenance of stable operations as extremely important missions. As its business involves combustibles, high-pressure gases, and other potentially dangerous materials, it must work for the sake of the community, its employees, and those engaged in its business activities. It must also secure the safety of those inhabiting nearby areas.

Environmental Policy

Cosmo Oil responds to environmental problems as one of its most important activities. The company aims to minimize the environmental impact which occurs through its business activities and to apply the best of its abilities and technological skills it has developed over the years to contribute to society through the development of environmental technology.

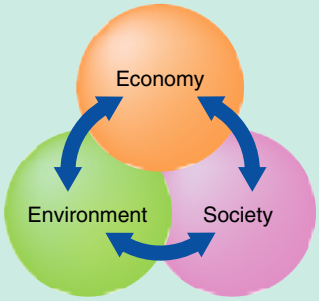
unique environmental management system (EMS) which encompasses the whole company in FY 2002. In addition, we will reestablish our organizational structure to clarify where the company's environmental decision-making authority lies so that the PDCA (Plan-Do-Check-Action) cycle is effectively implemented. This will be made possible by placing the "Global Environment Committee", which promotes environmental protection, and the "Comprehensive Safety Action Headquarters", which promotes safety, under the control of the Executive Board.

Cosmo Oil drew up a new medium-term environmental plan, "Blue Earth 21*", as a goal shared and strived for by all employees. It demonstrates our efforts to address environmental issues both internally and to the public. "Blue Earth 21" includes action targets for the reduction of environmental impacts. These targets cover all stages of the life cycle of our products from oil development and production to distribution and sales at service stations.

We also set action targets with social aspects from the viewpoint as a corporate citizen.

Hence, we strive to operate our business based on "Blue Earth 21", a medium-term environmental plan, and "Value Creation 21", which is a business plan, focusing on the triple bottom line: the environment, society, and the economy.

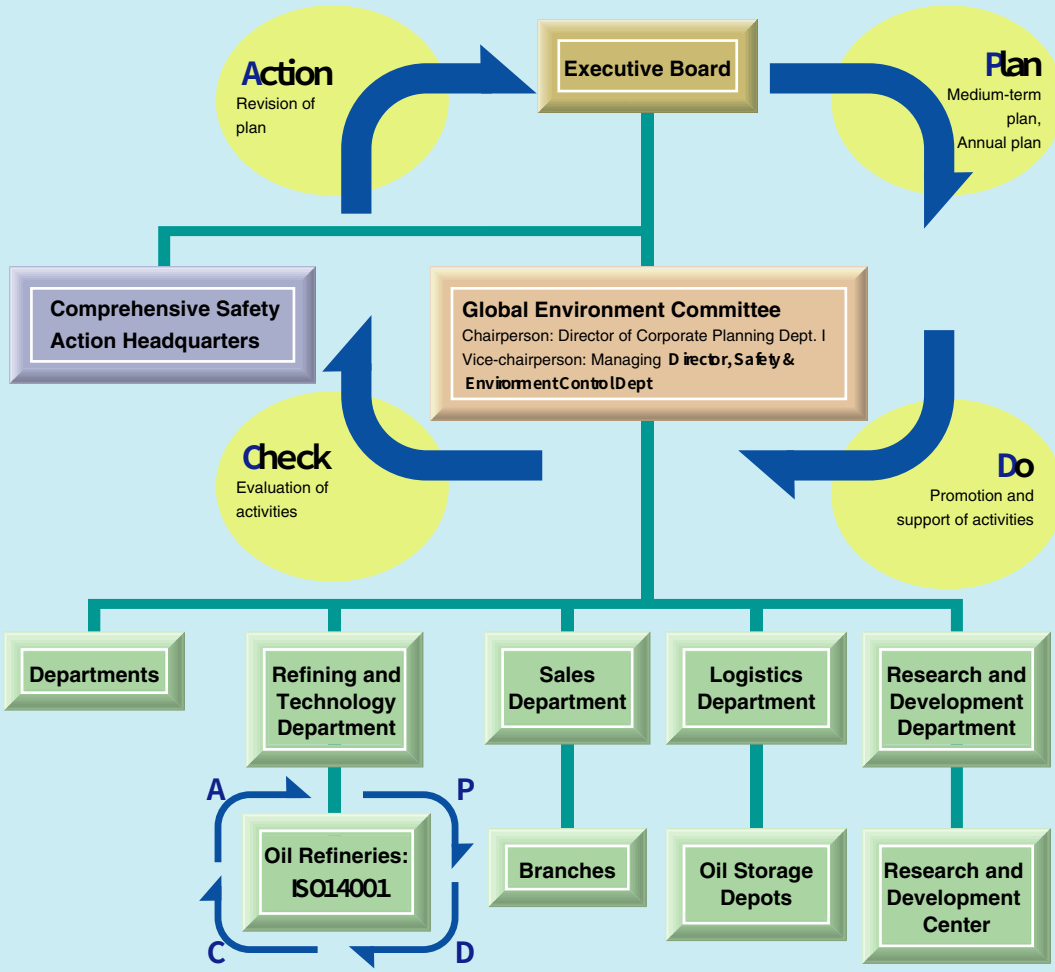
Management Plan:
"Value Creation 21"



Medium-term Environmental Plan:
"Blue Earth 21"

*See pages 7 and 8 for details.

Promotion of Continuous Improvement through PDCA Cycles by a New Organizational Structure for Environmental Management



Medium-term Environmental Plan: Blue Earth 21

In an effort to become a sustainable company while meeting environmental, social, and economic responsibilities as a company, Cosmo Oil drew up "Blue Earth 21", a medium-term environmental plan in FY 2002.

Six challenges are included in "Blue Earth 21" under the "Medium-term Environmental Plan Slogans". By further categorizing them into nine principle themes, we will work hard to achieve concrete targets set for each department by FY 2004.

- **Medium-term Environmental Plan Slogans**

"Environmentally preferred Cosmo Oil."

"Aiming for a true environmentally advanced company."

"Meeting social responsibilities as a corporate citizen."

"Striking a balance between environmental protection and economic efficiency."

- **Six Challenges**

1. The challenge to develop green products
The development and sales of products with minimum environmental impacts.

2. The challenge to promote green factories
Efforts to achieve zero emissions and to minimize CO_2 emissions and waste generation.

3. The challenge to establish green logistics and sales
Promotion of resource and energy conservation.

4. The challenge to develop new energy technologies
The development of new energy technologies such as fuel cell and GTL (conversion of natural gas to liquid hydrocarbons) technology.

5. The challenge to promote green offices
The promotion of the three "R's" (reduce, reuse, and recycle).

6. The challenge to establish environmental communication
The fostering of environmental awareness among all employees and cooperation with stakeholders.

*** Ideas of environmental contribution projects:**
Cosmo Oil implements and supports environmental contribution projects based on the recognition that it is our responsibility to hand down an affluent society to the next generation, namely to promote sustainable development.
1. Environmental improvement and environmental protection activities in Japan and overseas.
2. Education and enlightenment activities for children.

Medium-term Environmental Plan "Blue Earth 21"

Theme	
1. Prevention of Global Warming	● Promotional activities for the reduction of energy consumption at each operating department. ● Efforts to use the Kyoto Mechanism and to develop new energy technologies.
2. Reduction of Pollutant Emissions	● Control of air and water pollutant emissions in accordance with the voluntary standards, which are more stringent than regulatory standards. ● Efforts of voluntary VOC emission control. ● Further reduction in industrial waste.
3. Soil Environment Protection	● Soil environment assessment by site and response to detected problems. ● Soil environment assessment at service stations and promotion of pollution prevention.
4. Resource Conservation	● Reduction in general waste by promoting three "R's" Paper (reduce, reuse, and recycle).
5. Reduction of Environmental Impacts of Products	● Provision of oil-based products that have less environmental impacts.
6. Green Procurement	● Expansion of the range of items considered for green purchase.
7. Research and Development	● Technology development in the oil-related business area. ● Technology development in the environmental area. ● Technology development in the new energy area.
8. Environmental Contribution Projects	● Promotion of continuous projects based on Cosmo Oil's basic policy*. Social Action Programs
9. Organization of Environmental Management	● Promotion of continuous improvement of environmental management systems. ● Improvement of communication activities for a variety of stakeholders

	Medium-term Targets (FY 2004)
Energy Conservation	9.2% reduction of crude oil energy consumption units used at oil refineries (compared with 1990 levels). Further reduction in the amount of fuel used for logistics. The promotion of energy conservation within our offices.
Kyoto Mechanism	Consideration of the use of the Kyoto Mechanism.
New Energies	Consideration of the introduction of power generation systems using natural energy resources (wind and solar power).
Air Pollution Control	Maintenance of the current levels of NOx, SOx and dust emissions from oil refineries. Consideration of the installation of VOC reduction equipment on dispensers at self-service stations.
Water Pollution Control	Maintenance of the current level of COD discharges.
Industrial Waste Reduction	Average annual reduction rate of 81% (compared with 1990 levels) in the amount of waste disposal from oil for a three-year period (2002-2004).
Business Establishments	Soil investigation at business establishments and the implementation of necessary measures.
Service Stations	Promotion of pollution prevention based on the new control standards. Voluntary inspection of service station facilities and implementation of necessary measures.
	40% reduction in paper purchased (compared with 2000 levels).
Commodities	Promotion of general waste reduction by encouraging garbage separation and recycling.
Water	Consideration of installation of wastewater recycling facilities at service stations.
Diesel Oils	**Provision of low-sulfur diesel oil meeting the regulatory level of less than 50ppm sulfur content.**
Gasoline	**Establishment of a new long-term supply system for the products subject to regulations.**
Office Supplies	**Green purchasing ratio of 80% (based on the purchase value).**
Others	**Promotion of the green procurement of equipment and materials (construction materials), sub materials (catalysts, containers, etc.), and consumable supplies (service station uniforms, etc.).**
Reduction of Environmental Impacts	**Development of high-activity desulfurization catalysts.**
Waste Reduction	**Reduction of the amount of catalyst used, development of technologies for spent catalyst recycling, and for the reduction of excess sludge generated from oil refineries.**
Soil Remediation	**Development of a new method for the evaluation of oil content in the soil.**
Environmental Businesses	**Development of technologies for absorption/recovery of vapors including VOC.**
Performance Evaluation of New Energies	**Development of technologies for fuel cell system and the conversion of natural gas to liquid hydrocarbons (GTL: Gas to Liquid).**
Environmental Technology Support	Transfer of environmental technologies to other countries.
Eco Card Project	Implementation of and support for projects for the prevention of global warming, natural environment conservation, environmental education, etc.
	Active involvement in social action programs.
Human Resource Development	Creation of a system to share environmental awareness.
Communication	Promotion of effective environmental information disclosure for each type of stakeholder.

Promoting Effective Use of Energy Resources: Aiming to Become "Environmentally Preferred Cosmo Oil"

Effective Use of Oil Resources from a Product Life Cycle Perspective

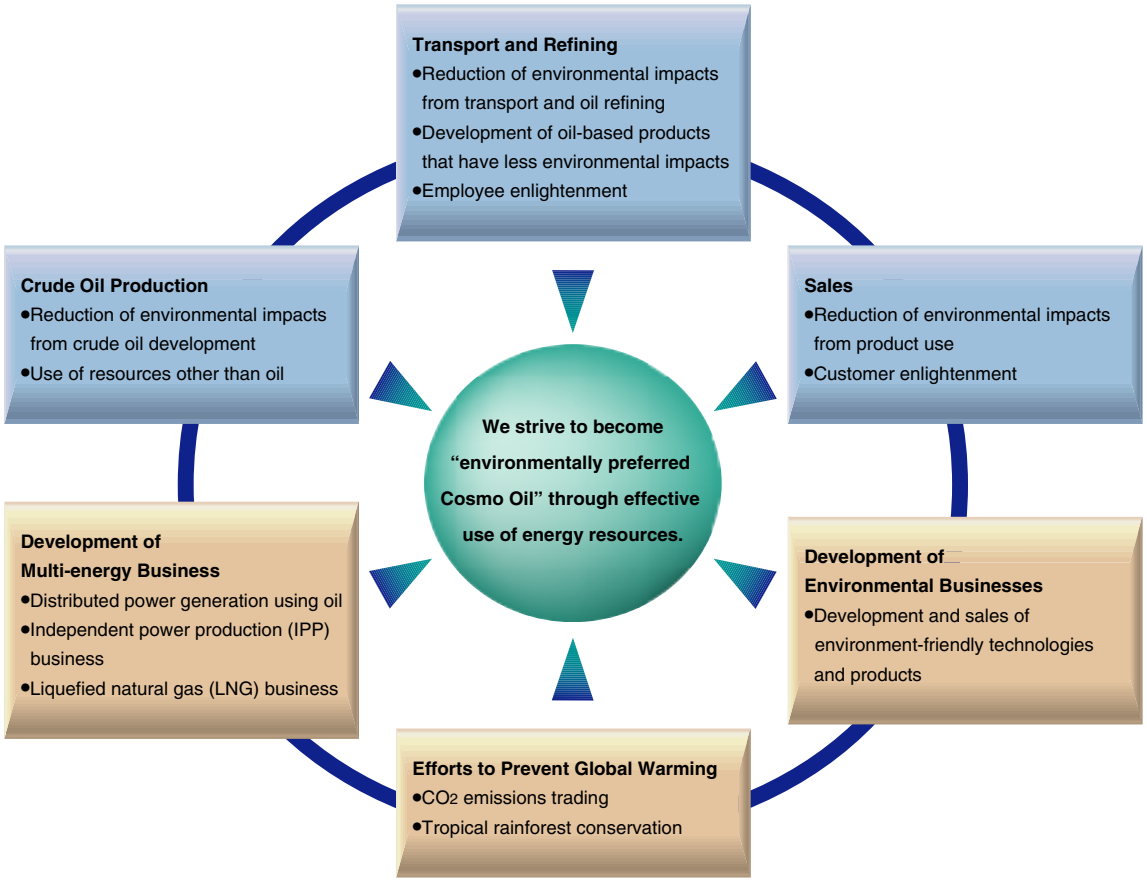
The great progress of civilization in the 20th century was made possible by petroleum energy; the old century has now come to an end and a new one has begun, which can now be called "the century of the environment". The relationship between people and petroleum has reached an entirely new phase. The inescapable reality is that petroleum resources are finite. If consumption continues at the current pace, the nearly unanimous prediction is that the crisis of supply shortages will occur during the 21st century.

Some people say, "It is not because stones ran out that the Stone Age came to an end". There is a growing recognition that it is crucial to develop alternative energies that are less damaging to the environment before we use up fossil energy resources. But nuclear energy and other alternatives to petroleum also have a variety of problems, so the widespread use of new energy sources will take some time. Petroleum is indisputably the most beneficial energy resource for society at the current time.

The Cosmo Oil Group's businesses encompass every stage of the life cycle* of petroleum, including oil development in the oil-producing countries, import of crude oil, production of products such as fuel oils and lubricants at oil refineries, and sales of products to businesses and consumers. Our top priorities are the effective production of products from crude oil and the minimization of environmental impacts at each process. We must therefore work on the environmental issues more actively and responsibly.

In "Value Creation 21", our management plan created in 2001, we are focusing on becoming an environmentally advanced company. In 2002, we

* See page 27.



devised our medium-term environmental plan, "Blue Earth 21*1", in which we set targets for nine objectives including the prevention of global warming and the reduction of environmental impact of products. We strive to become a company "environmentally preferred" by customers, shareholders and investors by making efforts to produce "clean" products and to reduce emissions of pollutants such as SOx (sulfur oxides) and the generation of waste at each process. This includes crude oil development, refining, and transport.

Reduction of Environmental Impacts from Business Operations

The life cycle of petroleum-based products starts with crude oil production in oil fields. Abu Dhabi Oil Co., Ltd., a subsidiary of Cosmo Oil, has been developing the crude oil business in Abu Dhabi in the UAE since the 1960s.

In the Abu Dhabi fields, the introduction of new technology was completed. Associated gases are compressed and reinjected into the ground, instead of being burned off. In many oil fields around the world, the associated gas that emerges as a byproduct of crude oil drilling is normally burned off at the site. The Zero-Flare*2 technology, a first for the Japanese petroleum industry, decreases CO_2 emissions and, through the reinjection of the pressurized gas into the ground, increases recovery efficiency. In terms of crude oil transport, we formed a business partnership in 2000 with the former Nippon Mitsubishi Oil Corporation (presently, Nippon Oil Corporation), which aimed at joint operations*3, and have promoted efficiency in transportation and reduction of environmental impacts by taking advantage of economies of scale.

At oil refineries which process crude oil, we have been strengthening safety controls to practice day-to-day environmental management and to prevent accidents as well as implementing careful system checks and detailed control of facility operations to conserve energy.

At service stations, we are taking measures for waste reduction and have started installing solar panels for energy conservation.

Service station equipped with solar panels

At our Research and Development Center, we are developing various environmental technologies to provide assistance for environmental protection activities at all stages of our businesses. As for hydrocarbon vapors, a cause of photochemical smog, which are produced during shipping operations at oil refineries and oil storage depots and during fueling at service stations, measures such as the installation of vapor recovery equipment are necessary. We thus continue developing adsorbents for vapor recovery equipment. In FY 2001, we successfully developed adsorbents that can be used with organic solvents as well as petrol solvents. As for the reduction of industrial wastes, Cosmo Oil has successfully used biotechnology to dramatically reduce the amount of excess sludge generated from wastewater treatment facilities (patent pending). A unit for performance evaluation is under construction at our refineries and long-term continuous operation is planned for FY 2002. We have also been involved in the development of technology for the remediation of oil in the soil. In addition to laboratory evaluation, we conducted demonstration tests of this technology using a bioremediation method and developed know-how for soil remediation.

Experimental setup of the system for remediation of oil in the soil using a "bioremediation method"

*1 See page 7.
*2 See page 29.
*3 See pages 30 and 33.

The Quality Control of Petroleum Products and Reduction of Environmental Impacts from the Customer Use of Products

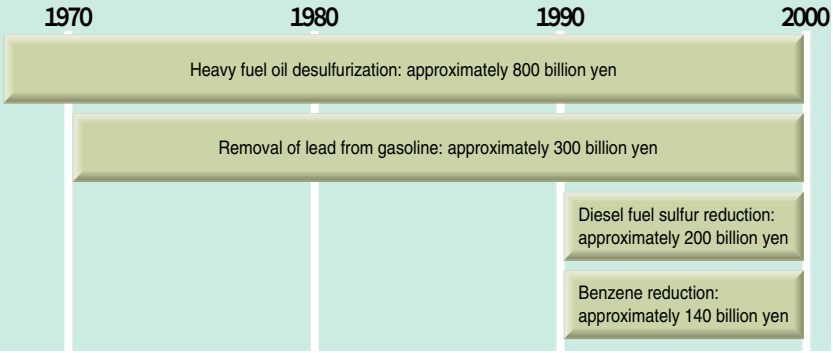
Japan is largely dependent on Middle East crude oil, which contains a high quantity of sulfur compared to African and North Sea crude oil. Therefore, producing materials that have less environmental impacts from Middle East crude oil requires far more advanced refining facilities. Japan's petroleum industry has been investing heavily in desulfurizers and other facilities to reduce environmental pollution. As a result, we have been providing products that are least damaging to the environment compared with many other companies around the world.

Cosmo Oil has been developing technologies for fuel desulfurization and further improvement of fuel quality as a top priority in order to provide products that meet the needs of society while conserving energy. We will continue to focus on research and development such as the development of catalysts for desulfurization of petroleum products to provide customers with products that cause less environmental impacts when they are used.

***1 MTBE:** Taking the environmental impacts of MTBE into consideration, Cosmo Oil suspended shipments of gasoline with MTBE as an additive in 2001.

***2** Benzene has received attention for its adverse effects on the human body. Japan's Ministry of the Environment classified it as a high-priority harmful air pollutant, although its effects on living organisms are not completely clear.

Environmental Protection and Plant Investment (Totals for Japan Petroleum Industry)



• Gasoline

The Japanese petroleum industry has been promoting the switch to lead-free gasoline, benzene reduction, and sulfur reduction to reduce the environmental impact of gasoline.

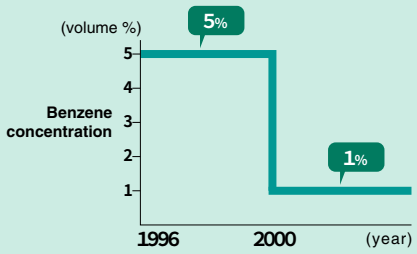
In the 1960s, when high economic growth resulted in the rapid spread of the automobile throughout society, 4-alkyl lead was added to gasoline to increase the octane number. In 1970, however, lead pollution in the Shinjuku area of Tokyo highlighted the toxicity problem of 4-alkyl lead. To respond to exhaust gas regulations and to solve the problem of lead, the idea of moving to lead-free gasoline was considered and as a result, regular gasoline became entirely lead-free by 1975. Lead-free premium gasoline was placed on the market in 1983 and the production and sale of all leaded gasoline were terminated in 1986.

The History of Gasoline Quality Improvement in the Japanese Petroleum Industry

1950 Gasoline production begins
1970 Shinjuku-ku, Tokyo air pollution incident
1975 Sales of non-leaded regular gasoline begin
1986 Sales of non-leaded premium gasoline begin
1987 Sales of 100-octane premium gasoline begin
1991 Sales of MTBE (methyl tertiary butyl ether) blended premium gasoline begin*1
1996 Revision of the JIS (benzene less than 5.0 volume percent, sulfur content of less than 100 ppm, and MTBE less than 7.0 volume percent)
2000 Regulation for benzene content of one volume percent

New Japanese regulations that came into effect from April of 1996, also limit benzene*2 in gasoline to less than five volume percent. In addition, the Petroleum Council decided in 1996 to move toward the reduction of benzene to less than one volume percent. Low-benzene gasoline with less than one volume percent benzene actually began shipping from January 2001.

Changes in Benzene Concentration in Gasoline



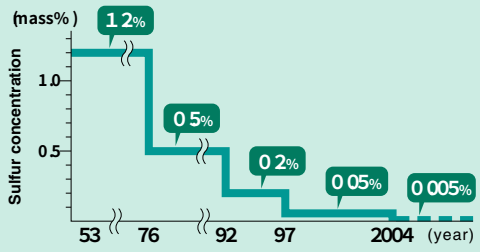
Sulfur that is burned and emitted into the atmosphere causes major environmental problems such as acid rain. Although regulated by the JIS to less than 0.01 mass percent (100 ppm), Cosmo Oil ships its premium gasoline with a level of only 0.0005 mass percent and regular gasoline at 0.003 mass percent (figures for FY 2001)—figures dramatically lower than regulation figures for sulfur content. The Reid Vapor Pressure of gasoline during summer was lowered from 78 kPa to 72 kPa in 2001 in order to reduce hydrocarbon vapor emissions, which are a cause of photochemical smog.

• Diesel Fuel

To reduce the amount of sulfur in diesel fuel, the Japanese petroleum industry began the installation of desulfurization units in oil refineries, particularly hydrodesulfurization facilities, from the latter half of the 1950s. Sulfur levels in diesel fuel were reduced to 0.2 mass percent in 1992, which were further reduced to less than 0.05 mass percent from 1997. Cosmo Oil ships diesel fuel with a sulfur level of 0.04 mass percent (figures for FY 2001).

Changing regulations for diesel exhaust gases mean that the allowable sulfur content of diesel fuel is expected to be further reduced to 0.005 mass percent (50 ppm). Demonstration tests are currently being conducted at Sakaide Oil Refinery, using the existing catalysts to provide high-level desulfurization with a view to producing diesel fuel with a sulfur level of less than 50 ppm. We are developing high-performance catalysts in cooperation with the New Energy and Industrial Technology Development Organization (NEDO). We plan to start the distribution of diesel fuel with lower sulfur content in Tokyo from September 2002.

Changes in Diesel Fuel Sulfur Content Regulation



• Kerosene

In Japan, where kerosene-fueled heaters are widely used in homes, sulfur content has long been strictly regulated to protect public health. The current JIS are for sulfur levels of 0.008 mass percent (80 ppm), but Cosmo Oil kerosene was shipped at 0.004 mass percent (figures for FY 2001)—far below the statutory standard.

• Heavy Fuel Oil

Sulfur oxides (SOx), which are released when heavy fuel oil burns, were a serious source of pollution in heavily industrialized areas during the high economic growth period of the 1960s. With the enactment of the Basic Law for Environmental Pollution Control in 1967, the public and government began the work of preventing air pollution.

The petroleum industry responded by importing low-sulfur crude oil and rapidly deploying heavy fuel oil desulfurizing units. By 1980, 44 direct heavy fuel oil desulfurization units and a number of indirect desulfurization units had been constructed. Since then, progress has continued in other areas where heavy fuel oil is used, such as flue gas desulfurization facilities, and the concentration of SOx has improved to a degree seen in few other countries.

In response to the recent fall in demand for heavy fuel oil, Cosmo Oil further refines low-sulfur heavy fuel oil produced through direct heavy fuel oil desulfurization units for low-sulfur fuel oils such as diesel fuel and gasoline that have higher added-value than heavy fuel oil.

***1 Kerosene heat-pump air-conditioning unit**
Heat pumps are systems that collect heat from low-temperature materials and move it to high-temperature items. In a kerosene heat pump air conditioning unit, kerosene is used to run a compressor; the heat transfer medium is repeatedly vaporized and liquefied, providing both cooling and heat.

***2 ATR (Auto Thermal Reforming)**
In the manufacture of hydrogen, oxygen is mixed with the raw materials (hydrocarbon and steam) oxidizing a portion of the raw material and providing the heat for hydrogen generation.

***3 Independent Power Production (IPP) Business**
In 1995, the Electric Utilities Industry Law was revised to allow corporations with electrical generation capabilities to sell electrical power to utilities; in 2000, further revisions allowed for the direct sale of electricity to major users. By using reserve electrical generating equipment and our own fuel, relatively inexpensive electricity can be supplied.

Development of Multi-energy Projects: Fuel Cells, Natural Gas, etc.

With the ongoing deregulation of the energy sector, the barriers between energy areas such as oil, electricity, and gas are diminishing. We are actively involved in multi-energy projects including the development of fuel cells and the LNG (liquefied natural gas) business other than oil-related businesses to enable more effective use of energy that is less harmful to the environment.

• Distributed power business

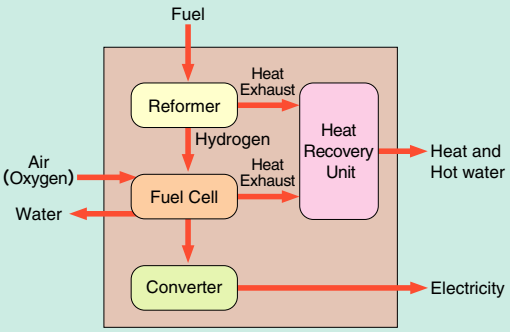
The supply of electric power from power plants brings with it major waste through energy lost during power transmission. With distributed power generation, electricity is generated directly where it is needed with no power transmission loss and waste heat can be used in a more effective form, thereby significantly reducing energy consumption.

Cosmo Oil has developed a cogeneration system for power generation and the effective use of waste heat, and the system is in use in hotels, hospitals, etc. We have also been developing for some time a kerosene heat pump air-conditioning unit*1. We can increase efficiency through our existing supply network by using this fuel supply in a distributed power system.

Fuel cells are seen as the next-generation energy source, because the exhaust they produce contains very few pollutants. We are focused on the development of a home-use fuel cell system using liquid fuels such as gasoline and diesel fuel, commissioned by the New Energy and Industrial Technology Development Organization (NEDO) and the Petroleum Energy Center (PEC). In FY 2001, a demonstration unit that represents the middle stage of our research, a butane-fueled fuel cell, successfully completed a 1,000-hour trial run. We are also working to develop hydrogen production technology using a new technology called ATR (Auto Thermal Reforming)*2.

Demonstration testing of a micro gas turbine fueled by kerosene that is intended for stores is now being conducted.

Fuel Cell System



• Independent Power Production (IPP) Business*3

We are proceeding with the construction of a power-generating station with a capacity of 200 thousand kW on land adjoining the Yokkaichi Oil Refinery. Operation will start in FY 2003 and the generated power will be supplied to Chubu Electric Power Co., Inc. The power station will use oil residue (asphalt fraction) as fuel which is to be pumped through the pipeline from the Yokkaichi Oil Refinery.

Power station under construction in Yokkaichi

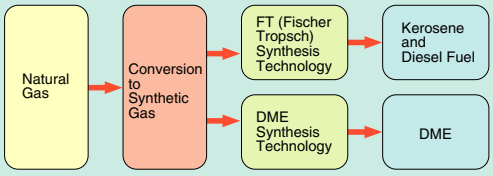
• Liquefied Natural Gas (LNG) Business

Cosmo Oil took part in establishing LNG Chubu Corporation, a liquefied natural gas sales company set up by Chubu Electric Power Co., Inc. and other companies, and began to supply LNG to gas companies at the end of 2001. In addition, we formed

Sakai LNG Co., Ltd. as a joint venture with Kansai Electric Power Co., Inc. and others. This new company will build a shipping pier and base for LNG rigs on land adjacent to the Sakai Oil Refinery for the receiving, storage, vaporization, and delivery of LNG.

Natural gas has an advantage as it creates less environmental impacts during use, but transportation of LNG requires facilities that are capable of maintaining temperatures as low as -162°C during transportation and storage. For transportation of natural gas from gas fields, on the other hand, pipeline facilities are needed. Cosmo Oil therefore is developing a new technology called GTL (Gas to Liquid) technology with which natural gas is converted to liquid hydrocarbons for ease of transport. In collaboration with other companies, Cosmo Oil is participating in projects conducted by Japan National Oil Corporation and is developing catalysts for the production of liquid fuels from synthetic gases. We are carrying out demonstration tests at a pilot plant in Hokkaido. The possibilities of DME synthesis technology are also being evaluated.

Technologies for the Conversion of Natural Gas to Liquid Hydrocarbons (GTL: Gas to Liquid)



GLT technology involves chemical conversion of methane, the main component of natural gas, to synthetic gas (i.e., a mixture of carbon monoxide and hydrogen) which is then converted into kerosene and diesel fuel using the FT (Fischer Tropsch) synthesis technology or into dimethyl ether using the DME*1 (dimethyl ether) synthesis technology. Because the liquid fuels produced by GTL contain no sulfur and aromatics, they are viewed as a promising clean energy for the next generation.

Challenging Global Warming: Emissions Trading, etc.

Global warming is one of the issues that must be addressed by businesses and nations working together. To achieve the goal set for Japan at COP (i.e., a reduction by six percent from the level of 1990 by the years 2008 to 2012), we are working to make effective use of the Kyoto Mechanism*2 established at COP, which includes CO_2 emissions trading*3, CDM*4 and JI*5, as well as reducing environmental impacts throughout our business activities.

In May 2001, the new company, Natsource Japan, was founded by 12 major corporations, including Cosmo Oil, as an emissions trading agency. This company is involved in consulting on CO_2 emissions reduction and the development of the emissions trading agency business.

In June 2001, for example, we entered into an emissions trading option contract with a private Australian firm for the emissions of 2.8 million tons of CO_2. In this, the amount of CO_2 that is absorbed by the planted eucalyptus trees is traded. We believe that emissions trading provides indirect support for the maintenance of forests.

In Papua New Guinea, we are providing assistance for local people to make a transition from slash-and-burn farming to settled farming for global environmental protection*6.

***1 DME**
Chemical formula: CH_3OCH_3
DME is mainly used as an aerosol propellant. It is a chemically stable colorless gas that is easily liquefied under pressure at room temperature. It is attracting attention for its potential as a clean alternative to diesel fuel.

***2 Kyoto Mechanism**
The Kyoto Protocol provides a flexibility mechanism that facilitates the cost-effective fulfillment of national emissions reduction commitments for industrialized countries. The Kyoto Mechanism includes CO_2 emissions trading, CDM, and JI.

***3 CO_2 Emissions Trading**
This allows industrialized nations that have committed to greenhouse gases emission reduction targets to trade part of their emissions allowance.

***4 CDM**
(Clean Development Mechanism)
CDM allows industrialized nations that have committed to greenhouse gases emission reduction targets to invest in emissions reduction projects in developing nations and gain credits for the reductions achieved. This allows both nations to benefit: the industrialized nation can use the credits received to achieve its own targets, while the developing nation acquires technology transfer and investment.

***5 JI**
(Joint Implementation)
This allows industrialized nations to transfer to, or acquire from, other industrialized nations emission reduction units resulting from projects aimed at reducing greenhouse gases emissions or sequestrating greenhouse gases.

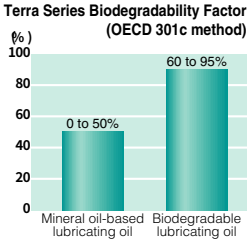
***6** See page 39.

Expansion of Environmental Business: The Development of Environmental Technologies and Products, etc.

Working closely together as one unit, the group companies of Cosmo Oil have been developing products that have less environmental impacts as well as developing petroleum-related environmental technologies. These technologies and products are helping to the reduction of adverse impacts on the environment in companies in the same and other industries.

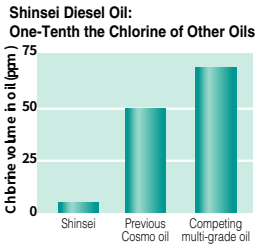
• Cosmo Oil Lubricants

Cosmo Oil Lubricants develops and sells its low environmental impact lubricating oils such as biodegradable and chlorine-free products.



Cosmo Terra is a series of synthetic lubricating oils with a highly biodegradable structure that was developed with the first priority being to protect the environment, and the oils have been certified as Eco Mark products. Because the oils can be decomposed by microorganisms into carbon dioxide and water, they help to prevent water and soil contamination. It is a series with wide applications including lubricating oils for construction and agricultural machines, railway vehicles, outboard motors, and chainsaws.

The Cosmo Clean series of metal cutting oils, which were also developed with the highest focus on environmental protection, provide chlorine-free benefits in solving the problems associated with chlorine in disposal and washing. Cosmo Shinsei Synthetic Diesels, an oil for diesel cars which has a level of chlorine just one-tenth that of normal oils, was released in 1999. It not only provides the benefits of low-chlorine oils for the environment, but also extends engine life and the interval between oil changes.



The Cosmo Lio SL series of engine oils are oils for gasoline engine cars that provide a cleaning effect, increased heat resistance and reduced engine oil consumption as well as reduced fuel consumption. The SL is an international standard established by the American Petroleum Institute (API).

Cosmo Lio Supreme

• Cosmo Engineering Co., Ltd.

Cosmo Engineering mainly shoulders the responsibility for the plant construction and maintenance of our oil refinery equipment. The company has made a contribution to environmental protection in businesses in other industries, not to mention in Cosmo Oil, through its achievements in environmental technologies including development of a hydrocarbon vapor recovery unit, a dioxin removal unit, and process wastewater treatment technology.


Hydrocarbon vapor recovery unit


Dioxin removal unit

The hydrocarbon vapor recovery unit was developed to recover gasoline and other vapors during shipping from oil refineries and oil storage depots. In 1997, the recovery unit using the adsorbent developed by Cosmo Oil, the application called the “Cosmo adsorption system” to adsorb vapor, was put into practical use. This unit is now being supplied not only within Cosmo Oil, but to other petroleum companies as well. For example, the same technology was put to use in a volatile organic compound (VOC) recovery unit that provides a high recovery rate and space-saving size, and has been praised for its high level of safety. These factors all contribute to its wide use in the chemical, printing, and pharmaceutical factories.

Cosmo Engineering also introduced the adsorption unit technology that is installed after the fly-ash collector device of existing incinerators and can greatly reduce the concentration of dioxin, with removal rates of 99 percent or more. This greatly

decreases the dioxin generated by municipal and industrial waste incineration facilities.

The process wastewater treatment technology developed for oil refineries is also finding application in the livestock industry for the treatment of animal waste. The high-efficiency active sludge unit and denitrification and phosphorus removal units can be combined for an advanced level of waste treatment in hog farms.

• Cosmo Ventures, Inc.

Cosmo Ventures, Inc. is involved in the development and sale of products, such as wastewater treatment systems and cleaning agents replacing CFCs, based on petroleum-related technology for the reduction of environmental impact that can also be applied to other industries.


Bioflora 01

Bioflora 01 is one such product for the treatment of wastewater containing oils using bioremediation (a wastewater treatment technology using microorganisms). Unlike existing treatment facilities, no chemicals or filtration films are necessary, and since oil or organic materials in the wastewater are biodegraded into water and carbon dioxide, it not only reduces the use of chemicals but also dramatically reduces the sludge generated during water treatment. We will promote the introduction of this technology to factories striving to achieve zero-emission operations.

Another product sold by Cosmo Ventures, Inc. is New Petrosafesol, a new cleaning agent that has no ozone depletion or global warming effect, replacing specified CFCs or trichloroethane as a detergent for metal parts. Because it has excellent washing and drying properties, and does not require equipment for washing with water, it has attached much attention as a true next-generation cleaning agent.

• Cosmo Trade & Service Co., Ltd.

Cosmo Trade & Service is a trading company; in FY 2001 a new Environment Development Division was established to assist the import and sales of environment-related products including surface-strengthening and heat insulation materials.

Ashford Formula, a US-made concrete protector and strengthener, is used at distribution centers, home improvement centers, and factories throughout Japan. This product is used to strengthen concrete floors, helping to protect employees' health by suppressing concrete dust.

For Super Therm, a heat insulation coating material first developed by NASA of the US, new applications are being considered. We are developing a broad range of applications including insulation for railway vehicles, buses and trucks and other applications taking advantage of its sound-insulating properties in addition to its conventional use in insulating roofs and piping.

• Cosmo Matsuyama Oil Co., Ltd.

Cosmo Matsuyama Oil Co., Ltd. whose businesses include production of petrochemical products, gasoline, kerosene, diesel oil, and jet fuel oil, contributes to the effective use of oil by flexibly responding to market needs for products.

The company, for example, receives benzene that is generated from the benzene separation process at oil refineries and uses it as a raw material for producing chemical products by processing it with equipment such as aromatics extractors.


Aromatics extractor processing petrochemicals

Pseudocumene, a petrochemical produced by Cosmo Matsuyama Oil, is used as a base material in a new method of neutrino detection at KemLAND, a neutrino observatory for a research project organized by Tohoku University.

Aiming to Meet Higher Targets: Implementing the PDCA Cycle at Each Division Including Oil Refineries

Action Plan and Results for FY 2001

The action plan and the results up to the end of FY 2001 are shown in the table below. As to the environmental management system, we will establish a system to implement the PDCA (Plan-Do-Check-Action) cycle*1 from FY 2002, not only at oil refineries but also at other departments including the headquarters, oil storage depots and Research and Development Center. We drew up "Blue Earth 21"*2, a medium-term environmental plan for the period FY 2002-2004, and set targets for nine principal themes.

*1 See page 6.
*2 See page 7.

Action Plan		Results	Related theme of Blue Earth 21
Theme	Target	FY 2001 Results (Related page)	
Promotion of energy conservation	To control emissions of CO_2, a cause of global warming, energy conservation will be promoted, with a target of reducing crude oil energy consumption units at oil refineries by FY 2010 to 10% below FY 1990 levels.	Reduction in FY 2001 to levels 9.1% below FY 1990 levels. Investment for energy conservation purposes is being made to meet the target. (Page 19)	(日)
	To reduce the amount of fuel used for the land and domestic ocean transport of petroleum by FY 2010 to 9% below FY 1990 levels.	By the continued move toward larger, more efficient vehicles and vessels, FY 2001 figures for land vehicles were 17% below FY 1990 levels, while ocean transport fuel use was 15% below FY 1990. (Page 33)	(日)
Promotion of environmental protection	Reduction of the final disposal of industrial wastes generated from oil refineries to 67% of FY 1990 levels by FY 2010.	Successful reduction in FY 2001 to 78.4% of FY 1990 levels. (Page 21)	(月)
	To not simply meet regional emissions standards for the emissions of pollutants such as SOx, NOx and COD, but to strive for a higher level of reduction.	Pollutant emissions are already far below the regulatory standards. Continued efforts will be made to reduce emissions. (Page 20)	(月)
Promotion of environmental protection activities at service stations	Promotion of resource and energy conservation at service stations.	Environmentally friendly uniforms made from recycled PET plastics were developed (certified as an Eco Mark product). The uniform will be introduced to service stations from FY 2002. Solar panels were installed at ten service stations in order to save energy. (Page 34)	(水) (日)
	Fostering of environmental awareness in service stations.	"Service Station Facilities Operation Manual" which features approaches to environmental issues (PRTR Law, Industrial Waste Disposal Law, etc.) was prepared and distributed to special agencies, service stations, and dealers. (Page 34)	(祝)
Promotion of green activities in the offices	Promotion of resource saving and recycling through the implementation of a paperless office.	Paperless operations through positive use of office automation equipment, green purchase of office supplies, and waste paper recycling are being promoted. (Page 35)	(水)
Research and development • Technological development in the primary petroleum business	Promotion of the development of high-performance desulfurization catalysts.	High-performance catalyst with the potential for the production of diesel fuel with sulfur levels of 50 ppm has been developed and is undergoing performance evaluation at the Sakaide Oil Refinery. Further efforts will be made in the development of higher-performance catalysts. (Page 12)	(土)
• New energy	Promotion of the development of new energy technologies.	High-performance catalyst for the efficient production of liquid fuel from natural gas has been successfully developed for industrial use. (Page 14) Steady progress has been made in the testing of fuel cell systems using petroleum-based fuel. (Page 13)	(土)
• Development of environmental technologies for industries	Promotion of the development of wastewater treatment technologies.	At Sakaide Oil Refinery, preparation for a performance evaluation of a technology to reduce the volume of excess sludge generated during the wastewater treatment process has been completed. (Page 10)	(土)
	Promotion of the development of soil remediation technologies.	A new method to evaluate the applicability of soil remediation technology using microorganisms has been developed and demonstration tests have been carried out. (Page 10)	(土)
	Promotion of the development of hydrocarbon vapor recovery technologies.	An adsorbent for the recovery of hydrocarbon vapor that can be used with non-petroleum solvents such as organic solvents has been developed. (Page 15)	(土)
Social action and public relations activities	Active promotion of social action programs and transmission of information about Cosmo Oil's environmental activities both internally and to the public.	A variety of social action programs including support activities for traffic-accident orphans and physically handicapped people were implemented. (Page 39) Information has been disclosed on the company website and various periodicals. (Page 42)	(祭)
International cooperation	Efforts for environmental protection, energy conservation, and promotion of safety management technology for pollution prevention overseas, taking advantage of the company's personnel and technology.	In 2001, 53 interns from six countries, which were mainly Asian and Central American, were invited and four specialists were dispatched overseas. (Page 41)	(祭)
Emergency countermeasures	Implementation of countermeasures to ensure minimal environmental impact in emergencies.	Maintenance of emergency facilities has been carried out; accident prevention training and education is being made on a regular basis; and preparations have been made for the rapid deployment of appropriate measures in case of emergencies. (Page 32)	(祝)

Active Approach to Environmental Protection Activities and Safety Preparations at Oil Refineries

Environmental Management Systems at Oil Refinery

ISO14001 certification*, an international standard for environmental management systems, has been obtained at all four of our refineries and at Cosmo Matsuyama Oil Co., Ltd., whose business involves refining and storing oil products. In accordance with ISO14001, the head of each oil refinery establishes an environmental policy, sets goals, works to save energy and reduce wastes, implements education and training programs and conducts other activities focused on the continuous improvement of environmental protection.

Apart from the external audits by accredited registrars, internal audits are carried out regularly according to the audit standards set by each oil refinery to confirm progress toward targets and to improve our activities continuously. In FY 2001, Cosmo Matsuyama Oil Co., Ltd. renewed its certification.

ISO14001 Certification Acquisition at Cosmo Oil Refineries

Refinery name	Location	Accredited registrars	Certification Date
Chiba Oil Refinery	Chiba Prefecture	JQA	March 13, 1998
Yokkaichi Oil Refinery	Mie Prefecture	JQA	March 20, 1998
Sakai Oil Refinery	Osaka Prefecture	JQA	March 20, 1998
Sakaide Oil Refinery	Kagawa Prefecture	JQA	June 18, 1997
Cosmo Matsuyama Oil Co., Ltd.	Ehime Prefecture	JQA	December 28, 1998

Number of Personnel Obtaining Environmental Qualification

Air Pollution Control Manager	86
Water Pollution Control Manager	94
Noise Pollution Control Manager	15
Vibration Control Manager	6
Dioxin Control Manager	6
Hazardous Materials Officer (Class A, Class B)	1,878
High-Pressure Gas Production Safety Manager (Class A, Class B)	1,076
Qualified Person for Energy Manager (heat)	89
Qualified Person for Energy Manager (electricity)	22
Personnel in charge of industrial waste subject to special control	18
Technical manager for industrial waste treatment facility	14
Environmental Measurement Staff	7
Boiler Engineer (expert)	24
Boiler Engineer (1st and 2nd class)	1,162

As of March 2002

Safety Activities at Oil Refineries

At oil refineries, we are actively improving safety by bringing together Cosmo Oil employees and the employees of affiliated companies. To prevent operational accidents and occupational hazards, danger forecasting, research into accident causes and examination of the accident recurrence prevention plan are carried out, and a variety of programs to raise the awareness of all employees are being implemented.

As a result of these efforts, there were no operational accidents and two occupational hazards with no suspension of operation in FY 2001. Chiba Oil Refinery became number-one in the petroleum industry for the total accident-free hours.

Regarding health, physicians who visit the oil refineries, with follow-ups as necessary, conduct periodic employee health checks.

Number of Hours without Accident

Refinery name	Hours
Chiba Oil Refinery	14,377,554
Yokkaichi Oil Refinery	57,360
Sakai Oil Refinery	495,635
Sakaide Oil Refinery	38,302
Cosmo Matsuyama Oil Co., Ltd.	6,239,375

As of March 2002

Yokkaichi Oil Refinery, first in Mie Prefecture, received the Director-General of Fire-Defense Agency Award at the Convention on Hazardous Materials for its efforts in obtaining certification for “certified facility concerning modification work” under the Fire Defense Law, and for its voluntary safety management system.

Chiba Oil Refinery received the Minister of Health, Labor and Welfare Commendation for its activities to improve occupational health and safety.

Yokkaichi Oil Refinery received the Director-General of Fire-Defense Agency Award at the Convention on Hazardous Materials.

Chiba Oil Refinery received the Minister of Health, Labor and Welfare Commendation.

*** ISO 14001**

An international standard for environmental management systems published by the International Organization for Standardization (ISO). It establishes important points in reducing environmental impacts in business activities, products, and services.

Reduction of Environmental Impacts from Product Production and from Product Use

Although the largest environmental impacts that occur within the life cycle of petroleum products are attributable to the CO_2 emissions from product use, considerable environmental impacts are caused during crude oil refinery processes as well. On this account, Cosmo Oil works hard to reduce energy use at refineries, prevent air and water pollution, reduce waste, and control chemical substances.

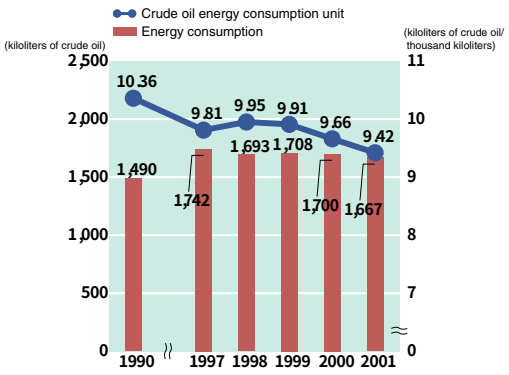
We also recognize that in order to promote effective environmental protection, it is important to provide information that confirms the actual effects of our activities on the reduction of impacts on the environment. This year, therefore, we did a trial calculation on the balance between the environmental impacts occurring from product production and from customer use of products*1.

Prevention of Global Warming

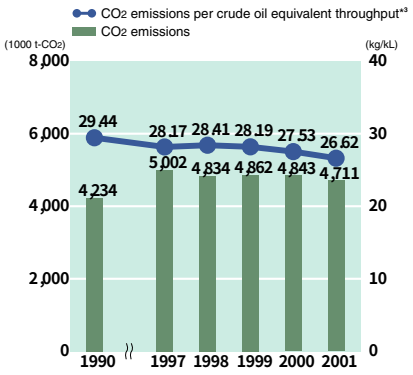
Oil refineries use a great deal of energy and emit large amounts of CO_2 in the process of refining crude oil; therefore, Cosmo Oil focuses on preventing global warming by reducing energy use. The oil industry sets its activity targets for reducing CO_2 emissions in terms of crude oil energy consumption units*2; we also set similar targets and promote the reduction of energy use for heating furnaces and boilers that are used during the refining processes.

In the 1990s, the increases in crude oil throughput, and the actions for the environment such as the reduction of sulfur content in kerosene and the reduction of benzene in gasoline increased energy consumption at oil refineries. However, through the promotion of energy conservation, FY 2001 levels of energy consumption units in total for the four refineries were already 9.1 percent below FY 1990 levels.

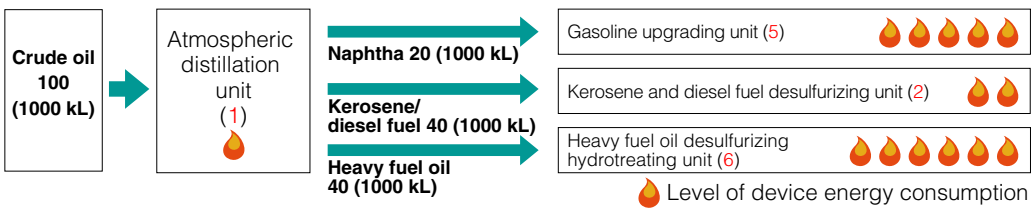
Changes in Energy Consumption



Changes in CO_2 Emissions



- **Calculation:** Total oil refinery energy use (5000 kL crude oil equivalent)



- **Crude oil equivalent throughput** (100x1) + (20x5) + (40X2) + (40x6) = 520
- **Crude oil energy consumption units** 5000/520 9.6 (kiloliters of crude oil/thousand kiloliters)

*1 See page 22.

***2 Crude oil energy consumption units**

The unit of crude oil energy consumption is the total amount of energy used at oil refineries divided by the amount of crude oil equivalent throughput. The unit is shown in "kiloliters of crude oil/thousand kiloliters". The total amount of energy used is converted to the crude oil equivalent and the unit is shown in "kiloliters of crude oil".

***3 Crude oil equivalent throughput**

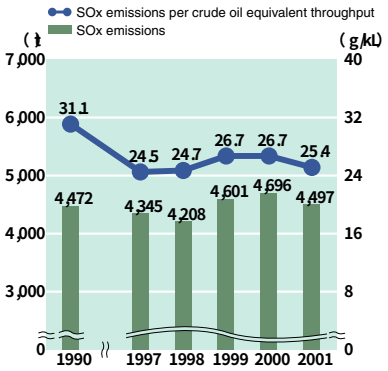
Crude oil equivalent throughput is derived by converting the throughput of each unit into the crude oil equivalent throughput at the atmospheric distillation column. Crude oil is first separated at the atmospheric distillation column into naphtha, kerosene, diesel fuel, heavy fuel oil, etc., and then processed for sulfur reduction. Because the composition of units differs among oil refineries, crude oil energy consumption units are calculated by using crude oil equivalent throughputs that reflect the operating conditions of each unit. The throughputs are converted based on the consumption of energy at each unit with the energy consumption at the atmospheric distillation column as the base. The sum of the throughputs for individual units is the total crude oil equivalent throughput for an oil refinery.

Prevention of Air Pollution

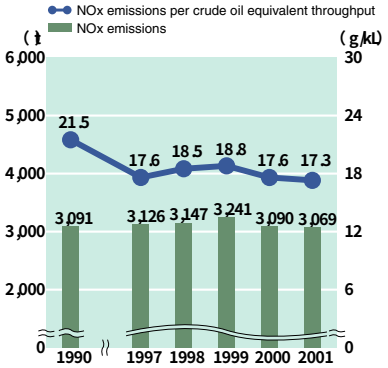
The heating furnaces, boilers and other facilities used for refining at the oil refineries emit both SOx (sulfur oxides) and NOx (nitrogen oxides) gases. We therefore work hard not only to comply with regulatory standards but also to further reduce emissions of these air pollutants through the use of low-sulfur fuels and countermeasures including the desulfurization of flue gases.

As for hydrocarbon vapors, a cause of photochemical smog, actions have been taken to reduce their leakage from tanks and distribution facilities at oil refineries and oil storage depots. These countermeasures also contribute to the reduction of emissions of benzene, toluene, xylene, etc. which are contained in petroleum products*1.

Changes in Sulfur Oxides (SOx) Emissions



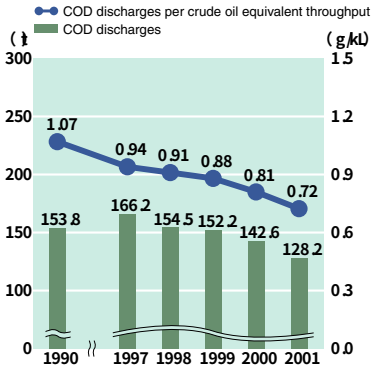
Changes in Nitrogen Oxides (NOx) Emissions



Prevention of Water Pollution

Because oil becomes mixed with wastewater at oil refineries, oil separation systems are installed to purify the wastewater before discharge in order to prevent water pollution.

Changes in Water Pollutant (COD*2) Discharges



Reduction of Emissions of Dioxins*3

Pollution caused by dioxins emitted from facilities such as waste incineration plants has attracted great attention in recent years. In 1999, the Law Concerning Special Measures against Dioxins, which sets environmental standards and emission standards, came into force. The levels of dioxins emitted from our oil refineries equipped with incinerators had been controlled well below the emission standards; however, we decided to suspend the use of some of the incinerators in consideration of future circumstances surrounding the issue. For the rest of the incinerators, we have tightened their control.

PCB Storage Management

The production of polychlorinated biphenyls (PCBs), which had been widely used in electric appliances such as transformers and condensers, was banned in 1972, since their toxicological properties caused controversy through incidents as the Kanemi Rice Oil Case in 1968. In 2001, the Law Concerning Special Measures against PCB Waste was enacted, under which organizations holding PCB waste are required to submit a report on the storage conditions and to properly dispose of the waste within a certain period of time. PCBs are stored under strict control at our sites.

***1** See page 21 “Control of Chemical Substances”.

***2 COD**
Chemical Oxygen Demand. A water pollution index that indicates the amount of oxygen consumed in the complete chemical oxidation of organic and inorganic oxidizable substances present in wastewater.

***3 Dioxins**
Polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and coplanar PCBs are classified as “dioxins” under the Law Concerning Special Measures against Dioxins. They are generated through, for example, the incinerating process of wastes, and have toxic and carcinogenic effects.

Soil Conservation

As public awareness of soil conservation and soil pollution prevention has increased in recent years, many laws have been passed by the government in order to improve the situation. The Cosmo Oil Group drew up a policy for its approach to soil conservation in June 2002, and will work to protect the soil environment based on this policy.

Policy on Soil Conservation

We check the soil condition at the offices of Cosmo Oil and its affiliated companies and sales facilities of Cosmo brand products according to the plans, and take measures where required.

- Voluntary soil investigations conducted at our service stations, where underground tanks were installed more than 20 years ago, revealed obvious soil pollution at some sites. We will therefore take the following additional measures.
  1. A risk assessment of the soil environment will be performed at all our service stations including special agents. A voluntary check of facilities will be conducted in accordance with the degree of risk and measures will be taken.
  2. A new standard for service station management will be established to strengthen day-to-day management and to prevent oil leakages.
- For other business establishments, specific soil investigation plans will be drawn up based on the type of business and use of each establishment, and the plans will be implemented accordingly.

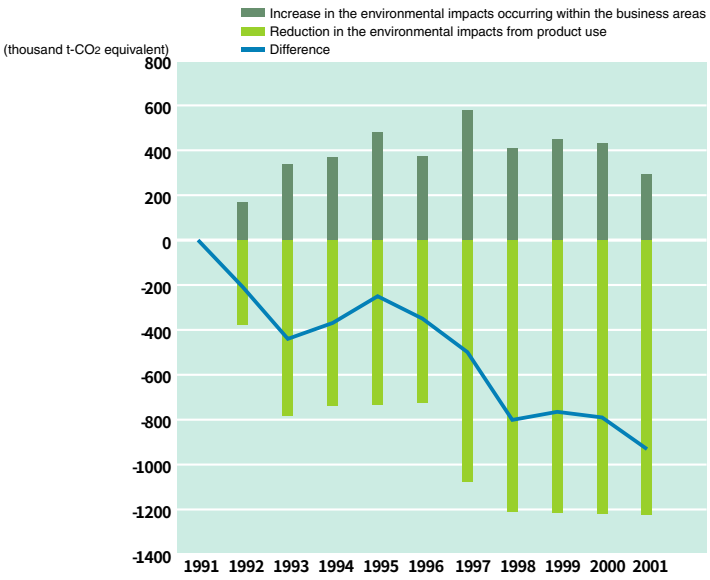
Diesel Fuel Sulfur Reduction and Integrated Evaluation of Environmental Impacts

In order to reduce environmental impacts occurring at the time of product use by increasing the quality of petroleum products, a large amount of energy is required during the refining process at oil refineries thereby increasing the environmental impacts generated. Environmental impacts must be evaluated comprehensively in order to reduce the impacts throughout the life cycle of oil. We performed an integrated evaluation of sulfur reduction and environmental impacts caused by oil refineries on a trial basis, focusing on sulfur reduction of diesel fuel as a typical example of quality improvement of petroleum products. We used EPS*, a common method for integrated evaluation developed in Sweden.

The sulfur level in diesel fuel was reduced from the previous level of 0.5% to 0.2% by October 1992, and it was further reduced to less than 0.05% by July 1997. During this period, improvements were made to facilities and their operation, including the installation of a deep desulfurization unit, and although crude oil energy consumption units and environmental impacts per crude oil equivalent throughput were reduced as a result of our efforts to conserve energy and reduce environmental impacts, the absolute amount of environmental impacts occurring at oil refineries inevitably increased.

The figure below shows changes in environmental impacts from oil refineries and from use of diesel fuel, compared with FY 1991 levels. The environmental impacts from oil refineries increased; however, a greater reduction was achieved in the impacts caused by use of diesel fuel. This means that the environmental impacts from the whole life cycle of products was reduced.

*EPS: Environmental Priority Strategies in Product Design Version 2000
(Centre for Environmental Assessment of Products and Material Systems, Sweden)



* Weighting factor in EPS (CO_2 = 1): SOx = 30.3, NOx = 19.7 and COD = 0.00935
* The environmental impacts from oil refineries that have been evaluated include CO_2, SOx, NOx, and COD.
* The environmental impacts from the use of diesel fuel was calculated as SOx emissions. The total amount of sulfur content in diesel fuel is firstly calculated by multiplying the sulfur content in diesel fuel according to the JIS and the production volume. The total amount of sulfur is then converted to SO_2 emissions.

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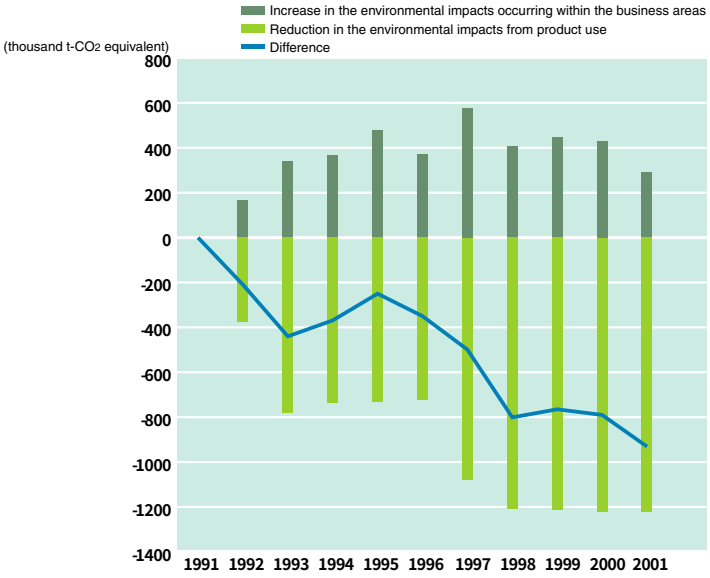

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Sophisticated Environmental Accounting Systems for Better Management Decision-making and Disclosure

Environmental Accounting System of Cosmo Oil Group

The environmental accounting system of the Cosmo Oil Group has entered its second year since the Group introduced the system in 2001. The Cosmo Oil Group is using the system as a tool for management decision-making and for promoting accountability to the public.

In gathering environmental accounting data, we measure the costs associated with our environmental protection activities and also the benefits resulting from those activities, taking into account several unique characteristics of the petroleum industry, such as:
1) That since petroleum products are burned when used by consumers, environmental pollutants are generated at the consumption stage; and
2) That because Japan's petroleum products are largely produced from high-sulfur Middle East oil, massive investment has been necessary over many years to build an advanced purification infrastructure (see the graph 'Changes in Year-end Acquisition Costs', which is shown below).

In the previous year, we undertook environmental accounting in accordance with the guidelines of the Petroleum Energy Center (PEC), drawing upon the guidelines of the Ministry of the Environment (2000 version). This year, however, we referred to the 'Guideline for Introducing an Environmental Accounting System (2002 Version)' of the Ministry of the Environment, which was made public in March 2002, to make our environmental accounting more comprehensible.

As in the previous year, environmental costs are calculated to cover the costs stated in financial accounting.

This year, the Cosmo Oil Group, for the first time, calculated environmental indicators*. Although this effort is still in its pilot phase, we hope the indicators will be of use to the reader.

Period and Scope of the Environmental Accounting Report

• Report Period

Fiscal year 2001 (April 1, 2001 to March 31, 2002)

• Report Scope

The report covers Cosmo Oil's four oil refineries and its Research and Development Center, and Cosmo Matsuyama Oil. With regard to the environmental costs and benefits of the affiliated companies, only those that are closely related to Cosmo Oil's four oil refineries are identified and measured.

Cosmo Oil Co., Ltd.

Chiba Oil Refinery, Yokkaichi Oil Refinery, Sakai Oil Refinery, Sakaide Oil Refinery, Research and Development Center (only the costs and benefits of research and development in the area of environmental protection are included)

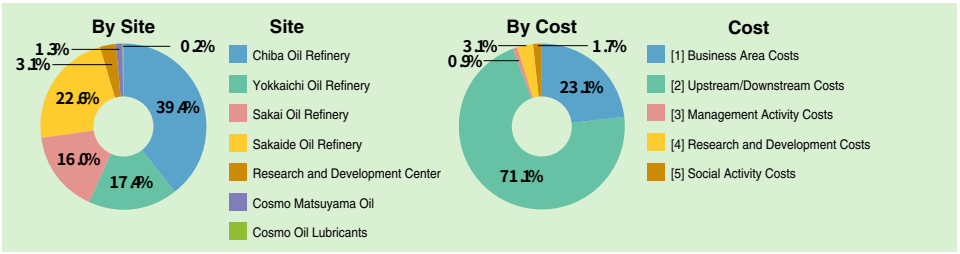
Cosmo Matsuyama Oil Co., Ltd.

Cosmo Oil Lubricants, Co., Ltd.

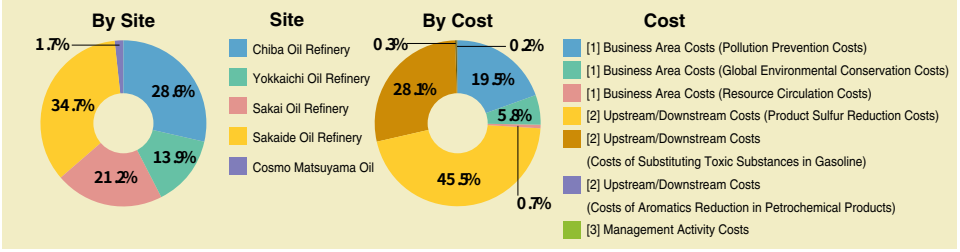
Chiba Factory, Yokkaichi Factory (the environmental costs and benefits of these two factories are included in those of Cosmo Oil's Chiba Oil Refinery and Yokkaichi Oil Refinery), green procurement costs for raw materials of lubricating oils

* See pages 22, 25, 27 and 28.

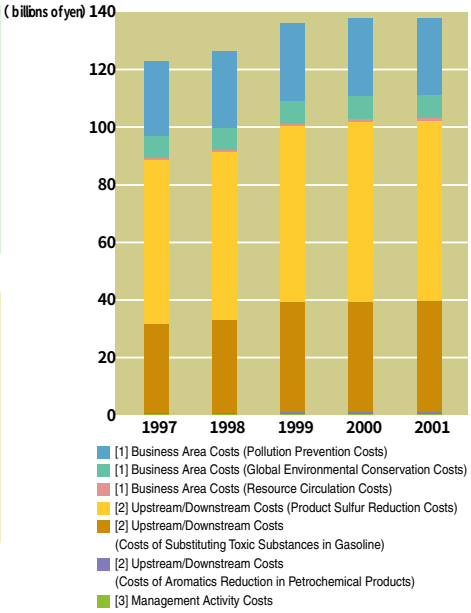
Environmental Cost



Year-end Acquisition Costs



Changes in Year-end Acquisition Costs



Environmental Accounting by Site

Environmental accounting is prepared separately for Cosmo Oil's four refineries, Cosmo Matsuyama Oil and others. Separate data on each site is provided on pages 45 to 50.

Changes from the Previous Year

Changes from the previous year's environmental accounting are shown below.

Expansion of Scope

In the previous year, at Cosmo Matsuyama Oil, only the after-treatment facilities used for the reduction of benzene in gasoline, which is directly related to Cosmo Oil's products, were included in the scope. This year, however, the scope was expanded to include all environmental protection activities.

Cosmo Matsuyama Oil, which mainly deals with petrochemicals production, differs in its objectives, equipment, and processes from oil refineries, which are principally concerned with the production of fuels such as gasoline. The process in which aromatics are removed from Cosmo Matsuyama Oil's products is regarded as the process of producing environment-friendly products, and the costs associated with the process are accounted for as upstream/downstream costs.

Data Compilation

- In the previous year, we compiled environmental accounting data in accordance with the guidelines of the Petroleum Energy Center (PEC). This year, however, we turned to the guidelines of the Ministry of the Environment, and counted 'product environmental impact reduction costs' and 'product environmental impact reduction benefits' as 'upstream/downstream costs' and 'upstream/downstream benefits', respectively.
- The costs and benefits of product sulfur reduction did not cover all the products of the Cosmo Oil Group and therefore were not fully comprehensible. This year, sulfur reduction in the Cosmo Oil Group's major products, which range from LPG to heavy fuel oil C, is subject to environmental accounting. The costs of product sulfur reduction are allocated to each product according to the sulfur reduction rate of the product.
- The costs of the environmental impact reduction of gasoline, which were shown as 'costs of removal of lead from gasoline' and 'costs of benzene reduction in gasoline' in the previous year, are shown as 'costs of substituting toxic substances in gasoline'.
- The benefits of environmental impact reduction, which were in the previous year measured as the differences between the levels set by the Japanese Industrial Standards (JIS) and the actual levels, are measured as the differences between the concentrations or the basic units of the previous year and those of the current year.

Results of Environmental Accounting

For the fiscal year 2001, the investment amount was 1,062 million yen and the expenditure amount was 47,191 million yen. Compared with the previous year, the investment amount decreased by 1,371 million yen, while the expenditure amount decreased by 1,773 million yen. On the other hand, the year-end acquisition costs were 137,804 million yen, an increase of 140 million yen from the previous year.

With regard to the benefits of environmental protection, we performed better than the previous year in almost all items of the 'business area benefits'. Among the 'upstream/downstream benefits', although the sulfur content of four oil products increased, the average of all oil products scored better than that of the previous year.

The sulfur content of kerosene increased from the previous year, but it is still far below the level of 0.008 volume percent, which is set by the JIS.

Tasks for the Future

This year, which is the second year of our environmental accounting, we focused on issues remaining from the previous year.

Public demand for the disclosure of environmental information will surely continue to grow in the future.

In response, the Cosmo Oil Group will conduct research on how environmental accounting can be used to assist management decision-making while fulfilling our obligations to stakeholders.

Furthermore, we will consider developing computer systems for environmental accounting to improve the accuracy and speed of compiling environmental accounting data.

Methods of Compiling Environmental Accounting Data

Measurement of Environmental Costs
Investment amount: Capital investment for depreciable assets which were acquired for the purpose of environmental protection
Expenditure amount: Current expense amount associated with environmental protection activities (including depreciation expense)
Changes: Changes from fiscal year 2000
[1] Business area costs
Global environmental conservation costs:
Costs associated with energy saving facilities and equipment such as co-generation facilities
Pollution prevention costs:
●Costs to prevent air pollution (sulfur recovery facilities, nitrogen oxide control facilities, etc.)
●Costs to prevent water pollution (wastewater treatment facilities, sour water treatment facilities, etc.)
Resource circulation costs:
Costs related to waste processing and recycling
[2] Upstream/downstream costs
Product environmental impact reduction costs:
Costs associated with producing products that are less damaging to the environment
●Product sulfur reduction costs:
Costs associated with reducing the emissions of SOx that are generated during product use by lowering the sulfur content in products
●Costs of substituting toxic substances in gasoline (benzene, etc.):
Costs associated with the reduction and substitution of toxic substances in gasoline such as benzene and lead
●Costs of aromatics reduction in petrochemical products:
Costs associated with the reduction of aromatics and olefins in raw materials of petrochemical products
[3] Management activity costs:
Costs incurred for employee environmental education, operation, and maintenance related to the environmental management system, maintenance of green spaces in business establishments, and the monitoring and measurement of environmental impacts
[4] Research and development costs:
Costs incurred for research and development related to environmental protection
[5] Social activity costs:
Costs incurred for compensation levied by the Pollution-related Health Damage Compensation Law
Measurement of Benefits of Environmental Protection
"Reduction benefit" and "Reduction": The 2000 value minus the 2001 value
[1] Business area benefits
●Concentrations/unit values: Environmental impacts per crude oil equivalent throughput
●Environmental impacts: Environmental impacts generated at business establishments
* Concentrations/unit values of Business area benefits do not include figures of Cosmo Matsuyama Oil, since no crude oil is processed at Cosmo Matsuyama Oil and therefore crude oil equivalent throughput cannot be calculated.
[2]Upstream/downstream benefits
Benefits of product environmental impact reduction through the sophistication of refining processes at refineries
●Concentrations/unit values:
Product sulfur reduction: Sulfur content in products
Benefits of substituting toxic substances in gasoline (benzene reduction in gasoline): Benzene concentration in gasoline
CO_2 emissions from product use: CO_2 Emissions divided by the production volume of petroleum products
●Environmental impacts: Potential environmental impact expected when the product is used, after the reduction of product environmental impacts at the oil refinery level
Product sulfur reduction: SOx emissions, calculated by multiplying the average sulfur content in products by their production volume
Benefits of substituting toxic substances in gasoline (benzene reduction in gasoline): Potential benzene emissions, calculated by multiplying the average benzene concentration in gasoline by its production volume
Benefits of aromatics reduction in petrochemical products: Aromatics in raw materials of petrochemical products reduced at business establishments
CO_2 emissions during product use: CO_2 Emissions, calculated by multiplying the CO_2 emission factor for the product, which is set by the Petroleum Association of Japan, by its production volume
* The actual SOx emissions are smaller than the potential SOx emissions, as the reduction of SOx emissions by the desulfurization unit at the time of customer use is not taken into consideration.
* Most suitable production methods are employed to strike a balance between costs and environmental protection, and thus the sulfur content of each product is well below the level set by the JIS.
* The figures include those of naphtha, although naphtha is used as a raw material for petrochemicals and fertilizers and thus SOx and CO_2 are not directly generated.

Environmental Accounting

Item	Environmental cost (million yen)			
	Investment amount		Expenditure amount	
	FY 2001	Changes	FY 2001	Changes
1 Business area costs	**203**	**– 390**	**10,911**	**– 232**
Global environmental conservation costs	1	– 29	6,494	14
Pollution prevention costs	185	– 220	3,794	– 157
Resource circulation costs	17	– 141	623	– 89
2 Upstream/downstream costs	**859**	**– 981**	**33,546**	**– 1,726**
Product environmental impact reduction costs	859	– 980	33,446	– 1,744
Product sulfur reduction costs	469	– 1,044	23,817	– 1,236
Gasoline	133	– 297	6,497	– 332
Naphtha	29	– 60	1,597	183
Jet fuel oil	16	– 35	1,296	77
Kerosene	82	– 180	4,116	– 600
Diesel fuel	116	– 255	5,935	– 586
Heavy fuel oil A	66	– 157	2,705	152
Heavy fuel oil C	8	– 30	780	– 159
LPG	19	– 30	891	29
Costs of substituting toxic substances in gasoline (benzene, etc.)	389	63	9,514	– 506
Costs of aromatics reduction in petrochemical products	1	1	115	– 2
Green procurement costs	0	– 1	100	18
3 Management activity costs	**0**	**0**	**452**	**22**
4 Research and development costs	**0**	**0**	**1,462**	**131**
5 Social activity costs	**0**	**0**	**820**	**32**
Total	**1,062**	**– 1,371**	**47,191**	**– 1,773**

Integrated Environmental Indicators and Environmental Productivity

As part of environmental accounting, we calculated integrated environmental indicators and environmental productivity on a trial basis.

Integrated environmental indicators are derived by using EPS, which is a commonly used method for integrating environmental impacts. The emissions from business establishments of SOx, NOx, benzene, COD, CO_2, and the emissions of SOx and CO_2, which are assumed to be generated at the time of customer use, are evaluated from a comprehensive standpoint.

Environmental productivity is the production volume divided by the integrated environmental impacts. Greater environmental productivity indicates that more is produced per given environmental impacts. Both types of indicators score better than those of the previous year.

Item	Benefits of environmental protection			
	Concentrations/unit value		Environmental impacts	
	Reduction benefit	FY 2001	Reduction	FY 2001
1 Business area benefits				
Benefits of reduction in resource input	(kL-crude oil/thousand kL)	(kL-crude oil/thousand kL)	(TJ)	(TJ)
• Energy input	0.24	9.42	1,350	66,724
	(kg/kL)	(kg/kL)	(thousand t)	(thousand t)
• Water input	−9	190	−1,854	37,010
Benefits of reduction in emissions and waste generation				
Release to atmosphere	(kg-CO_2/kL)	(kg-CO_2/kL)	(thousand t-CO_2)	(thousand t-CO_2)
• CO_2	0.91	26.62	139	4,862
	(g/kL)	(g/kL)	(t)	(t)
• SOx	1.3	25.4	223	5,478
• NOx	0.3	17.3	35	3,256
• Benzene	0.00	0.03	0.57	13.54
Release to water	(g/kL)	(g/kL)	(t)	(t)
• COD	0.09	0.72	14.5	130.6
Wastes	(g/kL)	(g/kL)	(t)	(t)
• Industrial wastes generated	33	301	5,715	53,584
• Industrial wastes recycled	−1	63	−173	11,204
• Industrial wastes disposed of	3	10	522	1,881
2 Upstream/downstream benefits				
Benefits of product environmental impact reduction				
Product sulfur reduction	(sulfur: mass %)	(sulfur: mass %)	(potential SOx emissions: t-SO_2)	(potential SOx emissions: t-SO_2)
Total	0.0636	0.4083	29,631	178,022
Gasoline	0.0003	0.0025	26	235
Naphtha	−0.0010	0.0271	−143	757
Jet fuel oil	−0.0081	0.0255	−215	501
Kerosene	−0.0006	0.0039	−31	225
Diesel fuel	0.0003	0.0409	88	3,433
Heavy fuel oil A	0.0617	0.4665	2,060	27,057
Heavy fuel oil C	0.0593	1.7546	27,847	145,811
LPG	−0.0001	0.0003	−1	3
Benefits of substituting toxic substances in gasoline	(volume %)	(volume %)	(t)	(t)
	0.0743	0.5401	4,006	30,595
Benefits of aromatics reduction in petrochemical products			(kL)	(kL)
			−1,736	3,652
	(t-CO_2/kL)	(t-CO_2/kL)	(thousand t-CO_2)	(thousand t-CO_2)
CO_2 Emissions from Product Use	0.018	2.5365	1,105	69,355

Economic Benefits

(million yen)

Item	Amount
Savings through energy reductions (savings through cogeneration)	2,067
Saving through catalyst recycling	22
Benefits from research and development	104
Total	2,193

●Measurement of Economic Benefits
Savings through energy reductions (savings through cogeneration):
Savings through cogeneration = Savings from steam generation + Reduction of electricity costs − Costs of fuels (LPG, heavy fuel oil, etc.)
Saving through catalyst recycling (reduction of waste management cost, etc.):
The costs avoided of purchasing new catalysts and of disposing of waste catalysts, through catalyst recycling
Benefits from research and development (income from royalties, etc.):
Income from royalties is the actual amount received, and savings from research and development are the costs avoided through the achievement of research and development.

Integrated Environmental Indicators

(Unit: thousand t-CO_2 equivalent)

Item	CO_2 equivalent using EPS	
	FY 2001	Reduction (compared with FY 2000)
Business Area SOx	166	7
NOx	64	1
Benzene	0	0
COD	0	0
CO_2	4,863	138
Business Area Total	5,093	146
Product Use Potential SOx emissions	5,394	898
CO_2 emissions from product use	69,355	1,105
Product Use Total	74,749	2,003
Business Area Total + Product Use Total	79,842	2,148

1. Weighting factor in EPS (CO_2 = 1): SOx = 30.3, NOx = 19.7 and COD = 0.00935
*EPS: Environmental Priority Strategies in Product Design Version 2000
(Centre for Environmental Assessment of Products and Material Systems, Sweden)

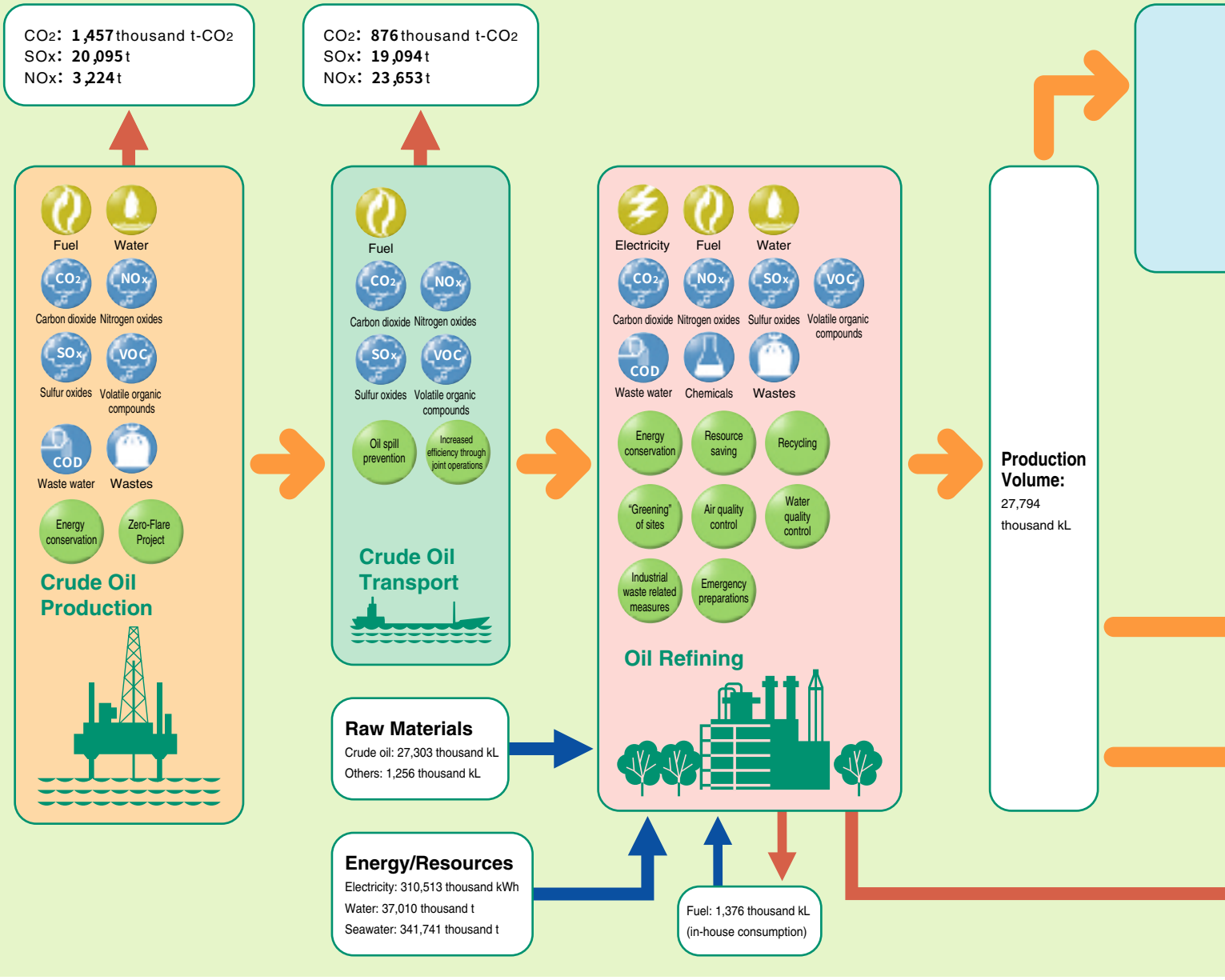
Environmental Productivity

(Unit: kL/t-CO_2 equivalent)

Item	Production Volume Per Unit of Integrated Environmental Impacts	
	FY 2001	Improvement (compared with FY 2000)
Business Area Total	5.457	0.124
Product Use Total	0.372	0.008
Business Area Total + Product Use Total	0.348	0.007

Quantification and Effective Reduction of the Environmental Impacts from Business Activities

Cosmo Oil is engaged in business activities throughout the life cycle of oil, from oil field development and production in the producing nations, to crude oil transport, refinement and product transport to service stations (SS). To be able to provide products that have less environmental impacts throughout their entire life cycle, including the consumption stage, it is important not only to work to reduce environmental impacts at each process, but also to assess what influence the activities in each process have on the

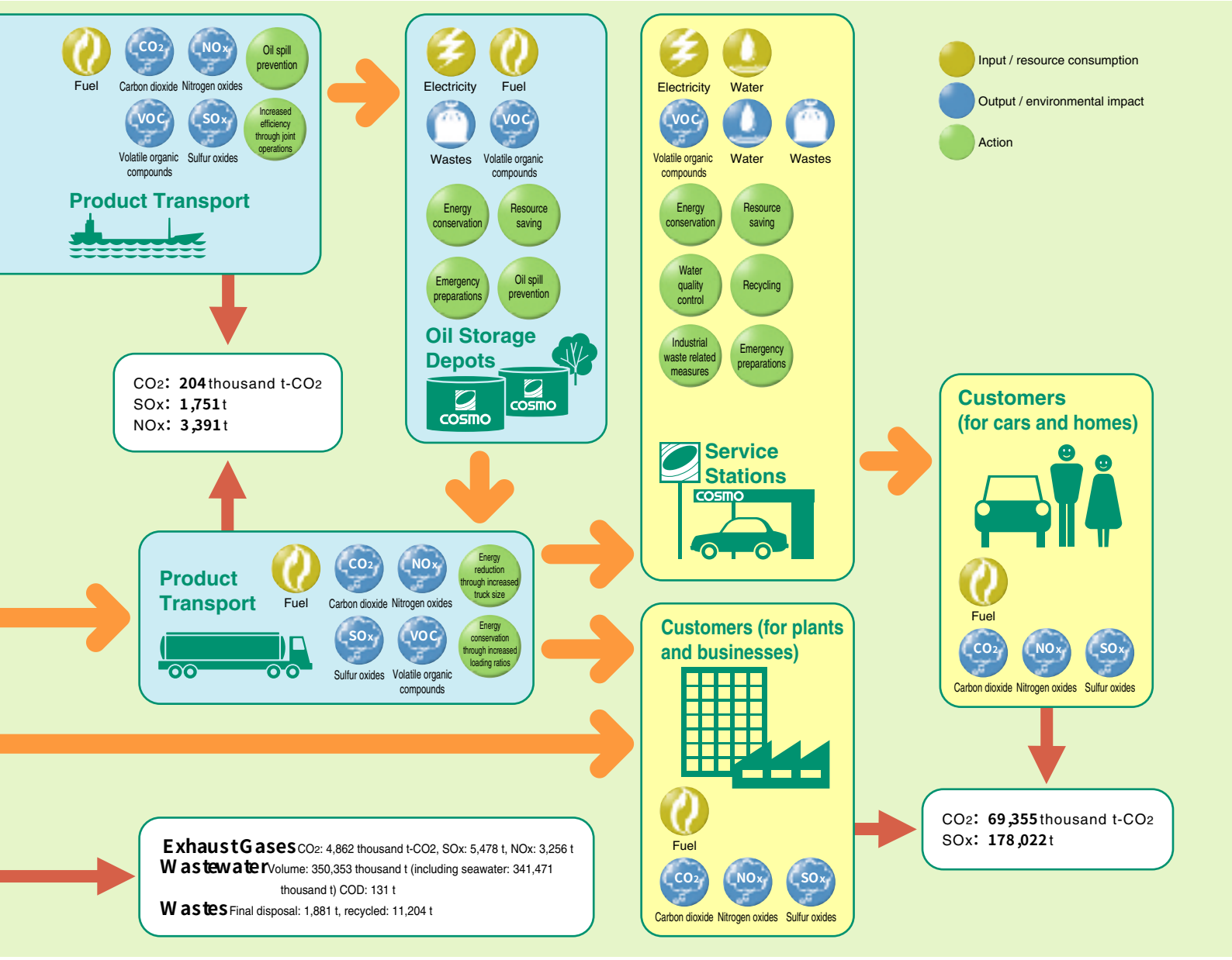


Life Cycle Inventory (LCI) of Oil

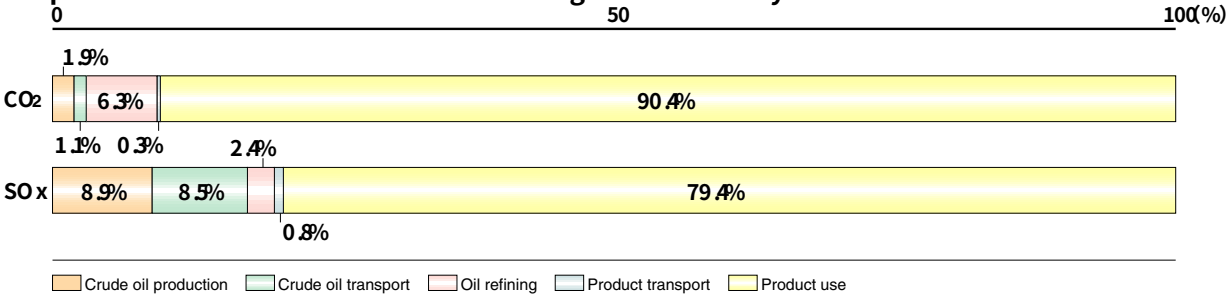
	Crude oil production	Crude oil transport	Oil refining	Product transport	Product use	Total
CO_2 emission (thousand t-CO_2)	1,457	876	4,862	204	69,355	76,754
SOx emission (t-SO_2)	20,095	19,094	5,478	1,751	178,022	224,440
NOx emission (t-NO_2)	3,224	23,653	3,256	3,391	—	—

- The figures are based on the production volume for FY 2001.
- The figures for "crude oil production", "crude oil transport" and "product transport" were calculated based on "LCI for Petroleum Products by Fuel and Environmental Impact Assessment for Petroleum Products", published in March 2000 by the Petroleum Energy Center.
- The figures for "oil refining" and for "product use" are based on the results of the environmental accounting. See "Environmental Accounting" for the method and basis for the calculation.
- Because the NOx emitted during "product use" is formed mainly from nitrogen in the air and products are used in a variety of forms, assessment of product-use NOx emissions is a difficult issue that remains to be addressed. Estimating the emissions of pollutants from oil storage depots and service stations also remains as a future task.
- Environmental impacts associated with plant construction are not included in the assessment.
- It should be noted that the environmental impacts of SOx or NOx such as photochemical smog and acid rain are regional impacts; therefore, unlike CO_2, they cannot be assessed uniformly on a global scale.

other processes. For instance, a large amount of energy is consumed at oil refineries during the advanced refining process for product sulfur reduction thereby increasing environmental impacts; however, this reduces environmental impacts occurring at the time of customer use. To support well-balanced, effective environmental protection activities, this year, we assessed the environmental impacts of each business process on a trial basis from a life cycle assessment (LCA) standpoint.



Proportions of Emissions of Pollutants throughout the Life Cycle of Oil



Stable and Secure Supply of Oil and Environmental Protection in Oil-producing Countries

Japan depends on imports of crude oil from abroad, largely from the Middle East. To ensure a stable supply of energy, Cosmo Oil has been developing the crude oil business in Abu Dhabi in the UAE (United Arab Emirates) since the 1960s and established Abu Dhabi Oil Co., Ltd. in 1968.

Crude oil from our independently developed oil field accounts for about 15 percent of the crude oil we process, which is a high level for Japanese-capital companies.

Relationship Development with Oil-producing Countries and Activities in Abu Dhabi Oil

Cosmo Oil Co., Ltd. has been developing relationships with oil-producing countries including Abu Dhabi in the UAE since 1960s, and the Chairman of Cosmo Oil currently serves as the vice president of the United Arab Emirates-Japan Society. We are actively engaged in personnel dispatching, technological services, and cultural exchanges as well as the promotion of international friendship.

Mr Yousef Omeir, CEO, and other members of Abu Dhabi National Oil Company (ADNOC) visited Japan in January 2002 and actively exchanged their views with Mr Okabe, Chairman of Cosmo Oil. Office of Abu Dhabi Oil

Abu Dhabi Oil, in which we hold a majority share (51.1%), is operated by a total of approximately 300 staff consisting of about 130 employees from 18 countries (including about 50 Japanese employees) and contract employees. It plays a central role in the local Japanese society and is actively promoting cultural exchange activities and a student exchange program. In addition, the company is working to create an HSE (Health, Safety and Environment) management system as well as to set up an emergency contact system and to improve disaster prevention equipment and facilities such as oil booms.

Office of Abu Dhabi Oil

Abu Dhabi Oil is working hard to protect the environment in the local community. The company is helping to "green" the region by planting mangroves and treating domestic wastewater with wastewater treatment equipment to be used for watering trees planted on Mubarraz Island.

Mangrove forest planted by Abu Dhabi Oil

Mangrove Planted in Mubarraz Island

1. Seeded year: 1983
2. Type: (1) *Avicennia marina* – Indigenous species of Abu Dhabi
   (2) *Rhizophora stylosa* – Indigenous species of Pakistan
   (3) Others
   Type (1) accounts for 95% of the mangroves planted.
3. Mangrove habitat:
   (1) Mubarraz Island: 7,385 square meters
   (2) Others: 2,445 square meters
4. Maximum tree height: approximately 5 meters
5. Maximum trunk diameter: approximately 10 centimeters

Zero-Flare Project: Achieving a Reduction in CO_2 Emissions of Approx. 200 Thousand Tons per Year

A familiar sight at oil fields around the world is the orange flame—the flare—of associated gas*1, which emerges during crude oil production, being burned in the atmosphere. This results in the airborne emissions of a substantial amount of CO_2 and other toxic substances.

Abu Dhabi Oil Co., Ltd. and its affiliated companies operate Mubarraz, AR and GA Oil Fields*2, and at the latter two of these oil fields, we started, in November 2000, the Sour Gas Reinjection Project, in which associated gas is reinjected into the earth. Through this project, the associated gas, which previously was burned off, is repressurized by a large compressor and reinjected into the reservoir, thus reducing emissions of SOx and CO_2. The reinjected gas increases the reservoir pressure thereby increasing crude oil recovery rates. This project not only helps to prevent air pollution in Abu Dhabi, but also contributes greatly to the prevention of global warming. The project was selected as the Supreme

***1 Associated gas**
The gas that emerges from the oil field during crude oil production. There are two types of gases: "sour gas" and "sweet gas". Sour gas refers to natural gas containing more than trace amounts of acid gas such as carbon dioxide and hydrogen sulphide.

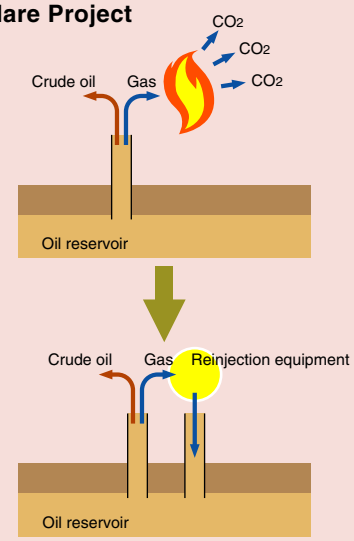
***2 AR and GA Oil Fields**
AR Oil Field: Umm Al Ambar Oil Field
GA Oil Field: Neewat Al Ghalan Oil Field
Abu Dhabi Oil operates Mubarraz, AR and GA Oil Fields and mixes the crude oil produced at these three oil fields to ship it as the "Mubarraz Blend". and GA Oil Fields and mixes the crude oil produced at these three oil fields to ship it as the "Mubarraz Blend".

Winner of the “2000 ADNOC HSE Award” presented by the Abu Dhabi National Oil Company.

The Mubarraz oil field, which started the reinjection of associated gases in May 2001, is the third oil field at which we have achieved zero-flare operation following the AR and GA oil fields. As a result, we succeeded in reducing CO_2 emissions by approximately 200,000 tons per year.

Production at the Abu Dhabi Mubarraz Oil Field

Zero-Flare Project



Safe, Energy-saving Ocean Transport of Crude Oil: Promoting Double Hulls for Oil Tankers

Crude oil is transported from the Middle East to Japan by tanker. A VLCC (Very Large Crude Carrier) tanker with a capacity of over 200 thousand tons can transport enough crude oil to power the nation for one-third of a day by each trip, which takes approximately 20 days.

The top priority in our tanker operations is safety. Selected and experienced crews operate our VLCCs and the ships have state-of-the-art equipment including collision avoidance controllers to ensure safe passage in dangerous waters and are well-prepared for severe weather.

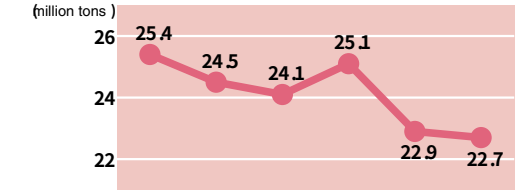
To respond to the unlikely occurrence of an accident resulting in oil spills, we have been switching to oil tankers with double-hulls since 1998. The double-layered hulls provide double protection against oil spills. As of March 31, 2002, four out of 12 term-charter vessels were double-hulled. In addition, we pay careful attention to the protection of the ocean environment by taking measures such as ensuring the use of oil booms during the loading and unloading of oil tankers.

Double-hull tanker which prevents oil spills

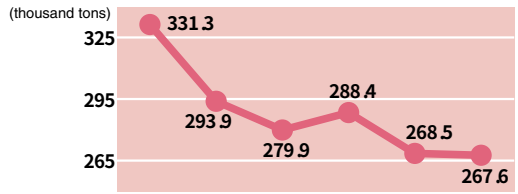
To reduce energy consumption during transport, we are shifting to larger vessels and improving the efficiency of tanker operations. The use of VLCCs has resulted in a 10 percent reduction in the fuel used per volume of transported crude oil compared to FY 1996 levels. To increase the efficiency of tanker operations, Cosmo Oil, together with Nippon Mitsubishi Oil Corporation (presently, Nippon Oil Corporation), founded Nippon Global Tanker Co., Ltd. in November 2000, aiming at joint tanker operations. By drawing on advantages of scale, the new company provides increased efficiency in ships and operations, as well as reduced fuel consumption.

Term-charter VLCC Fuel Consumption

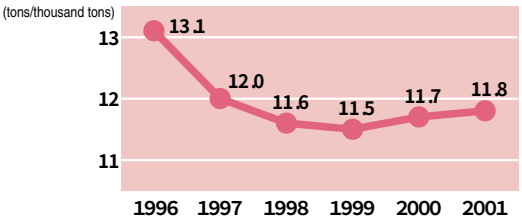
Total Amount Transported



Total Fuel Consumption



Fuel Consumption per Thousand Tons Transported



The Production of Products with Less Environmental Impacts Through the Efficient Use of Energy

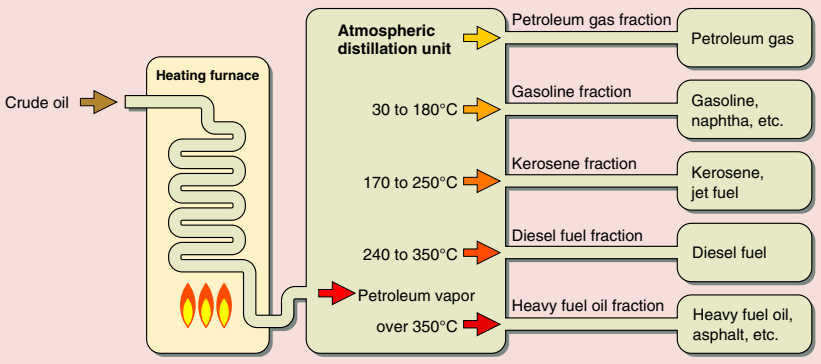
The crude oil transported from the Middle East and other areas is refined in oil refineries in order to produce petroleum products including gasoline, kerosene, and diesel fuel.

The oil refineries are equipped with heaters, boilers, and other facilities. When these facilities burn fuel oil and petroleum gas, a byproduct of refining, to obtain energy required in the refining processes, CO_2, SOx (sulfur oxides), NOx (nitrogen oxides), and other gases are released. Cosmo Oil is working to use energy efficiently to reduce CO_2 emissions, and to reduce SOx and NOx emissions*1. We are also working on the reduction of water use during the refining process, the appropriate treatment of wastewater, and the reduction of industrial wastes*2.

Cosmo Oil strives to reduce the environmental impacts occurring throughout the life cycle of our products not only by reducing the impacts from the refining processes themselves but also by employing advanced refining processes to reduce the environmental impacts from product use*3.

*1 See pages 19 and 20.
*2 See page 21.
*3 See pages 22, 27 and 28.
*4 **Flue gas denitration unit**
A unit that removes NOx from exhaust gases. Ammonia and a catalyst are used to reduce the gas, or absorption solutions are used to absorb the gas.

Mechanism of Atmospheric Distillation Unit



Petroleum Refining Process

1. Crude oil is heated to the boiling point of the various desired materials and divided into fractions.
   ⇨ Distillation (atmospheric distillation, vacuum distillation, etc.)
2. Fractions are purified by eliminating sulfur, nitrogen and metals.
   ⇨ Desulfurization (hydrodesulfurization unit)
3. The purified fractions are processed to provide added value.
   ⇨ Conversion (catalytic reforming)
   ⇨ Cracking (catalytic cracking)
4. The fractions (base materials) are mixed according to market needs.
   ⇨ Blending (gasoline mixing unit, fuel oil blending unit, lubricating oil mixing unit)

Promotion of Efficient Energy Use to Prevent Global Warming

Cosmo Oil set up energy conservation task teams at the headquarters and at four oil refineries in 1997 and has been developing and implementing effective measures to save energy.

One of such measures taken so far is the introduction of cogeneration systems. With cogeneration systems, electricity is generated at each oil refinery, thereby reducing energy loss in transmission and enabling the efficient use of energy by producing steam using the exhaust heat from power generation. The amount of power provided by the cogenerators operating at our refineries is 39,500 kW at Chiba Oil Refinery, 17,500 kW at Yokkaichi Oil Refinery, and 17,000 kW at Sakai Oil Refinery.

By improving existing facilities and by precisely controlling their operations, a further reduction in CO_2 emissions can be achieved. Cosmo Oil is promoting the horizontal implementation of energy conservation activities at our refineries. The achievements in our activities in FY 2001 include the following: Efficient use of the off-gas from the naphtha hydrodesulfurization unit (Chiba Oil Refinery); Modification of the heat exchanger installed in the atmospheric distillation unit resulting in a reduction in the heat load on the heating furnace (Yokkaichi Oil Refinery); and Improvement in the efficiency of the rotating machine resulting in a reduction in the power required (Sakaide Oil Refinery). We are planning future capital investments in facilities such as the installation of the second cogenerator at Yokkaichi Oil Refinery.


Cogeneration facility at the Chiba Oil Refinery

Preventing Air Pollution with Flue Gas Desulfurization and Vapor Recovery

We are reducing emissions of SOx and NOx gases by using fuels that are low in sulfur and nitrogen for our oil refineries' heaters and boilers. In addition, low-NOx burners are used to reduce the thermal NOx formed when atmospheric nitrogen and oxygen react during combustion, and flue gas desulfurization and denitration units*4 have been installed to remove SOx and NOx from flue gases. Electric precipitators are also used to eliminate fine particles from exhaust gases.


Fuel gas denitration unit which removes NOx from exhaust gases

Through these actions, the levels of SOx and NOx emissions from Cosmo Oil's four oil refineries have all met the local emissions control standards*1.

For gasoline tanker trucks, the release of hydrocarbon vapors*2 into the atmosphere during loading is prevented through the installation of vapor recovery units.

Vapor recovery unit that prevents the release of hydrocarbon vapors into the atmosphere

Effective Use of Water Resources and Prevention of Water Pollution

Seawater and industrial water are used in the oil refining processes. After being used for washing and other refining processes, the resulting process wastewater*3 is processed in the oil-water separation unit to remove oil, and then undergoes active sludge treatment and other processes to prevent water pollution. Cosmo Oil conserves water by recirculating industrial water for cooling.

Wastewater treatment unit

Promotion of Waste Reduction through Volume Reduction and Recycling

The major industrial wastes generated at oil refineries are the spent catalysts from the refining process and the sludge from the wastewater treatment process.

Spent catalysts are reactivated for reuse or processed for metal recovery. Otherwise, they are recycled as a raw material for cement. This reduces both the amount of waste and the costs for new catalyst purchases.

To reduce the volume, sludge is first dehydrated and then incinerated in incinerators that meet the dioxin emission regulations before disposal.

Safety and Emergency Measures

Oil refineries handle large quantities of combustible materials. Therefore, the head of the refinery serves as the chairman of the safety and health committee, which plans preventive safety measures for transportation, the construction of facilities, and general operations and administration. Our ongoing systematic safety control efforts help us meet the targets set for each year. We are making further efforts in voluntary safety measures by strengthening safety management at our oil refineries that have been in place since January 2001.

Detection of problems at an early stage is crucial to prevent accidents and disasters. Along with the installation of fire alarms and gas detection units, careful patrols are carried out at our oil refineries to immediately detect unusual conditions.

In preparation for any fire emergencies within our oil refineries, heavy-duty chemical fire engines are on standby and an internal fire brigade has been established, with ongoing comprehensive disaster drills and reporting training being carried out. We also strengthen local protection against disasters by establishing joint emergency systems with neighboring industrial complexes and by conducting joint training with public organizations.

Company fire brigade at oil refinery

Comprehensive emergency drill

To take precautions against oil spills from tankers, oil booms*4 are laid on the surface of the sea during shipping operations.

Other preparations against widespread ocean pollution that may be caused by large-scale oil spills include participation in the Petroleum Association of Japan's Oil Spill Cooperative Organization (POSCO). We bear partial responsibility in its mutual support system by setting up and maintaining a base for oil spill prevention materials and facilities at the Yokkaichi Oil Refinery.

Oil boom (in stored position)

*1 See pages 45-50.

***2 Hydrocarbon vapor**
The gasified form of light hydrocarbons.

***3 Process wastewater**
Wastewater containing oil discharged from refining facilities.

***4 Oil boom**
A boom that rides on the surface of the ocean, preventing the spread of spilled oil. It is towed into place by a tugboat or other vessel.

Improving Efficiency and Conserving Energy by Shifting to Larger Tanker Trucks and Ships

Petroleum products are transported by tanker trucks and domestic tanker ships from oil refineries to nationwide service stations, oil storage depots, and factories of major customers. Cosmo Oil has long been engaged in a variety of activities to increase efficiency and save energy, including shifting to larger tanker trucks and ships, and consolidating and closing oil storage depots or sharing them with other companies. We set a target of a nine percent reduction in fuel consumption from FY 1990 levels by 2010 for both land and sea transport and are already well ahead of this target.

We request the companies that jointly operate tanker trucks to conduct safety training and fatigue testing of their employees and to upgrade their tanker trucks; we commend those who make a contribution to the safety of transport.

Efficient Land Transport

Energy conservation is being achieved in land transportation through a shift to larger vehicles, longer operating hours, and a reduction in the number of vehicles used. The operating hours of each truck have been improved by increasing the nighttime, Sunday, and holiday deliveries made, while reducing the number of vehicles by 59 (10.1 percent) in FY 2001. These efforts resulted in reduced fuel consumption in FY 2001, a reduction of 16.8 percent from the FY 1990 figure.

We will continue to work hard to reduce energy consumption by further increasing loading ratios, expanding night deliveries, and improving delivery efficiency.

Large-sized tanker truck

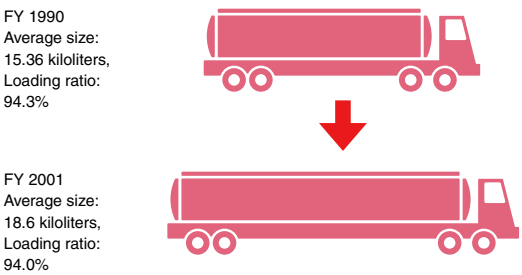
Efficient Ocean Transport

Several thousand-ton tankers are used for transport of petroleum products from oil refineries to distribution bases, oil storage depots, and other destinations. We have achieved a 15.3 percent reduction in fuel consumption compared with FY 1990 through shifting to larger vessels and improving loading ratios and rate of operation.

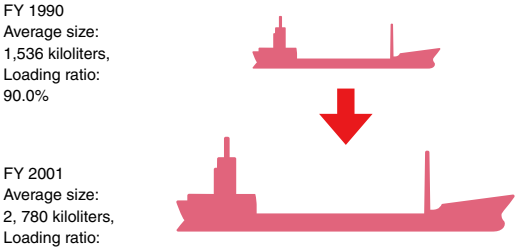
Cosmo Oil will continue to promote the elimination of mismatches in vessel allocation and the increase of cargo handling at night and on holidays as well as the shift to larger tankers by the joint use of oil receiving terminals, making the most of our alliance with Nippon Oil Corporation.

Large-sized tanker

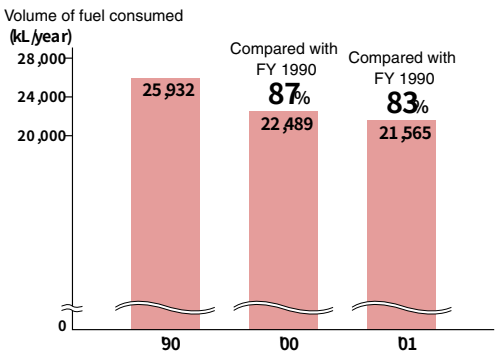
Average Size of Tanker Truck and Loading Ratio



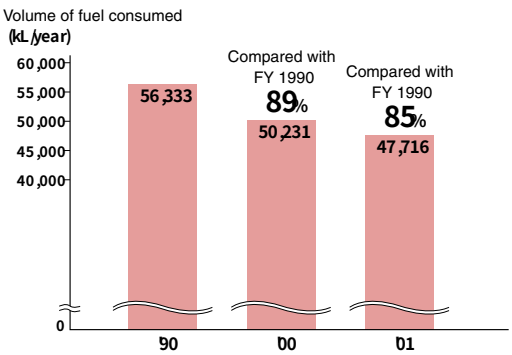
Average Size of Domestic Tanker and Loading Ratio



Fuel Consumption by Tanker Truck



Fuel Consumption by Tanker



Service Station Management to Win the Support of Green Consumers

Cosmo Oil's approximately 5,500 service stations around the country are visited by a great number of customers every day, making them truly the "face" of the Cosmo Oil Group. With environmental issues coming increasingly to the forefront, a new way of service station management is required which will ensure the fulfillment of obligations as a member of the local community as well as attach importance to environmental protection. Cosmo Oil has been conducting a variety of activities such as the introduction of environment-friendly uniforms and solar power panels, the implementation of anti-pollution and waste reduction measures, and the development of "Cosmo the Card Eco"*1 for encouraging environmental protection activities in cooperation with customers. We strive to create service stations that win the support of customers.

Creating Service Stations in Harmony with the Environment

Cosmo Oil developed a complete set of environment-friendly uniforms (except for sneakers) made from over 50 percent recycled PET plastics. The uniform, a first for the oil industry, was certified as an Eco Mark product in December 2001 and has been introduced to our service stations since May 2002.

In addition, to reduce CO_2 emissions, we are conducting a joint research project with NEDO (New Energy and Industrial Technology Development Organization) and installed solar panels, as a part of this project, in ten of our service stations in November 2001. These ten service stations are expected to save a total of approximately 170 thousand kWh of energy consumption annually and reduce CO_2 emissions by approximately 63 tons.

Environment-friendly uniform certified as an Eco Mark product

Anti-pollution and Waste Reduction Activities

At our service stations, a variety of measures have been taken for many years to prevent environmental impacts in the surrounding neighborhoods, taking into account the fact that there are stations that are located in urban areas.

To prevent water pollution, oil/water separation units have been installed in all of our service stations. There is always the possibility that wastewater from car washing or cleaning will contain some oil, so all water is collected into the oil separation tank and treated to separate the oil.

Oil-water separation unit, where oil is removed from water and water pollution prevented

For the prevention of air pollution, we continue to expand the use of hydrocarbon vapor collection units in wholesale gasoline sales activities.

For the reduction of waste, the need to separate garbage has been well established; cloth, bottles, and cans are carefully separated according to local rules. Used tires and other materials are recycled. Suitable treatment methods have been found for plastic chemical containers to meet the Containers and Packaging Recycling Law. The "manifest system*2" is being applied to strictly confirm the condition of waste materials up to the final treatment stage.

Activities to Ensure Safety

To raise awareness of accident prevention, safety measures and environmental concerns, we prepared the "Service Station Facilities Operation Manual" which features measures to meet regulatory requirements, safety and maintenance of facilities, disaster and crime prevention, emergency response, approach to environmental issues and communication with the local community. The manual has been distributed to all of our service stations. We send our supervisors to service stations to provide guidance to the staff in accordance with the manual.

Poster prepared by the Fire Defense Agency and Petroleum Association of Japan

Regarding fire prevention at our self-service stations, we have installed electrostatic discharge systems and displayed posters to advise customers of precautions to prevent fire.

***1** See page 37.

***2 Manifest system**
From 1998, all industrial waste generators are required to keep records of waste until final disposal. The industrial wastes that are generated from service stations include lubricating oil, metal trash, discarded plastics, tires and rubber waste, glass, acids, and spent alkali.

Resource and Energy Conservation Efforts at Offices

The headquarters, branches, and oil refinery offices of Cosmo Oil have long been engaged in activities to reduce environmental impacts such as the promotion of green procurement, the reduction of paper use, the encouragement of recycling, and energy conservation.

Cosmo Oil believes that environmental protection activities at our offices, including the strict separation of garbage, fosters environmental awareness among our employees and also increases business efficiency.

Advancing the Paperless Office through PC Use

The Cosmo Oil Group has been working for many years to save paper by building computer networks. The computer networks are used for making business contacts, proposals and suggestions, and for sharing materials. This has resulted in a drastic reduction in the number of meetings as well as the amount of paper materials needed for them. We also make other detailed efforts such as the encouragement of double-sided printing.

We will continue to implement effective measures with a view to both increasing business efficiency and reducing environmental impacts.

Promoting the Purchase of Recycled Paper and Environment-conscious Products

Since FY 1998, all copy paper and other papers for in-house use have been made from 100 percent recycled material. Business cards are made from kenaf.

We also have been promoting environment-friendly or “green” purchasing of office supplies. In addition to binders, sticky notes, and file folders that were purchased in FY 2000, highlighter pens and correction tapes were replaced almost entirely by environment-conscious products in FY 2001.

We will continue to actively promote the green purchasing of office supplies and equipment.

Documents printed on recycled paper and business cards made from kenaf

Promotion of Recycling

Cosmo Oil is working in a variety of ways to reduce the amount of garbage, by recycling stationery such as ballpoint pens, files, and copy machine toner cartridges.

Recycle bins have been set on all office floors to encourage the separation of paper wastes.

Offices of our oil refineries promote recycling of waste paper. As for newspapers, magazines and cardboard, 100% of them are being recycled. The amount of waste paper collected at our four oil refineries reached about 100 tons in FY 2001.

Recycle bin

Promotion of Energy Conservation

From August 2001 through March 2002, personal computers used in Cosmo Oil Group companies were replaced and 2,600 personal computers, which have a low standby power requirement, are now being used.

Education and Training: Respect for Human Rights as a Basic Principle of our Business Activities

Peace, human rights, and the environment are often cited as the key issues for the 21st century. In order to achieve our management goal, which is to become a "Cosmo Oil network that is truly valued by the customer", we are building a strong, kind, and positive company through employee education and training based on respect for human rights.

Human Rights Enlightenment

To maintain and develop the corporate culture that respects human rights, the Cosmo Oil Group has improved its human rights education program. We conducted training programs for all employees at headquarters, the eight branches, four refineries, one research laboratory, and 12 affiliated companies: the programs covered the basic idea of human rights, common human rights issues and what discrimination is. A total of 1,388 employees attended this program. We will continue to improve our education programs and enlightenment activities to raise awareness and interest in the issue, as it is essential to address discrimination with correct knowledge as ignorance can lead to further discrimination.

Activities in Response to the Equal Employment Opportunities Law

Since 1999, we have been conducting sexual harassment training as part of our ongoing human rights education program. Sexual harassment clauses have been included in labor agreements and office regulations.

Environmental Education and Enlightenment

To effectively promote environmental activities, all employees need to change their attitudes. Environmental protection can be achieved only if each one of us changes the way we think about the issue.

In FY 2001, we produced and distributed videos entitled "Cosmo Oil Environmental Report Vol. 2: Solomon Islands and Papua New Guinea", "Energy and Environmental Challenges", and "Global Environment from the Developing Countries' Viewpoint". We also organized an environmental research presentation meeting to announce the result of the "Case Research on Industrial Waste Reduction Activities in Overseas Oil Refineries" conducted by Cosmo Research Institute. At oil refineries, we provided environmental education for oil refinery employees and employees of related companies.

Personnel System

The Cosmo Oil Group's personnel system is based on two evaluations: the performance evaluation in which employees are evaluated on the basis of results and the process to achieve them; and the competency evaluation to evaluate how an employee demonstrated the required competency. Before target setting or evaluation, managers and the staff discuss and reach an agreement in order to ensure a fair evaluation and to help employees make autonomous decisions. A flexible promotion system has been established by simplifying the grading system.

Support for Retired Employees

Cosmo Oil conducts a "Life Planning Program" to provide guidance for a smooth transition to a post-retirement life on a personal level. The program provides support for retirement planning, mainly regarding household financial planning and lifestyle maintenance using a public assistance system. We organize "Koyukai", clubs for retired employees, in various regions and promote friendship and information exchanges between the members.

Improving Satisfaction of Many Customers

The Cosmo Oil Group has introduced “Cosmo the Card Eco” to encourage environmental protection activities in cooperation with customers and to improve customer satisfaction through a variety of activities including better two-way communication.

Promotion of Environmental Protection in Cooperation with Customers through “Cosmo the Card Eco”

“Cosmo the Card” is Cosmo Oil’s independently issued and managed credit card, with some 1.85 million cards now issued. In response to the increasing environmental awareness of customers, we additionally introduced “Cosmo the Card Eco” in FY 2001*1 (issued as of April 1, 2002).

Customers donate 500 yen when they obtain the “Cosmo the Card Eco” membership and then make a donation of the same amount annually from the second year of the membership. Cosmo Oil on its part donates a percentage of credit card sales together with the donation received from the members to NPOs, charitable organizations, and other organizations that conduct environmental protection activities. The donations are used for a rainforest conservation project in Papua New Guinea and environmental protection activities in Mt. Fuji, Shirakami Mountains, and Yakushima Island.

Cosmo the Card Eco

To make it easier for customers with high environmental awareness to use the Electronic Toll Collection (ETC) system*2, we led the way in the marketplace with the release of the “ETC Cosmo the Card”. ETC allows drivers to pass through tollgates without stopping, thereby reducing traffic jams while reducing CO_2 and other exhaust gases.

ETC Cosmo the Card

Caring for Handicapped Customers

There are estimated to be some 30 thousand hearing-impaired drivers in Japan; therefore, Cosmo Oil introduced “SS Order Card for the Hearing Impaired” to enable them to purchase fuel at service stations more easily. The card was inspired by a suggestion from one of our employees with hearing difficulties.

Order Card
“Order Card” is a small whiteboard. Regular order of the cardholder is marked with stickers and other orders are entered on the board using a special pen for whiteboard.

***1** A total of 38,142 members as of 31 August 2002

***2 Electronic Toll Collection (ETC) System**
An automatic, radio based system for the automatic payment of highway tolls. A special ETC card and in-car equipment are required.

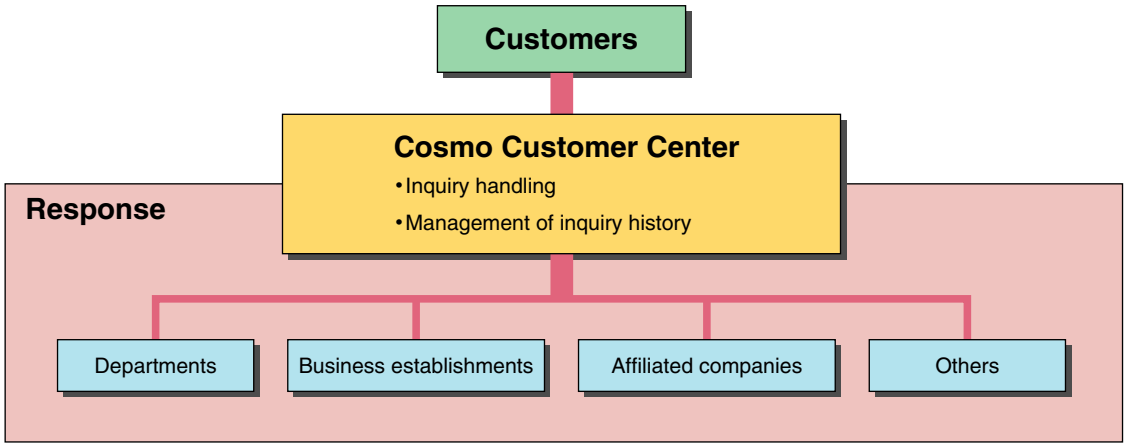
To Develop Customer Confidence: Cosmo Customer Center

In October 2000, Cosmo Oil established the new Cosmo Customer Center for handling customer requests and comments to promote two-way communication, and created a system to take customers' opinions into consideration for our business management.

An average of 180 contacts are received monthly via the toll-free telephone line and e-mail: They are questions (57%), complaints (23%), requests (17%), and other contacts (3%).

Cosmo Customer Center will continue to improve the speed and quality of our service in order to maintain and foster customer confidence.

Cosmo Customer Center
URL: http//www.cosmo-oil.co.jp
Toll-free telephone number:
0120-530-372
(domestic call only)



(Case 1)

From a customer to Customer Center	From Customer Center to Special Agent B through a branch	From Customer Center to the customer
"I left my car at a service station to have it fueled and washed. When I came back later to pick it up, I realized that my car had been fueled, washed, and carefully repaired where needed. I knew that the car needed repairing, so I was very impressed by their attentive service."	The Customer Center reported to the special agent B and the service station about the "thank-you e-mail". They replied that they would continue to work hard to improve their service.	The Customer Center contacted the customer to express appreciation for the "thank-you e-mail" and reported that the Center had passed the message to the special agent and service station.

(Case 2)

From a customer to Customer Center	From Customer Center to Special Agent D through a branch	From Customer Center to the customer
"We asked a service station to take care of some litter I had in the car, but they refused. I am greatly concerned about the quality of Cosmo's service."	The Customer Center verified the customer's report and learned that service stations do not take care of (dispose/separate) customers' litter in the area the service station was located for environmental concerns. It transpired that a service station staff had actually offered to take care of empty cans as the customer had gathered up all litter in the car, but the customer was not happy about the offer.	The Customer Center apologized for the unpleasant experience the customer had and reported that they had instructed the special agent and service station to improve their attitude toward service. The Center also asked the customer to understand that litter collection at service stations depends on the circumstances in each area.

Social Action Programs as a Global Citizen

Recognizing that Cosmo Oil operates in an industry that creates environmental impacts through business activities and the customer use of petroleum products, we are engaged in environmental social action programs. We are also involved in projects with local communities near to oil refineries.

These programs are mainly in the areas of international contribution, environmental protection, and motorized society, based on our three policies: long-term commitment irrespective of business performance, employees' voluntary participation, and Cosmo Oil's originality.

Tropical Rainforest Conservation Project for the Prevention of Global Warming

Environmental problems are a global issue that require global enlightenment and support. Cosmo Oil has been promoting the "Tropical Rainforest Protection Project" since April 2001 as part of our international contribution activities.

Currently, slash-and-burn farming is practiced in Papua New Guinea and the Solomon Islands in the South Pacific Ocean. The slash-and-burn plots are abandoned when soil nutrients become depleted, and so more forests are cleared and burned to cultivate new sites. The loss of rainforests not only leads to a decrease in CO_2 sinks but also reduces biodiversity and triggers major natural disasters such as mudslides.

We are contributing to conserve tropical rainforests and to solve the food problem by providing technical assistance through close coordination with local government agencies and NPOs in order to support the transition from slash-and-burn farming to settled farming. Our research revealed that although rice has been cultivated on a small scale, the transition to rice farming has been difficult as rice-milling equipment was not available.

Donation of a rice mill plant in Papua New Guinea

We therefore donated a rice mill plant and rice-milling machines. We will continue to provide the most appropriate support according to the local circumstances.

Environmental Protection through the Earth Conscious Act

The Earth Conscious Act is an FM-based activity supported by a partnership between Cosmo Oil along with Tokyo FM and other 36 JFN (Japan FM Network) stations that has been appealing to the people of the world to protect the global environment.

Cosmo Oil also supports the "clean-up climb of Chomolungma" project carried out by Ken Noguchi, an alpinist.

Supporting the "clean-up climb of Chomolungma" project carried out by Ken Noguchi

●The Cosmo Earth Conscious Act: A Message from One Million People

This is an FM radio program presented by Tokyo FM and JFN that features "earth conscious" messages such as "thoughts for the earth" from people who are engaged in environmental protection activities in many different areas and interviews with artists about "environment-friendly activities in everyday life." The program also features messages about environmental protection from listeners. It is aired on Monday to Friday from 6:51 to 6:54 am (FM OSAKA: 7:29–7:32 am, FM FUKUOKA: 6:00–6:03 am).

Poster for "Earth Conscious Act"

●Earth Day Concert

To spread the message, "Earth Conscious; we love music, we love the Earth", Cosmo Oil sponsors the Earth Day Concert held at Nihon Budokan on the Earth Day, 22 April. The concert is broadcast on 37 JFN stations, radio stations in countries throughout

the world, and the web. CHAGE & ASKA appeared in the 13th Concert held in April 2002 and sent their message to the world.

The Earth Day Concert held in April 2002

●Clean Campaign*

Cosmo Oil ran a campaign called the "Clean Campaign" at 40 historical sites throughout Japan. A total of 25,000 people participated in the campaign and collected about 300,000 liters of garbage. This activity was broadcast on the radio. In addition, we organized a special project in which 150 listeners were invited to go "clean-up" climbing Mt. Fuji with Ken Noguchi. In FY 2002, we have diligently carried out "Clean Campaigns" in the mountains, sea, and rivers throughout the country in order to protect the nature.

Clean Campaign

●The Picture Book: "Bua Forest"

"Bua Forest", a picture book, was written by Kiri Segawa who is a children's storybook writer. The book was illustrated by Kiyoshiro Imawano, who appeared in the Earth Day Concert in 2001. The book was initially created as a give-away; however, since it attracted great attention, it went on sale during Earth Day in 2002.

"Bua Forest": a picture book to encourage children to think about environmental issues

Support for Traffic Accident Orphans

Every year, about 9,000 people are killed in traffic accidents in Japan, causing about 3,000 children to become orphaned. Cosmo Oil has been organizing and sponsoring "Cosmo Waku Waku Camp", a two and a half day program, to give a nature-based experience to traffic accident orphans every year since 1993. Special holidays are granted to employees who participate in this program.

"Cosmo Waku Waku Camp"

Local Contributions by Oil Refineries

As a member of the local community, our oil refineries are engaged in the following activities to contribute to the local community.

Chiba Oil Refinery:

Cleaning outside the refinery, youth baseball tournament, tennis tournament, participation in eco-fair, etc.

Yokkaichi Oil Refinery:

Cleaning outside the refinery, junior soccer school, women's soft volleyball tournament, etc.

Sakai Oil Refinery:

Cleaning outside the refinery, tennis school, blood donations, opening of facilities, etc.

Sakaide Oil Refinery:

Sport promotions, softball tournament, etc.

Exchange event between our oil refinery and the local community. "Cosmo Oil Women's Soft Volleyball Tournament" was our 19th tournament.

* See http://www.tfm.co.jp/earth for details.

Technological Assistance and Technology Transfer to Help Solve Environmental Problems in Developing Countries

We are disseminating technologies for environmental protection, energy conservation, and safety management to prevent environmental pollution in developing countries by using the human resources and technologies within the Cosmo Oil Group.

Our main activities include the conduct of domestic and international training programs funded by the Japan Cooperation Center, Petroleum (JCCP), long- and short-term dispatches of our specialists through the Japan International Cooperation Agency (JICA), and technical cooperation for the investigation of projects through the New Energy and Industrial Technology Development Organization (NEDO). The Cosmo Oil Group conducts these activities in close partnership with governmental organizations.

Recent International Activities

• Model Project at Indonesian State Oil Company

Cosmo Oil, in cooperation with Cosmo Engineering Co., Ltd., conducted a feasibility study on a "Model Project for Improvement of Energy Efficiency" entrusted by NEDO at Indonesia's state-owned oil company in FY 2000-2001.

The results revealed that approximately 110 thousand tons of fuel consumption could be saved per year by flare gas recovery and hydrogen recovery from off-gas at the Balikpapan Oil Refinery run by the Indonesian state oil company.

Cosmo Engineering Co., Ltd. concluded a contract with NEDO to undertake the construction work for the project based on the study results (the planned construction period is three years from FY 2002). This is one of Japan's greenhouse gas reduction projects that are implemented in overseas countries with technologies and funds provided from Japan. While promoting energy conservation projects in host countries, the project will also earn emission credits equivalent to the amount of greenhouse gases reduced.

At Indonesian State Oil Company after the signing ceremony

• Energy Conservation Study at Isfahan Oil Refinery (Iran)

Cosmo Oil, entrusted by NEDO, carried out an energy conservation study at Isfahan Oil Refinery in cooperation with Niigata Engineering Co., Ltd. in FY 2001. A field investigation estimated that an annual reduction of 130 thousand tons of fuel consumption could be achieved by revamping the existing crude oil atmospheric distillation unit, catalytic

Meeting for the energy conservation project at Isfahan Oil Refinery

FY 2001 Training Results (Training on environmental protection technology, energy conservation technology, and safety management)

	Number of training courses	Number of persons	Country
Hosted trainees	7	53	China, Iran, Mexico, South Korea
Dispatched trainers	5	15	China, Iran, Thailand, Indonesia

Long-term Dispatch of Specialists (Training on environmental protection technology, energy conservation technology, and safety management)

Country	Training	Period	No. of specialists
Mexico (Safety Training Center)	Safety management technology	Jan 99 to Nov 01	1
Egypt (Egyptian Environmental Monitaring Center)	Water pollution analysis technology	Jul 99 to Jul 01	1
Egypt (Egyptian Environmental Monitaring Center)	Water pollution analysis technology	Aug 01 to Aug 02	1
Chile (National Environmental Center)	Industrial wastewater quality analysis technology	May 00 to May 02	1

Dispatch of Specialists for the NEDO Entrusted "Basic Survey Project for Joint Implementation, etc."

Country	Subject	Period	No. of specialists
Iran (NIORDC)	Energy conservation at Isfahan Oil Refinery	Sep 01 to Mar 02	6
Thailand (Bangkok Synthetics Co., Ltd.)	Utilization of waste gas from petrochemical complexes	Aug 01 to Mar 02	5
Myanmar (MPE)	Tanlin Oil Refinery energy conservation	Aug 01 to Mar 02	1

Dispatch of Specialists for the NEDO Entrusted "Model Project for Improvement of Energy Efficiency"

Country	Subject	Period	No. of specialists
Indonesia (Pertamina)	Energy conservation at oil refinery	Oct 01 to Mar 02	2

Active Disclosure of Information to Gain Social Acceptance

To be a company that is trusted by its stakeholders, customers, shareholders and investors, the local community, government organizations, and its employees, Cosmo Oil actively discloses information not only on our business activities but also on our environmental activities and social action programs.

Spreading Messages on Environmental Protection

Continuing from FY 2000, we broadcast television commercials, which contain Cosmo Oil's environmental message and an outline of the "Zero-Flare Project"*1, in order to deepen public understanding of our activities. A video clip of the commercial was presented at an exhibition held in Abu Dhabi in the UAE and was highly regarded by the visitors.

Environmental Enlightenment Activities

To encourage broader thinking about the global environment, we produce the environment information journal "Dagian", which is published three times a year and distributed to museums and other locations. In FY 2001, we published "Mame (or beans)" (Vol. 39), "Kaze (or wind)" (Vol. 40), and "Kai (or shells)" (Vol. 41). Each issue focuses on one environmental theme, with leading experts in the field commenting on that theme. The information is also available on the Internet.

"Dagian" an environment information journal

http://www.cosmo-oil.co.jp

Making Our Business Transparent and Open

As for investor relations activities, top management briefings are given twice each year and the "C's MAIL" (an investor's newsletter) is issued quarterly.

"Annual Report" and "Fact Book"

For international investors, we produce our English language annual report, fact book, and newsletter.

*1 See page 29.
*2 See pages 5 and 6.

"C's MAIL" (investor's newsletter) and "CLOSE-UP" (English language newsletter)

External Recognition

The external recognition we receive through active disclosure of information reflects how much progress we are making to be an environmentally advanced company.

Cosmo Oil received the "Award for Excellent Companies Chosen by the Global Environment Council" in the "11th Grand Prize for the Global Environment Award" in April 2002. We were commended for the establishment of our environmental management system*2 which organizes all stages of business activities from crude oil development to sales, as well as the Zero-Flare Project which has been reducing CO_2 emissions by approximately 200 thousand tons per year. In addition, in May 2002, our Environmental Report 2001 was awarded third prize in the "5th Green Reporting Award" jointly hosted by Toyo Keizai, Inc. and Green Reporting Forum.

Presentation ceremony for the "Award for Excellent Companies Chosen by the Global Environment Council"

Presentation ceremony for the "5th Green Reporting Award"

Enhancing Corporate Value by Placing Importance on Environmental Protection, Social Responsibility, and Economic Performance

Cosmo Oil strives to be a company supported and trusted by society, placing importance on the triple bottom line: the environment, society, and the economy.

We have received considerable recognition for our activities related to environmental protection and social responsibility from outside the company: in FY 2001 Cosmo Oil's stocks were included in the SRI funds of two companies, Asahi Life Asset Management Co., Ltd's "Asu No Hane" and UFJ Partners Asset Management's "Green Wings".

We will continue to expand our activities to become an environmentally advanced company while striking a balance between environmental protection and profit creation.

We created a two-year plan that started last year called "Value Creation 21", under which we have rationalized business operations and created added value. In spite of these efforts, revenues for FY 2001 decreased due to the loss of profits from crude oil production influenced by the collapse in oil prices and a drop in the volume of sales, and profits for FY 2001 also fell because of the loss from revaluation of securities.

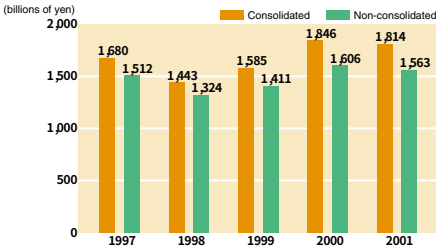
Currently, Cosmo Oil is working to improve service stations and to change how we provide our services, focusing on the self-service station and car-care markets. Although the oil industry is facing tough business conditions due to the intensification of competition, new-style businesses such as self-service stations at which drivers fill up their cars themselves and service station businesses, which provide car-care services including automobile inspection and maintenance, are becoming more popular. We are developing such new businesses by equipping large-scale service stations with the so-called "B-cle" facilities, which provide services such as automobile inspection and maintenance, high-quality car washes, and sales of car accessories. As of 31 March 2001, we have built a network of 217 B-cles and opened 109 self-service stations.

Large-scaled service station with B-cle

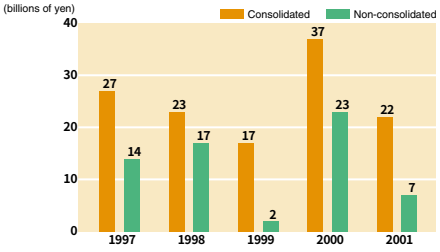
Focusing on "Cosmo the Card", a credit card system operated by Cosmo Oil, we will acquire more members and loyal customers through the mileage system.

Cosmo Oil will continue to establish the "Cosmo Network" as a solid base for profitability and to gain an absolute competitive advantage in the market by changing the style of service station businesses, while monitoring changes in customers' needs and regional characteristics.

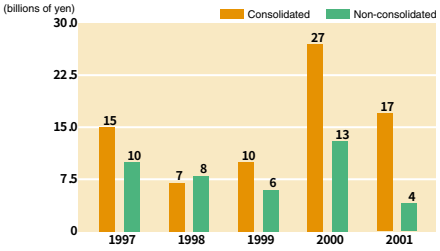
Sales



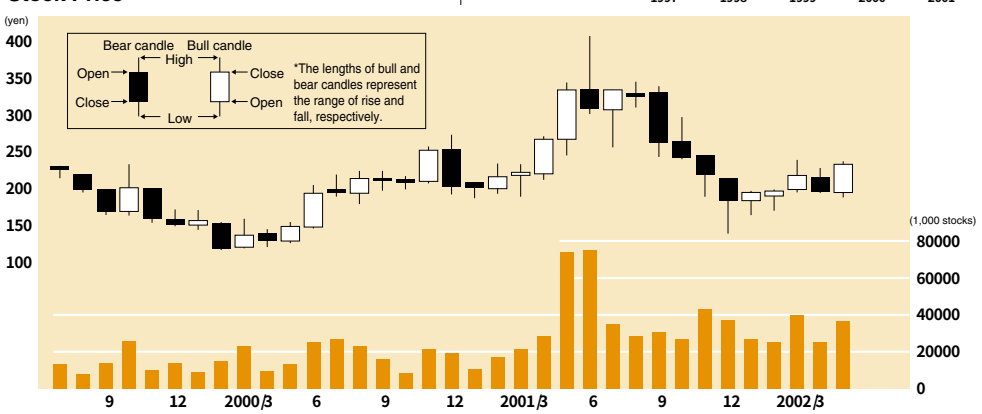
Operating profit



Working profit



Stock Price



Corporate Profile

Name: Cosmo Oil Co., Ltd.
Headquarters: Toshiba Bldg., 1-1-1, Shibaura, Minato-ku, Tokyo 105-8528, Japan
Telephone: +81-3-3798-3211
Established: April 1, 1986
Capital: 51,887 million yen
Major business activities: Petroleum refining and sales
Net sales: 1.563 trillion yen
Ordinary profit: 4 billion yen
Current term net profit: -9.8 billion yen
History: On April 1, 1986, Cosmo Oil Co., Ltd. was formed through the merger of Daikyo Oil Co., Ltd., Maruzen Oil Co., Ltd., and the former Cosmo Oil (Cosmo Refining), a subsidiary of both companies. In 1989, Asian Oil Co., Ltd. was merged into Cosmo Oil.
Employees: 1,892
Branches: Fukuoka, Hiroshima, Kanto, Nagoya, Osaka, Sapporo, Sendai, Takamatsu, Tokyo
Refineries: Chiba, Sakai, Sakaide, Yokkaichi
Research laboratory: Research and Development Center
Service stations: 5,541

Cosmo Oil Co., Ltd. Group
Oil refining and sales: Cosmo Oil Co., Ltd.
86 subsidiaries, 54 affiliates
Crude oil development and production: Abu Dhabi Oil Co., Ltd.; Mubarraz Oil Co., Ltd.; United Petroleum Development Co., Ltd.; four other companies
Import and export of crude oil and petroleum products: Cosmo Oil International Pte. Ltd.; Cosmo Oil (UK) Plc.; two other companies
Ocean transport of crude oil and petroleum products: Cosmo Tanker Co., Ltd.; Nippon Global Tanker Co., Ltd.
Production and sales of lubricating oil: Cosmo Oil Lubricants Co., Ltd.
Petrochemical product production: Cosmo Matsuyama Oil Co., Ltd.; Maruzen Petrochemical Co., Ltd.
Petroleum product sales: Cosmo Petroleum Gas Co., Ltd.; Cosmo Asphalt Co., Ltd.; Cosmo Oil Service Co., Ltd.; Toyo Kokusai Oil Co., Ltd.; 61 other companies
Cargo handling and transport: Cosmo Kaiun Co., Ltd.; Tokyo Cosmo Logistics Co., Ltd.; Sakaide Cosmo Kosan Co., Ltd., 21 other companies
Cargo handling and transport: Cosmo Kaiun Co., Ltd.; Tokyo Cosmo Logistics Co., Ltd.; Sakaide Cosmo Kosan Co., Ltd., 21 other companies
Technical research: Cosmo Technology Research Institute, one other company
Real estate: Cosmo Ventures Inc.; two other companies
Others: Cosmo Engineering Co., Ltd.; Cosmo Trade & Service Co., Ltd.; 29 other companies

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Product sales
(Unit: thousand kiloliters/thousand tons)
Gasoline, naphtha: 16,552
Diesel fuel, kerosene: 13,749
Heavy fuel oil: 9,823
Others: 3,321
Major customers:
Cosmo Oil special agents, public utility corporations, corporate customers, others

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Major shareholders:

The UFJ Bank, Ltd	4.99%
The Industrial Bank of Japan, Ltd.*	4.99%
Japan Trustee Services Bank, Ltd.	4.91%
Mitsui Sumitomo Insurance Company, Ltd.	3.63%
The Mitsubishi Trust and Banking Corporation	3.23%
The Kansai Electric Power Co., Inc.	2.94%
Cosmo Oil Employees Shareholding Association	2.93%
The Tokio Marine and Fire Insurance Co., Ltd.	2.58%
The Yasuda Fire and Marine Insurance Co., Ltd.	2 .29%
The UFJ Trust Bank Ltd.	2.02%

Note: all data for fiscal year 2001

* Presently, "Mizuho Corporate Bank, Ltd."

The Japanese petroleum refining and sales industry
Number of companies: 24 (as of April 2002)
Annual sales: 17.782 trillion yen (FY 2001)
Dependence on petroleum imports 99.7% (FY 2001)
(Source: Data from Petroleum Association of Japan)

Chiba Oil Refinery

Address: 2 Goi-Kaigan, Ichihara-shi, Chiba-ken

Start of operations: February 1963

Area: 1,209,585 m^2

Employees: 389

Crude oil processing capacity: 240,000 barrels/day

(as of March 2002)

■ Regulated Pollutants

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Air Pollutants	NOx (m^3_N/hour)	Pollution control agreement	Areawide total pollutant load control	141.1	113.4	86.3
	SOx (m^3_N/hour)	Pollution control agreement	Areawide total pollutant load control	189.7	138.0	104.0
	Particulate (boiler) (g/m^3_N)	Pollution control agreement	Concentration control	0.07	0.047	0.027

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Water Pollutants	COD (kg/hour)	Pollution control agreement	Areawide total pollutant load control	199	183.2	78.8
	COD (mg/L)	Prefectural ordinance	Concentration control	25	4.4	3.4
	SS (mg/L)	Prefectural ordinance	Concentration control	50	6.4	5.8
	Oil content (mg/L)	Prefectural ordinance	Concentration control	3	1.0	0.9
	Nitrogen (mg/L)	Prefectural directive	Concentration control	(10)	2.1	1.6
	Phosphorus (mg/L)	Prefectural directive	Concentration control	(1)	0.12	0.09
	Phenol (mg/L)	Prefectural ordinance	Concentration control	0.5	Below measurement threshold	

Figures in parentheses = daily average

■ Environmental Performance

	Amount	Amount per unit of production
Energy	649,795 (kL-crude oil/year)	8.99 (kL-crude oil/thousand kL)
CO_2	1,883,303 (t-CO_2/year)	26.05 (kg-CO_2/kL)
SOx	2,601 (t/year)	36.0 (g/kL)
NOx	1,550 (t/year)	21.4 (g/kL)
COD	28.7 (t/year)	0.40 (g/kL)
Industrial wastes generated	24,470 (t/year)	
Industrial wastes recycled	5,346 (t/year)	
Industrial wastes disposed of	505 (t/year)	

PRTR Law designated chemical substance	Release/transfer
Ethyl benzene (atmospheric release)	0.4 (t/year)
Xylene (atmospheric release)	1.3 (t/year)
1,3,5-trimethylbenzene (atmospheric release)	26 (kg/year)
Toluene (atmospheric release)	5.9 (t/year)
Benzene (atmospheric release)	1.0 (t/year)
Cobalt and its compounds (transfer)	0.0 (t/year)
Nickel compounds (transfer)	58.0 (t/year)
Molybdenum and its compounds (transfer)	79.0 (t/year)

■ Environmental Accounting

Item	Environmental cost (million yen)	
	Investment amount	Expenditure amount
1 Business area costs	74	3,812
Pollution prevention costs	57	1,426
Global environmental conservation costs	0	2,151
Resource circulation costs	17	235
2 Upstream/downstream costs	139	14,436
Product environmental impact reduction costs	139	14,436
Product sulfur reduction costs	120	12,417
Gasoline	29	2,991
Naphtha	10	1,041
Jet fuel oil	8	865
Kerosene	20	2,084
Diesel fuel	29	2,965
Heavy fuel oil A	12	1,253
Heavy fuel oil C	7	739
LPG	5	479
Costs of substituting toxic substances in gasoline	19	2,019
Costs of aromatics reduction in petrochemical products	0	0
Green procurement costs	0	0
3 Management activity costs	0	190
4 Research and development costs	0	0
5 Social activity costs	0	167
Total	213	18,605

Item	Benefits of environmental protection	
	Reduction of environmental impacts (2000 value minus 2001 value)	
	Concentrations/unit value	Environmental impacts
1 Business area benefits		
Benefits of reduction in resource input	(kL-crude oil/thousand kL)	(TJ)
Energy input	0.26	266
	(kg/kL)	(thousand t)
Water input	7	282
Benefits of reduction in emissions and waste generation		
Release to atmosphere	(kg-CO_2/kL)	(thousand t-CO_2)
CO_2	1.15	48
	(g/kL)	(t)
SOx	−0.1	−50
NOx	−0.6	−76
Benzene	0	0
Release to water	(g/kL)	(t)
COD	−0.01	−0.7
Wastes	(g/kL)	(t)
Industrial wastes generated	66	4,301
Industrial wastes recycled	−1	−172
Industrial wastes disposed of	2	164
2 Upstream/downstream benefits		
Benefits of product environmental impact reduction		
Product sulfur reduction	(sulfur:weight %)	(potential SOx emissions: t)
Total	0.0371	5,578
Gasoline	0.0005	11
Naphtha	−0.0007	−99
Jet fuel oil	−0.0048	−115
Kerosene	−0.0009	−16
Diesel fuel	0.0014	87
Heavy fuel oil A	0.0591	1,275
Heavy fuel oil C	0.0154	4,435
LPG	0.0000	0
Benefits of substituting toxic substances in gasoline	(volume %)	(t)
	0.0969	1,110
CO_2 emissions from product use	(t-CO_2/kL)	(thousand t-CO_2)
	0.0237	−490

■ Economic Benefit (973 million yen)

Savings through energy reductions (savings through cogeneration): 973

Saving through catalyst recycling (reduction of waste management cost, etc.): 0

Benefits from research and development (income from royalties, etc.): 0

Yokkaichi Oil Refinery

Address: 1-1 Daikyo-cho, Yokkaichi-shi, Mie-ken

Start of operations: July 1943

Area: 1,192,039 m^2

Employees: 341

Crude oil processing capacity: 155,000 barrels/day

(as of March 2002)

■ Regulated Pollutants

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Air Pollutants	NOx (m^3_N/hour)	Pollution control agreement	Areawide total pollutant load control	78.4	68.3	41.4
	SOx (m^3_N/hour)	Pollution control agreement	Areawide total pollutant load control	108.21	61.0	30.2
	Particulate (boiler) (g/m^3_N)	Pollution control agreement	Concentration control	0.049	0.047	0.024

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Water Pollutants	COD (kg/hour)	Pollution control agreement	Areawide total pollutant load control	535	436.3	188.3
	COD (mg/L)	Water Pollution Control Law	Concentration control	160(120)	15.0	7.0
	SS (mg/L)	Water Pollution Control Law	Concentration control	200(150)	13.0	5.1
	Oil content (mg/L)	Prefectural ordinance	Concentration control	1	Below measurement threshold	
	Nitrogen (mg/L)	Municipal guidance	Concentration control	15	2.0 Below measurement threshold	
	Phosphorus (mg/L)	Municipal guidance	Concentration control	1.5	0.09	0.05
	Phenol (mg/L)	Prefectural ordinance	Concentration control	1	Below measurement threshold	

Figures in parentheses = daily average

■ Environmental Performance

	Amount	Amount per unit of production
Energy	430,087 (L-crude oil/year)	10.63 (L-crude oil/thousand kL)
CO_2	1,147,014 (-CO_2/year)	28.36 (kg-CO_2/kL)
SOx	756 (/year)	18.7 (g/kL)
NOx	745 (/year)	18.4 (g/kL)
COD	68.7 (/year)	1.70 (g/kL)
Industrial wastes generated	8,741 (/year)	
Industrial wastes recycled	2,363 (/year)	
Industrial wastes disposed of	623 (/year)	

PRTR Law designated chemical substance	Release/transfer
Ethyl benzene (atmospheric release)	0.4 (t/year)
Xylene (atmospheric release)	1.5 (t/year)
1,3,5-trimethylbenzene (atmospheric release)	34 (kg/year)
Toluene (atmospheric release)	4.5 (t/year)
Benzene (atmospheric release)	1.5 (t/year)
Cobalt and its compounds (transfer)	0.0 (t/year)
Nickel compounds (transfer)	1.7 (t/year)
Molybdenum and its compounds (transfer)	7.7 (t/year)

■ Environmental Accounting

Item	Environmental cost (million yen)	
	Investment amount	Expenditure amount
1 Business area costs	74	3,143
Pollution prevention costs	74	920
Global environmental conservation costs	0	1,989
Resource circulation costs	0	234
2 Upstream/downstream costs	317	4,607
Product environmental impact reduction costs	317	4,607
Product sulfur reduction costs	169	2,636
Gasoline	48	754
Naphtha	12	188
Jet fuel oil	2	26
Kerosene	28	431
Diesel fuel	38	593
Heavy fuel oil A	34	535
Heavy fuel oil C	0	0
LPG	7	109
Costs of substituting toxic substances in gasoline	148	1,971
Costs of aromatics reduction in petrochemical products	0	0
Green procurement costs	0	0
3 Management activity costs	0	90
4 Research and development costs	0	0
5 Social activity costs	0	361
Total	391	8,201

Item	Benefits of environmental protection	
	Reduction of environmental impacts (2000 value minus 2001 value)	
	Concentrations/unit value	Environmental impacts
1 Business area benefits		
Benefits of reduction in resource input	(kL-crude oil/thousand kL)	(TJ)
Energy input	0.18	– 198
	(kg/kL)	(thousand t)
Water input	– 45	– 2,185
Benefits of reduction in emissions and waste generation		
Release to atmosphere	(kg-CO 2/kL)	(thousand t-CO_2)
CO_2	0.52	– 12
	(g/kL)	(t)
SOx	– 2.2	– 109
NOx	– 2.0	– 100
Benzene	0.01	0.3
Release to water	(g/kL)	(t)
COD	0.36	12.3
Wastes	(g/kL)	(t)
Industrial wastes generated	47	1,609
Industrial wastes recycled	14	487
Industrial wastes disposed of	8	276
2 Upstream/downstream benefits		
Benefits of product environmental impact reduction		
Product sulfur reduction	(sulfur weight %)	(potential SOx emissions: t)
Total	0.0181	1,050
Gasoline	0.0000	5
Naphtha	– 0.0005	– 39
Jet fuel oil	0.0005	1
Kerosene	– 0.0003	– 5
Diesel fuel	0.0013	44
Heavy fuel oil A	0.0074	– 566
Heavy fuel oil C	0.0619	1,611
LPG	– 0.0006	– 1
Benefits of substituting toxic substances in gasoline	(volume %)	(t)
	0.1080	1,869
CO_2 emissions from product use	(t-CO 2/kL)	(thousand t-CO_2)
	0.0055	– 166

■ Economic Benefit (424 million yen)

Savings through energy reductions (savings through cogeneration): 423

Saving through catalyst recycling (reduction of waste management cost, etc.): 1

Benefits from research and development (income from royalties, etc.): 0

Sakai Oil Refinery

Address: 3-16 Chikko-Shinmachi, Sakai-shi, Osaka-fu

Start of operations: October 1968

Area: 1,254,603 m^2

Employees: 216

Crude oil processing capacity: 80,000 barrels/day

(as of March 2002)

■ Regulated Pollutants

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Air Pollutants	NOx (m^3_N/hour)	Municipal notification	Areawide total pollutant load control	48.82	12.0	10.0
	SOx (m^3_N/hour)	Municipal notification	Areawide total pollutant load control	45.6	1.0	0.5
	Particulate (boiler) (g/m^3_N)	Prefectural ordinance	Concentration control	0.05	Below measurement threshold	

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Water Pollutants	COD (kg/hour)	Water Pollution Control Law	Areawide total pollutant load control	186.8	89.6	54.9
	COD (mg/L)	Prefectural ordinance	Concentration control	15 (10)	9.8	7.2
	SS (mg/L)	Prefectural ordinance	Concentration control	40 (30)	5	Below measurement threshold
	Oil content (mg/L)	Prefectural ordinance	Concentration control	2	Below measurement threshold	
	Nitrogen (mg/L)	Prefectural directive	Concentration control	35	5.0	3.0
	Phosphorus (mg/L)	Prefectural directive	Concentration control	1.5	0.557	0.128
	Phenol (mg/L)	Prefectural ordinance	Concentration control	2	Below measurement threshold	

Figures in parentheses = daily average

■ Environmental Performance

	Amount	Amount per unit of production
Energy	256,959 (kL-crude oil/year)	8.68 (kL-crude oil/thousand kL)
CO_2	721,314 (t-CO_2/year)	24.37 (kg-CO_2/kL)
SOx	12 (t/year)	0.4 (g/kL)
NOx	180 (t/year)	6.1 (g/kL)
COD	20.1 (t/year)	0.68 (g/kL)
Industrial wastes generated	5,036 (t/year)	
Industrial wastes recycled	1,028 (t/year)	
Industrial wastes disposed of	323 (t/year)	

PRTR Law designated chemical substance	Release/transfer
Ethyl benzene (atmospheric release)	0.2 (t/year)
Xylene (atmospheric release)	0.7 (t/year)
1,3,5-trimethylbenzene (atmospheric release)	21 (kg/year)
Toluene (atmospheric release)	1.7 (t/year)
Benzene (atmospheric release)	0.8 (t/year)
Cobalt and its compounds (transfer)	0.0 (t/year)
Nickel compounds (transfer)	1.8 (t/year)
Molybdenum and its compounds (transfer)	0.0 (t/year)

■ Environmental Accounting

Item	Environmental cost (million yen)	
	Investment amount	Expenditure amount
1 Business area costs	7	3,023
Pollution prevention costs	6	611
Global environmental conservation costs	1	2,354
Resource circulation costs	0	58
2 Upstream/downstream costs	22	4,370
Product environmental impact reduction costs	22	4,370
Product sulfur reduction costs	14	2,053
Gasoline	5	681
Naphtha	1	123
Jet fuel oil	1	193
Kerosene	2	311
Diesel fuel	3	539
Heavy fuel oil A	2	178
Heavy fuel oil C	0	0
LPG	0	28
Costs of substituting toxic substances in gasoline	8	2,317
Costs of aromatics reduction in petrochemical products	0	0
Green procurement costs	0	0
3 Management activity costs	0	83
4 Research and development costs	0	0
5 Social activity costs	0	88
Total	29	7,564

Item	Benefits of environmental protection	
	Reduction of environmental impacts (2000 value minus 2001 value)	
	Concentrations/unit value	Environmental impacts
1 Business area benefits		
Benefits of reduction in resource input	(kL-crude oil/thousand kL)	(TJ)
Energy input	0.51	− 540
	(kg/kL)	(thousand t)
Water input	19	− 130
Benefits of reduction in emissions and waste generation		
Release to atmosphere	(kg-CO2/kL)	(thousand t-CO_2)
CO_2	1.38	− 40
	(g/kL)	(t)
SOx	0.1	0.0
NOx	0.6	− 3.0
Benzene	− 0.01	− 0.13
Release to water	(g/kL)	(t)
COD	0.03	− 1.2
Wastes	(g/kL)	(t)
Industrial wastes generated	3	− 451
Industrial wastes recycled	3	− 25
Industrial wastes disposed of	8	186
2 Upstream/downstream benefits		
Benefits of product environmental impact reduction		
Product sulfur reduction	(sulfur:weight %)	(potential SOx emissions: t)
Total	0.1720	10,883
Gasoline	0.0000	0
Naphtha	0.0152	16
Jet fuel oil	− 0.0055	− 51
Kerosene	− 0.0003	− 4
Diesel fuel	− 0.0011	− 86
Heavy fuel oil A	− 0.0104	133
Heavy fuel oil C	0.2241	10,875
LPG	− 0.0001	0
Benefits of substituting toxic substances in gasoline	(volume %)	(t)
	− 0.0207	− 255
CO_2 emissions from product use	(t-CO2/kL)	(thousand t-CO_2)
	0.0352	− 74

■ Economic Benefit (671 million yen)

Savings through energy reductions (savings through cogeneration): 671

Saving through catalyst recycling (reduction of waste management cost, etc.): 0

Benefits from research and development (income from royalties, etc.): 0

Sakaide Oil Refinery

Address: 1-1 Bannosu Midori-machi, Sakaide-shi, Kagawa-ken
Start of operations: October 1972
Area: 847,943 m^2
Employees: 234
Crude oil processing capacity: 120,000 barrels/day
(as of March 2002)

■ Regulated Pollutants

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Air Pollutants	NOx (m^3_N/hour)	Pollution control memorandum	Areawide total pollutant load control	190	52	33
	SOx (m^3_N/hour)	Pollution control memorandum	Areawide total pollutant load control	164	107.9	45.1
	Particulate (boiler) (g/m^3_N)	Pollution control memorandum	Concentration control	0.05	0.007	0.006

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Water Pollutants	COD (kg/hour)	Prefectural ordinance	Areawide total pollutant load control	120	49.1	29.2
	COD (mg/L)	Prefectural ordinance	Concentration control	15 (10)	5.0	3.4
	SS (mg/L)	Prefectural ordinance	Concentration control	15 (10)	10.0	4.5
	Oil content (mg/L)	Prefectural ordinance	Concentration control	2	Below measurement threshold	
	Nitrogen (mg/L)	Water Pollution Control Law	Concentration control	120 (60)	2.1	1.3
	Phosphorus (mg/L)	Water Pollution Control Law	Concentration control	16 (8)	0.05	0.03
	Phenol (mg/L)	Prefectural ordinance	Concentration control	1	Below measurement threshold	

Figures in parentheses = daily average

■ Environmental Performance

	Amount	Amount per unit of production
Energy	330,012 (kL-crude oil/year)	9.52 (kL-crude oil/thousand kL)
CO_2	959,376 (t-CO_2/year)	27.67 (kg-CO_2/kL)
SOx	1,128 (t/year)	32.5 (g/kL)
NOx	594 (t/year)	17.1 (g/kL)
COD	10.7 (t/year)	0.31 (g/kL)
Industrial wastes generated	15,021 (t/year)	
Industrial wastes recycled	2,352 (t/year)	
Industrial wastes disposed of	334 (t/year)	

PRTR Law designated chemical substance	Release/transfer
Ethyl benzene (atmospheric release)	0.5 (t/year)
Xylene (atmospheric release)	2.1 (t/year)
1,3,5-trimethylbenzene (atmospheric release)	42 (kg/year)
Toluene (atmospheric release)	8.1 (t/year)
Benzene (atmospheric release)	2.2 (t/year)
Cobalt and its compounds (transfer)	7.4 (t/year)
Nickel compounds (transfer)	37.0 (t/year)
Molybdenum and its compounds (transfer)	60.0 (t/year)

■ Environmental Accounting

Item	Environmental cost (million yen)	
	Investment amount	Expenditure amount
1 Business area costs	47	909
Pollution prevention costs	47	820
Global environmental conservation costs	0	0
Resource circulation costs	0	89
2 Upstream/downstream costs	378	9,543
Product environmental impact reduction costs	378	9,543
Product sulfur reduction costs	166	6,711
Gasoline	51	2,071
Naphtha	6	245
Jet fuel oil	5	212
Kerosene	32	1,290
Diesel fuel	46	1,838
Heavy fuel oil A	18	739
Heavy fuel oil C	1	41
LPG	7	275
Costs of substituting toxic substances in gasoline	212	2,832
Costs of aromatics reduction in petrochemical products	0	0
Green procurement costs	0	0
3 Management activity costs	0	49
4 Research and development costs	0	0
5 Social activity costs	0	153
Total	425	10,654

Item	Benefits of environmental protection	
	Reduction of environmental impacts (2000 value minus 2001 value)	
	Concentrations/unit value	Environmental impacts
1 Business area benefits		
Benefits of reduction in resource input	(kL-crude oil/thousand kL)	(TJ)
Energy input	0.04	1,737
	(kg/kL)	(thousand t)
Water input	−3	210
Benefits of reduction in emissions and waste generation		
Release to atmosphere	(kg-CO_2/kL)	(thousand t-CO_2)
CO_2	0.30	137
	(g/kL)	(t)
SOx	5.4	358
NOx	3.2	200
Benzene	0.01	0.40
Release to water	(g/kL)	(t)
COD	0.06	4.0
Wastes	(g/kL)	(t)
Industrial wastes generated	−47	99
Industrial wastes recycled	−22	−530
Industrial wastes disposed of	−5	−144
2 Upstream/downstream benefits		
Benefits of product environmental impact reduction		
Product sulfur reduction	(sulfur weight %)	(potential SOx emissions: t)
Total	0.0703	12,168
Gasoline	0.0004	10
Naphtha	−0.0191	−21
Jet fuel oil	0.0001	3
Kerosene	−0.0009	−3
Diesel fuel	−0.0014	45
Heavy fuel oil A	0.2764	1,208
Heavy fuel oil C	0.0524	10,926
LPG	−0.0001	0
Benefits of substituting toxic substances in gasoline	(volume %)	(t)
	0.0896	1,255
CO_2 emissions from product use	(t-CO_2/kL)	(thousand t-CO_2)
	0.0078	1,981

■ Economic Benefit (21 million yen)

Savings through energy reductions (savings through cogeneration): 0
Saving through catalyst recycling (reduction of waste management cost, etc.): 21
Benefits from research and development (income from royalties, etc.): 0

Cosmo Matsuyama Oil Co., Ltd.

Address: 3-580 Okaga, Matsuyama-shi, Ehime-ken
Start of operations: February 1944
Area: 532,879 m^2
Employees: 119
Business activities: Production and sales of fuel oils, petroleum products, petrol solvents and liquefied gases

(as of March 2002)

■ Regulated Pollutants

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Air Pollutants	NOx (m^3_N/hour)	—	—	—	14.79	11.63
	SOx (m^3_N/hour)	Pollution control agreement	Areawide total pollutant load control	208	56.34	45.16
	Particulate (boiler) (g/m^3_N)	Pollution control agreement	Concentration control	0.17	0.06	0.03

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Water Pollutants	COD (kg/hour)	Note 1	Areawide total pollutant load control	363.3	35.7	6.8
	COD (mg/L)	Prefectural ordinance	Concentration control	15 (10)	3.9	3.4
	SS (mg/L)	Prefectural ordinance	Concentration control	20	3	3
	Oil content (mg/L)	Prefectural ordinance	Concentration control	2	Below measurement threshold	
	Nitrogen (mg/L)	Water Pollution Control Law	Concentration control	120 (60)	1.10	0.66
	Phosphorus (mg/L)	Water Pollution Control Law	Concentration control	16 (8)	0.21	0.15
	Phenol (mg/L)	Prefectural ordinance	Concentration control	0.3	Below measurement threshold	

Note 1: Law for Special Measures for the Conservation of the Seto Inland Sea

Figures in parentheses = daily average

■ Environmental Performance

	Amount
Energy	57,181 (kL-crude oil/year)
CO_2	151,481 (t-CO_2/year)
SOx	981 (t/year)
NOx	187 (t/year)
COD	2.4 (t/year)
Industrial wastes generated	316 (t/year)
Industrial wastes recycled	115 (t/year)
Industrial wastes disposed of	96 (t/year)

PRTR Law designated chemical substance	Release/transfer
Ethyl benzene (atmospheric release)	4.3 (t/year)
Xylene (atmospheric release)	23.0 (t/year)
1,3,5-trimethylbenzene (atmospheric release)	3.5 (kg/year)
Toluene (atmospheric release)	47.0 (t/year)
Benzene (atmospheric release)	8.1 (t/year)

■ Environmental Accounting

Item	Environmental cost (million yen)	
	Investment amount	Expenditure amount
1 Business area costs	1	24
Pollution prevention costs	1	17
Global environmental conservation costs	0	0
Resource circulation costs	0	7
2 Upstream/downstream costs	3	490
Product environmental impact reduction costs	3	490
Product sulfur reduction costs	0	0
Gasoline	0	0
Naphtha	0	0
Jet fuel oil	0	0
Kerosene	0	0
Diesel fuel	0	0
Heavy fuel oil A	0	0
Heavy fuel oil C	0	0
LPG	0	0
Costs of substituting toxic substances in gasoline	2	375
Costs of aromatics reduction in petrochemical products	1	115
Green procurement costs	0	0
3 Management activity costs	0	40
4 Research and development costs	0	0
5 Social activity costs	0	51
Total	4	605

Item	Benefits of environmental protection
	Reduction of environmental impacts (2000 value minus 2001 value)
	Environmental impacts
1 Business area benefits	
Benefits of reduction in resource input	(TJ)
Energy input	85 (thousand t)
Water input	−31
Benefits of reduction in emissions and waste generation	
Release to atmosphere	(thousand t-CO_2)
CO_2	6
	(t)
SOx	24
NOx	14
Benzene	0
Release to water	(t)
COD	0.1
Wastes	(t)
Industrial wastes generated	157
Industrial wastes recycled	67
Industrial wastes disposed of	40
2 Upstream/downstream benefits	
Benefits of product environmental impact reduction	
Product sulfur reduction	(potential SOx emissions: t)
Total	−48
Gasoline	0
Naphtha	0
Jet fuel oil	−53
Kerosene	−3
Diesel fuel	−2
Heavy fuel oil A	10
Heavy fuel oil C	0
LPG	0
Benefits of substituting toxic substances in gasoline	(t) 27
Benefits of aromatics reduction in petrochemical products	(kL) −1,736
CO_2 emissions from product use	(thousand t-CO_2) −146

Research and Development Center

Address: 1134-2 Gongendo, Satte-shi, Saitama-ken
Start of operations: April 1969
Area: 86,200 m^2
Employees: 109

Cosmo Oil Lubricants Co., Ltd.

Address: 4-9-25, Shibaura, Minato-ku, Tokyo
Start of operations: April 1988
Employees: 200
Business activities: Manufacturing, research and sales of lubricating oils and other products

Research and Development Center

■ Regulated Pollutants

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Water Pollutants	COD (mg/L)	Water Pollution Control Law	Concentration control	160 (120)	19.5	10.2
	SS (mg/L)	Prefectural ordinance	Concentration control	60 (50)	7	5
	Oil content (mg/L)	Water Pollution Control Law	Concentration control	5	1	1
	Nitrogen (mg/L)	Water Pollution Control Law	Concentration control	120 (60)	8	6
	Phosphorus (mg/L)	Water Pollution Control Law	Concentration control	16 (8)	1.0	0.8
	Phenol (mg/L)	Prefectural ordinance	Concentration control	1	Below measurement threshold	

Figures in parentheses = daily average

Research and Development Center; Cosmo Oil Lubricants Co., Ltd.

■ Environmental Accounting

Item	Environmental cost (million yen)	
	Investment amount	Expenditure amount
1 Business area costs	0	0
Pollution prevention costs	0	0
Global environmental conservation costs	0	0
Resource circulation costs	0	0
2 Upstream/downstream costs	0	100
Product environmental impact reduction costs	0	0
Product sulfur reduction costs	0	0
Gasoline	0	0
Naphtha	0	0
Jet fuel oil	0	0
Kerosene	0	0
Diesel fuel	0	0
Heavy fuel oil A	0	0
Heavy fuel oil C	0	0
LPG	0	0
Costs of substituting toxic substances in gasoline	0	0
Costs of aromatics reduction in petrochemical products	0	0
Green procurement costs	0	100
3 Management activity costs	0	0
4 Research and development costs	0	1,462
5 Social activity costs	0	0
Total	0	1,562

Notes on the expenditure amount for FY 2001
100 million yen for green procurement in the upstream/downstream costs:
Expenditure associated with the green procurement of raw materials for lubricating oils (Cosmo Oil Lubricants)
Research and development costs of 1,462 million yen:
Expenditure for research and development for environmental protection (Research and Development Center)

■ Economic Benefit (104 million yen)

Benefits from research and development (income from royalties, etc.): 104

Steps in Environmental Protection Activities

	Cosmo Oil Group
1986	● Cosmo Oil Co., Ltd. established ● Establishment of the Environment and Safety Control Department at company headquarters, Environment and Safety Offices at oil refineries ● Establishment of Environment and Safety Administration Rule and Environment and Safety Countermeasures Headquarters Rule ● Start of setting up and implementing annual environment and safety targets starting with "No Accident and No Disaster through the Involvement of All Employees" and "Be Creative for Environmental Protection" ● Start of annual environment and safety inspections at oil refineries and oil storage depots in accordance with Environment and Safety Inspection Procedure
1987	● Completion of the FCC exhaust gas desulfurization unit at Sakai Oil Refinery
1988	● Start of spent grain drying business at Sakai Oil Refinery
1989	
1990	● Completion of cogeneration facilities at Yokkaichi Oil Refinery
1991	● Dispatch of oil spill prevention expert team to the Persian Gulf
1992	● Installation of atmospheric distillation flue gas denitration unit at Sakai Oil Refinery ● Installation of spent grain drying unit at Chiba Oil Refinery
1993	● Global Environment Action Program devised and submitted to the Ministry of International Trade and Industry ● Global Environmental Committee Rule, following Establishment of Global Environment Committee
1994	● The First Global Environment Committee meeting held, to be held annually thereafter ● Annual target "Challenging Global Environmental Problems" set up ● Completion of diesel fuel desulfurization unit at Chiba Oil Refinery
1995	● Completion of cogeneration facilities at Sakai Oil Refinery ● Sakai Oil Refinery receives Director-General of National Resources and Energy Award for its excellent industrial energy management ● Introduction of industry-first 24-kiloliter tank truck ● Comprehensive Disaster Countermeasures Rule and Detailed Comprehensive Disaster Countermeasures Rule established (superceding existing rule and detailed regulations)
1996	● "Report on the Follow-up Results of Environmental Action Plan" prepared and submitted to the Ministry of International Trade and Industry ● Completion of cogeneration facilities at Chiba Oil Refinery ● Completion of diesel fuel deep desulfurization unit at Sakai Oil Refinery
1997	● Nakhodka Oil Spill Support Team established in response to a major oil spill on the Japan Sea coast by the Russian tanker, Nakhodka ● Sakaide Oil Refinery obtains ISO14001 certification ● Start of environmental impact assessment at Cosmo Oil's Yokkaichi Kasumi Electric Power Plant (IPP) ● Sakaide Oil Refinery receives Energy Conservation Center Chairman's Prize
1998	● Introduction of double-hull charter tanker ● ISO14001 certification obtained at Chiba Oil Refinery, Yokkaichi Oil Refinery, Sakai Oil Refinery and Cosmo Matsuyama Oil Co., Ltd. ● Completion of gasoline benzene reduction unit ● Completion of No. 2 atmospheric distillation unit heating denitrification unit at Chiba Oil Refinery
1999	● Release of Terra series of biodegradable lubricating oil ● Release of Shinsei non-chlorine diesel engine oil
2000	● Start of full-scale development of oil-based fuel cell ● Sakaide Oil Refinery receives Director-General of National Resources and Energy Award ● Opening of Cosmo Customer Center ● Industrial Waste Management Rule established
2001	● Publication of "Cosmo Oil Environmental Report 2001" ● Chiba Oil Refinery receives the Minister of Health, Labor and Welfare Commendation ● Cosmo Oil receives the "Award for Excellent Companies" in the "11th Grand Prize for the Global Environment Award" (organized by Ministry of Education, Fuji Sankei Group, etc. in collaboration with World Wildlife Fund Japan) ● Cosmo Oil receives third prize in the "5th Green Reporting Award" (jointly hosted by Toyo Keizai, Inc. and Green Reporting Forum) ● Yokkaichi Oil Refinery receives the "Director-General of Fire-Defense Agency Award" at the "Convention on Hazardous Materials"

Diesel fuel desulfurization unit

SQ product quality mark

Nakhodka oil spill

Petroleum Industry	Society
● The Law Concerning Provisional Measures for the Import of Specific Petroleum Products enacted ● All premium gasoline replaced by lead-free gasoline	
	● Adoption of the Montreal Protocol, the treaty for the protection of the ozone layer
	● Exxon Valdez oil spill off the coast of Alaska
	● Gulf War begins ● Massive oil spills in the Persian Gulf ● Keidanren Global Environmental Charter formulated and adopted
● Reduction of sulfur content in diesel fuel to less than 0.2 percent	● United Nations Framework Convention on Climate Change signed ● United Nations Conference on the Environment and Development (Earth Summit) held ● Request for preparation of Environmental Voluntary Plan by the Ministry of International Trade and Industry
	● The Basic Environment Law enacted
	● The United Nations Framework Convention on Climate Change enters into force ● Cabinet decision on The Basic Environment Plan
	● The First Conference of the Parties to the United Nations Framework Convention on Climate Change (COP1) held in Berlin ● The Great Hanshin-Awaji Earthquake
Large tanker truck, 15 meters long, 24 kiloliter capacity	
● Petroleum Association of Japan prepares "Control Program on Poisonous Air Pollution Substances" ● Law of Import Restriction on Specific Petroleum Products repealed ● Reduction of benzene content in gasoline to less than five volume percent	● ISO 14001, an international standard for environmental management system, published ● The Second Conference of the Parties to the United Nations Framework Convention on Climate Change (COP2) held in Geneva ● Enforcement of Law on the Quality Control of Gasoline and Other Fuels ● Decision on Keidanren Appeal on Environment – Declaration on Voluntary Action of Japanese Industry Directed at Conservation of Global Environment in the 21st Century
● Reduction of sulfur content in diesel fuel to less than 0.05 weight percent ● Petroleum Association of Japan prepares "The Self-Active Action Program for Global Environmental Conservation"	● Nakhodka oil spill ● Amendment of Law concerning the Rational Use of Energy ● Amendment of Waste Disposal and Public Cleaning Law ● Environmental Impact Assessment Law enacted, followed by the revision of Electric Utilities Industry Law ● Petroleum Association of Japan prepares "The Self-Active Action Program for Global Environmental Conservation", following the Keidanren Appeal ● The Third Conference of the Parties to the United Nations Framework Convention on Climate Change (COP3) held in Kyoto
● Lift of the ban on self-service stations	● Decision on Guideline of Measures to Prevent Global Warming ● Law Concerning the Promotion of Measures to Cope with Global Warming enacted ● The Fourth Conference of the Parties to the United Nations Framework Convention on Climate Change (COP4) held in Buenos Aires
Cosmo Oil's self-service station	● First Follow-up of Keidanren Voluntary Action Plan on the Environment ● Law Concerning Reporting of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in their Management (the PRTR Law) enacted ● Law Concerning Special Measures against Dioxins enacted ● Fifth Conference of the Parties to the United Nations Framework Convention on Climate Change (COP5) held in Bonn
● Benzene levels in gasoline reduced to less than one volume percent	● Sixth Conference of the Parties to the United Nations Framework Convention on Climate Change (COP6) held in the Hague ● The Basic Law for Establishing the Recycling-based Society enacted ● Law Concerning the Promotion of Procurement of Eco-friendly Goods and Services by the State and Other Entities enacted ● Amendment to Waste Disposal and Public Cleaning Law
● Vapor pressure of gasoline during summer lowered to 72 kPa	● Seventh Conference of the Parties to the United Nations Framework Convention on Climate Change (COP7) held in Marrakech ● Law Concerning Special Measures against PCB Waste enacted ● Central Environment Council issues recommendation on soil conservation method

Gulf War: Oil spills on the Persian Gulf result in major environmental damage. Photo: oil wells in flames

Negotiation on the reduction of greenhouse gases at COP3, Kyoto

Terminology

Petroleum Refining Facilities

Atmospheric Distillation Unit

Crude oil is composed of a variety of hydrocarbon compounds. The atmospheric distillation unit takes advantage of the different boiling points of these hydrocarbon compounds to separate crude oil into separate fractions—gasoline, kerosene, diesel fuel, fuel oil, and other materials—at normal atmospheric pressure. In general, the scale of an oil refinery is defined by the capacity of its atmospheric distillation unit.

Vacuum Distillation Unit

A unit which distills in a condition of reduced pressure. When oils with a high boiling temperature, such as heavy fuel oils, are heated, decomposition may occur before vaporization can happen. By reducing the pressure in the unit, the boiling point of the oil is reduced, allowing for its efficient separation.

Hydrodesulfurization Unit

This unit uses a catalyst to react the sulfur in the petroleum with hydrogen, converting the sulfur to hydrogen sulfide which can then be removed. Desulfurization can be performed for each fraction: naphtha, kerosene, diesel fuel, heavy fuel oil, etc.

Heavy fuel oil desulfurization units are further divided into direct and indirect desulfurization units. In the direct desulfurization unit, sulfur is removed from fuel oil emerging from an atmospheric distillation unit; the indirect desulfurization unit is used on fuel oil after the asphalt fraction has been separated in a vacuum distillation unit.

Diesel Fuel Desulfurization Unit

In 1997, the JIS for the sulfur content in diesel fuel was cut from 0.2 percent to 0.05 percent. This meant that a catalyst with higher desulfurization performance and a unit that could cope with the stricter conditions became a requirement. Because the existing hydrodesulfurization units could not meet the new standards, a large number of new desulfurization units were constructed at oil refineries across the country.

Catalytic Reformer

A unit which improves the octane number of naphtha separated by the atmospheric distillation unit. This naphtha with a higher octane number is then the source material for gasoline. Hydrogen, a by-product of this unit, is used in desulfurization.

Fluid Cat Cracker

This unit uses a minute-particle catalyst to crack heavy fuel oil. The cracked oil is divided into LPG, gasoline, diesel fuel and heavy fuel oil. The gasoline component produced by this unit has a high octane number, and a mix proportion rate to products.

Sulfur Recovery Unit

The unit collects sulfur from hydrogen sulfide with other by-product gases emitted by the hydrodesulfurization unit or other refinery facilities. Large quantities of sulfur oxide gas are released when gases containing hydrogen sulfide are directly used as fuel. Oil refineries therefore use sulfur recovery units to remove hydrogen sulfides from the by-product gases so they can be used as fuel.

Sour Water Treatment Unit

The wastewater discharged from hydrodesulfurization units and other refinery equipment contains hydrogen sulfide and other odorants. This unit uses steam injection to remove odorous materials. The hydrogen sulfide removed by this unit is then processed by the sulfur recovery unit.

Blending Unit

In this unit, gasoline, heavy fuel oil and other petroleum products are blended with a variety of manufactured base materials, adjusted to the desired qualities for the given application, then shipped. Each base material flows at a fixed volume, mixed on a continuous basis in the pipes, then moved to a tank and further mixed.

Petroleum Product Quality

Octane Number

Automobile gasoline octane quality regulations have been established because high octane numbers help reduce engine knocking. According to the JIS, regular gasoline has an octane number of 89.0 or higher, premium of 96.0 or higher.

Others

Conversion to Distillates

White oil is the general term for gasoline, kerosene and diesel fuel; conversion to distillates produces white oil by the decomposition of heavy fuel oil, or black oil. The composition of white and black oil depends on the type of crude oil, but various treatments at the refinery can be used to increase the production ratio of white oil.

Barrel

The unit of volume for petroleum. One barrel is approximately 159 liters.

Aromatics

Compounds that have benzene and benzene rings as part of their chemical structure. They may have two or more condensed benzene rings, or the hydrogens on the ring may be substituted by an alkyl group (toluene, xylene, etc.).

Independent Review Report

Asahi & Co

Independent Review Report on the "Cosmo Oil Environmental Report 2002"

To the Board of Directors of Cosmo Oil Co., Ltd.

1. Purpose and Scope of our Review

We have reviewed the "Cosmo Oil Environmental Report 2002" (the "Environmental Report ") of Cosmo Oil Co., Ltd. (the "Company") for the year ended March 31, 2002. The review consisted of performing certain procedures as described below in relation to the collection, compilation and calculation of the information included in the Environmental Report. As this is the second year of our review, any indicators for years prior to the year ended March 31, 2001 were not subject to these procedures.

Our work does not constitute an audit or examination. We therefore do not express an opinion on the accuracy or completeness of the indicators or databases used to compile the information or the representations made by the Company in the Environmental Report.

2. Procedures Performed

We have performed the following review procedures agreed to by the Company's management;

1) Obtained the environmental information supporting the environmental performance indicators and the environmental accounting indicators for the purpose of understanding the processes and the procedures of the Company for collecting the data information used to compile the Environmental Report.

2) With respect to the environmental performance indicators and the environmental accounting indicators in the Environmental Report, tested quantitative accuracy of the indicators on a sample basis and compared them on a sample basis with the supporting data compiled from the information collected by the Company.

3) With respect to the descriptive information in the Environmental Report other than the indicators referred to in the above procedures, interviewed the Company's responsible personnel, made on-site inspections of a refinery and compared such descriptive information with the data collected by the Company or the data found in certain published materials.

3. Results of the Procedures Performed

As a results of the procedures performed;

1) We are not aware of any material modifications that should be made to the environmental performance indicators, or the environmental accounting indicators in the Environmental Report in order for them to comply with the Company's policies and procedures for gathering and reporting such information.

2) We are not aware of any material modifications that should be made to the descriptive information other than the indicators in the Environmental Report to be consistent with the information the Company collected and other information we obtained.

Asahi & Co

Tokyo, Japan
September 4, 2002

Asahi & Co., acting in co-operation with member firms of KPMG International