The Cosmo Oil Group profile

The Cosmo Oil Group is an energy company group consisting of Cosmo Oil Co., Ltd. and its 134 subsidiaries and affiliated companies.

Through oil development, petroleum (mainly refining and sales), power production, and other businesses, its sales in fiscal 2002 reached 1.9 trillion yen (about U.S.$15.8 billion), mostly in the Japanese domestic market. Cosmo's share of all petroleum products combined in Japan is 13.6% (ranking third in Japan's petroleum industry).

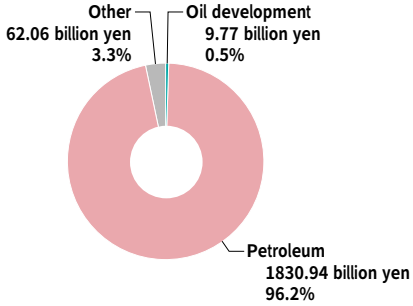
In Japan, Cosmo Oil Co. operates, besides its headquarters, 9 branch offices, 4 oil refineries, and a research institute, as well as 5,272 service stations including franchisees.

Overseas, there are Cosmo Oil Group crude oil development companies in the Middle East and Australia, as well as subsidiaries in the United States, the United Kingdom, and Singapore engaged in purchasing crude oil and other petroleum products and providing business services.

Business fields

Oil development
Petroleum; Oil refining and marketing
Others; Power, gas and others

Sales breakdown (consolidated) by field (billion yen)

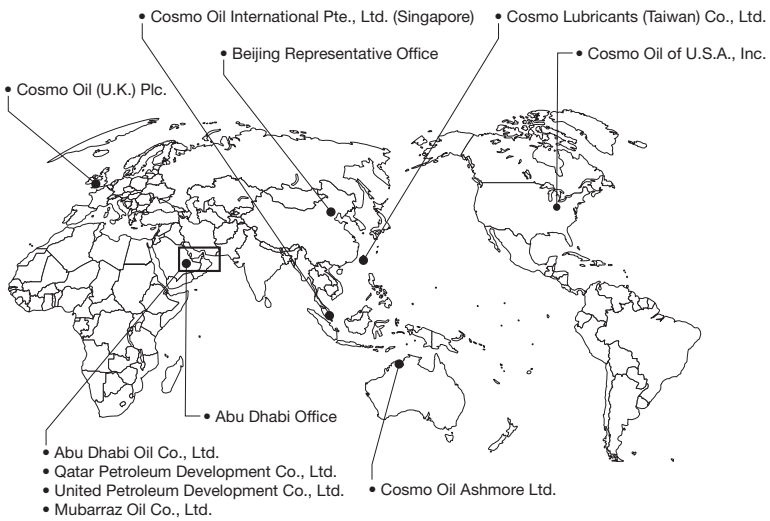


History of the Cosmo Oil Group environmental activities

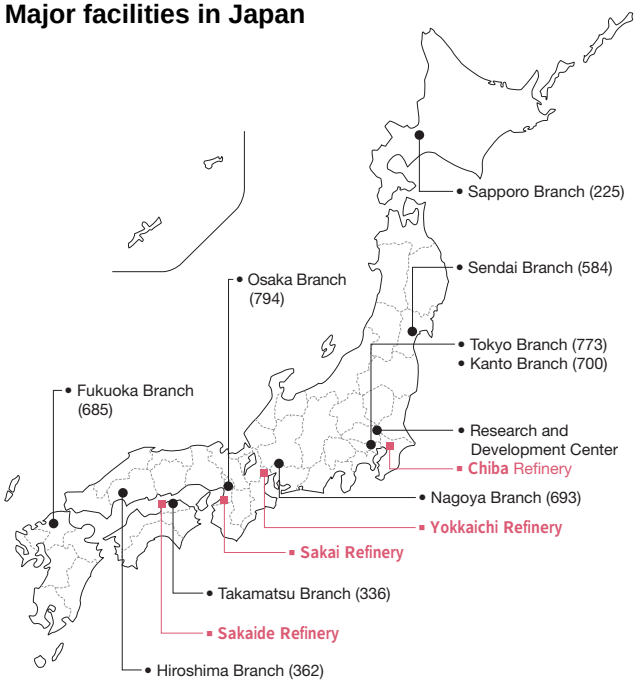
1986 Cosmo Oil Co. established through the merger of Daikyo Oil Co., Maruzen Oil Co., and the former Cosmo Oil (Cosmo Refining), a subsidiary of both companies.
1993 "Global Environment Action Program" devised.
1994 The first annual Global Environment Committee meeting held.
Cosmo Oil starts creating environmental targets annually, based on "Global Environmental Initiatives" document.
1996 "Environmental Action Plan Follow-Up Report" devised.
1997 Sakaide Oil Refinery obtains ISO 14001 certification.
Environmental impact assessments begin at Yokkaichi Kasumi Electric Power Plant (IPP).
1998 ISO 14001 certification obtained at three of Cosmo's oil refineries and Cosmo Matsuyama Oil Co.
1999 Sales launch of "Terra Series" biodegradable lubricating oil.
Sales launch of "Shinsei" chlorine-free diesel engine oil.
2000 Benzene levels in gasoline reduced to less than 1 volume %.
2001 "Cosmo Oil Environmental Report 2001" published.
2002 Cosmo the Card Eco credit card program launched.
Sales launch of diesel with 50 ppm sulfur content.

→ P.51

Major overseas operations



Major facilities in Japan



Figures in parentheses indicate number of service stations

Contents

Editorial policy

- This report is issued annually to describe the activities of the Cosmo Oil Group from the perspective of "social responsibility," with environmental protection as the main focus, and to report the results of activities to our stakeholders. Our stakeholders are described on page 8.
- In order to achieve its mission of "harmony and coexistence" with society, the Cosmo Oil Group is committed to integrated activities, including providing products that have low environmental impacts through their entire life cycles, ensuring a stable supply of petroleum, and preventing accidents, etc. For this reason, in this report, examples of both environment and society initiatives are reported together in one section, entitled "Environmental and Social Performance."
- Two features of the Cosmo Oil Group's environmental activities are promoting the effective use of oil resources and developing new technologies. This report describes our efforts to develop environmental technologies and our new energy businesses.
- The Environmental Reporting Guidelines released by the Japanese Ministry of the Environment were used as a reference to ensure that information is disclosed in a systematic way. Also, guidelines on "sustainability reporting" issued by the Global Reporting Initiative (GRI) were used as a reference for reporting on the "triple bottom line" (the environment, society, and the economy), to allow our stakeholders to see our activities from various perspectives.
- Unless stated otherwise, financial information is in Japanese yen (120.20 yen per U.S. dollar, 129.70 yen per Euro). The metric system is used for measures. Tons referred to in this report are metric tons (1,000 kg).
- The content and page structure of this English version of the report has been modified slightly from the original Japanese version. Detailed data on each company site have been omitted (these data can be accessed at our website, www.cosmo-oil.co.jp/eng/envi/2003/index.html), background information has been added on such issues as energy and the business environment surrounding the Cosmo Oil Group, and a summary of key performance indicators has also been added.

Scope of report

- This report mainly covers environmental and social activities of the Cosmo Oil Group in fiscal 2002 (April 1st, 2002 to March 31st, 2003); however, some of our activities in fiscal 2003 are included. There was no significant change in our business operations during the reporting term.
- The scope of data in this report covers the Cosmo Oil Group, consisting of Cosmo Oil Co. plus 134 subsidiaries and affiliated companies.
- The data presented in "Environmental Impacts from business activities" (page 31) and "Environmental accounting" (pages 47–50) in this report cover oil refineries, our Research and Development Center, offices, and Cosmo Matsuyama Oil Co.
- The data presented on pages 35–40 cover oil refineries.

As a corporate citizen and member of the global energy industry, the Cosmo Oil Group is working to help make society more sustainable.

We at the Cosmo Oil Group are building our business with the awareness that our most important mission in society is to supply energy in a stable and efficient way for use in everyday life and for the advancement of industry. Fossil fuels—the petroleum that forms our core business—have given many benefits to humanity. But it is also true that our world's mass consumption of oil has enormous impacts on the global environment. Thus, we recognize that for our group in oil industries, environmental protection is just as important a responsibility to society as providing a stable supply of oil.

The roles of corporations in reducing the overall environmental impacts of society—and in promoting sustainable development—are becoming increasingly important. In this context, the energy industry has a special challenge to help find ways to reduce the environmental impacts caused by the supply and consumption of energy. Thus, the Cosmo Oil Group has made the environment a priority management issue. To do our part, we are working to reduce the environmental impacts of the production and consumption of petroleum products. We are also putting effort into activities to protect and restore the natural environment.

Environmental protection—as a member of the oil industry

After the Industrial Revolution the world experienced a huge shift from coal to petroleum, or stated another way, from solid to liquid energy sources. As anyone can see, today the world depends heavily on petroleum products, and in Japan, for example, they provide about 50% of all energy consumed. From various perspectives—economics, safety, infrastructure, and fossil fuel reserves, for example—one could easily conclude that society is unlikely to abandon its oil dependency any time soon. Aware of this reality, the Cosmo Oil Group is making a great effort to reduce environmental impacts over the entire life cycle, from the production of crude oil to the transportation, manufacturing, marketing, and consumption of petroleum products.

To offer a few examples, in fiscal 2002, we developed a system to decrease the actual volume of active sludge discharged from oil refineries and installed it in our Sakaide Oil Refinery. We are continuing our efforts to address the issue of climate change and were able to reduce unit energy consumption at four refineries by 9.7% compared to fiscal 1990 (an additional 0.6 point improvement over our achievement in fiscal 2001). To reduce environmental impacts incurred during use, we have succeeded in developing low-sulfur diesel. We started trial shipments in the Tokyo area of diesel fuel with a reduced sulfur content of 50 ppm in September 2002, and expanded this product to supply nationwide in April 2003. These are but a few examples, and we promise many more to come.

Partnership with customers

Environmental issues affect every person on Earth, and our planet as a whole. To give individuals the opportunity to participate in activities to protect the environment, in April 2002 we launched the Cosmo the Card Eco, a credit card that customers can use at our service stations. Cardholders make an automatic donation of 500 yen each year, and Cosmo Oil also contributes an amount of funds each year that depends on sales volume.

About 56,000 customers joined this card program during fiscal 2002, and the funds collected through the card were used for environmental projects mainly in developing countries. To ensure that the funds are used effectively, Cosmo Oil employees actually visit the project sites and get directly involved, in partnership with citizens' organizations and other groups. To raise public interest, we are telling the world about these activities through television and newspaper advertisements. Until fiscal 2001, Cosmo Oil conducted projects independently with non-profit organizations, but thanks to the many customers who joined the Cosmo the Card Eco program, starting in fiscal 2002 we were able to expand the activities and social benefits and realize many synergies between our companies, customers and the NPOs.

During fiscal 2002, the funds were used to support trainings for organic rice-farming and to purchase and donate rice-milling machines. The aim of these efforts was to support the protection

of tropical rain forests that had been damaged from shifting cultivation in Papua New Guinea and the Solomon Islands, and to help address underlying issues of food supply. To ensure that the assistance will continue to be implemented effectively, we signed a memorandum of understanding with the local government and the government of Papua New Guinea regarding these projects.

Besides these activities, we are conducting a new initiative to make use of CO_2 emissions trading. During fiscal 2002 we purchased 24,000 tons (CO_2 equivalent) of carbon sequestration rights resulting from afforestation in Australia, and based on these rights issued "CO_2 Sequestration Certificates." In December, these certificates were applied to the 11,195 tons of CO_2 emitted through combustion of the gasoline purchased by Cosmo the Card Eco cardholders, meaning in effect that we have offered them "CO_2-neutral gasoline." We also sell the certificates in units of one ton at a time to consumers. Through such approaches we are offering individual users of petroleum products ways to tackle climate change.

Integrated energy projects

While the Cosmo Oil Group works to provide a stable supply of petroleum products with low environmental impact today, it is also working to develop energy that will meet humanity's needs in the future.

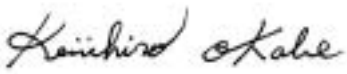
In fiscal 2002 we succeeded in manufacturing liquid fuel from natural gas for the first time in Japan, using our own catalyst technology. We also started operating a hydrogen fuelling station that uses sulfur-free gasoline to produce hydrogen for fuel cells. And we launched an independent power producer (IPP) electricity generation project in July 2003, a new type of venture for the Cosmo Oil Group. The electricity generated is being sold wholesale to Chubu Electric Power Co., LTD.

Committed to environmental excellence

Cosmo Oil is aiming to be an environmental leader, and we are still on the path to that goal. In April 2002 we made progress along the path to earn the reputation of "Cosmo Oil—the environmental choice," when we formulated what

we call *Blue Earth 21* (our Medium-Term Environmental Plan) and strengthened our internal corporate structure to support the plan, with the Global Environment Committee as the implementation body and the Executive Board as the decision-making body. A year later, in April 2003, we formulated the Corporate Ethics Regulations (including corporate Behavior Guidelines) for the Cosmo Oil Group as a whole. These codes encapsulate our basic policy on the environment. We have also established a Corporate Ethics Promotion Office.

To be truly appreciated and trusted by society and to have people continue valuing our existence, we at the Cosmo Oil Group must tell the world about our activities and listen sincerely to the opinions we receive. We started publishing the Environmental Report in 2001 as a part of our communications activities, in an effort to provide information clearly and systematically. We also undergo independent review to help ensure the accuracy and transparency of the information in our reports. We at the Cosmo Oil Group want to steadily improve the effectiveness of our environmental and social initiatives. To that end, we warmly welcome your comments and suggestions.



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

The Cosmo Oil Group works to provide a stable supply of energy, with a primary focus on petroleum products. The themes of “Harmony and Coexistence” and “Creation of Future Value” are key words to express our commitment to sustainable development.

In terms of value creation, we are strengthening our oil development business, transforming ourselves into an “integrated energy company” covering electrical power production and liquefied natural gas (LNG) business, and improving profitability of affiliated companies, as well as strengthening our core business of oil refining and sales.

To achieve harmony and coexistence with the natural environment, people, and society, we have committed ourselves to be an environmental leading company, by implementing our Medium-Term Environmental Plan, coordinated by the Global Environmental Committee. We are also committed to act in a socially responsible manner as a corporate citizen, by following the Corporate Behavior Guidelines set by our Corporate Ethics Committee.

We recognize that pursuing sustainable development must go hand in hand with communication with society. We will continue to communicate with various stakeholders and advance our environmental protection activities together with our customers, the end-users of the energy that we provide.

Performance in fiscal 2002

Fiscal 2002 saw achievements in many fields (indicated by ◇) and also areas for improvement in other fields (indicated by ◆). To move toward sustainable development, we have started taking action to progress further while overcoming such challenges.

■Activities Involving Customers and Society

◇ Increasing membership of Cosmo the Card Eco credit card and activities to mitigate climate change

To mitigate climate change by working together with our customers, we introduced a new credit card, Cosmo the Card Eco, in April 2002. The membership fees, combined with Cosmo’s contribution, are channeled through non-profit organizations to support environmental protection activities.

By the end of fiscal 2002, 56,000 people had joined the Eco card program. Contributions were made to environmental conservation activities such as tropical rainforest protection projects in Papua New Guinea and the Solomon Islands. We have also increased the environmental content of our advertising, with the aim of raising the public’s interest in environmental protection.

→ P.23

◇ Sales of CO_2-neutral gasoline and CO_2 Sequestration Certificates

In December 2002, we launched a “CO_2-neutral gasoline” program, which allows us to allocate Carbon Sequestration Rights (CSRs) to offset the CO_2 emitted by Cosmo the Card Eco cardholders’ use of gasoline.

Also, based on the CSRs, we issued “ CO_2 Sequestration Certificates,” which were offered for sale at 500 yen per ton of CO_2, and the money collected goes to help environmental protection activities. → P.24

■Reducing Environmental Impacts from Business Activities

◇ Most targets in the Medium-Term Environmental Plan achieved

We have achieved most of the targets in our Medium-Term Environmental Plan—reducing the amount of energy consumed per unit activity at oil refineries by 9.7% from fiscal 1990 levels (target was 8.0%), as well as reducing final disposal of industrial waste generated from oil refineries by 83% from fiscal 1990 levels (target was an average reduction of 81% by the period 2002–04). In addition, we established numerical targets where we previously had qualitative targets, such as for energy saving from transportation.

→ P.29

◇ Sales launch of diesel fuel with low sulfur content

As sulfur content is one of the sources of air pollution and other environmental impacts from the use of petroleum products, we have been actively working to lower the sulfur content of our products through investment in secondary treatment equipment and development of catalysts. Cosmo Oil was able to start supplying diesel with 50 ppm sulfur content in April 2003 nationwide (except in Okinawa and the outer islands), a year and nine months ahead of new government regulations. → P.17

◇Making longer-lasting catalysts

We succeeded in developing highly durable catalysts for heavy oil direct desulfurization units, and started trial operations at the Chiba Oil Refinery in November 2002. → P.15

◇Sludge reduction system

We tested a new sludge reduction system at the Sakaide Oil Refinery and estimate that approximately 400 tons of sludge from wastewater treatment equipment will be reduced each year at the refinery. → P.16

◆Working toward zero emissions

In fiscal 2003, we will launch our initiative to achieve zero waste generation at head office and all facilities, based on the "3Rs" concept (reduce, reuse, recycle). We will start devising plans for zero waste emissions of used catalysts and sludge at oil refineries and oil storage depots. → P.29

◆Devising green purchasing guidelines

In fiscal 2002, we discussed ways to integrate green purchasing into a company-wide initiative. In fiscal 2003, we will devise Cosmo's original Green Purchasing Guidelines (environmental criteria for purchasing). We have set a target of purchasing 70% of our office supplies through green purchasing. We will also work to expand the list of items covered, by gradually including materials used for production processes and the construction of facilities. → P.39

◆Soil conservation

We reinforced site inspections based on our Soil Conservation Policy. Our next tasks are to conduct site inspections at service stations and other operational sites, prevent oil leaks at service stations and minimize the environmental impacts in the event of leaks.→ P.16

■New Energy Developments

◇Launching into independent power production (IPP)

We constructed a power generating station with a capacity of 200,000 kW on land adjoining the Yokkaichi Oil Refinery. Power generation from oil residue (asphalt fractions) started in July 2003. → P.19

◇Developing GTL catalysts

We have developed gas to liquid (GTL) catalysts and succeeded for the first time in Japan to produce liquid fuels using GTL technologies. → P.20

◇Developing hydrogen production technologies for fuel cells

We participated in a Hydrogen/Fuel Cell Demonstration Project and opened a hydrogen fueling station in Yokohama for fuel cell automobiles. We have also succeeded in developing a hydrogen production unit using reforming catalysts and initiated a demonstration test. → P.19

◆Laying the foundations of an integrated energy company

In the Cosmo Oil Group Medium-Term Management Plan, we have included electrical power and natural gas as part of our business strategies until fiscal 2005. We are taking on the challenge of expanding our business to become an integrated energy company.

■Working for Greater Trust

◇Implementing Corporate Ethics Regulations

To keep the public's trust, the Cosmo Oil Group has formulated the Cosmo Corporate Ethics Regulations (including Corporate Behavior Guidelines) and started implementing them on April 1, 2003.

◇Computerizing systems for environmental accounting

We have completed computerization of environmental accounting and started operating the system in fiscal 2003. → P.48

◇Third party comment

To gain an objective perspective on our activities and the contents of our reporting, we have requested and included a third party comment by Mr. Toshihiko Goto. → P.53

◆Safer operations

There was one job accident requiring time off work at the refineries in fiscal 2002. With over 14 million accident-free hours, the Chiba Oil Refinery maintains its number-one safety ranking in Japan's petroleum industry. → P.40

◆Greater information disclosure

We are working toward greater information disclosure regarding Cosmo's social dimensions, especially in the areas of employee engagement such as human rights, personnel policy, and equal opportunity. We will keep working on further initiatives and information disclosure in the future. → P.43

Key Performance Indicators

Indicator	FY2001 Actual	FY2002 Actual	Target	Self-assessment	Page
Environment					
Unit energy consumption*1 (compared with FY1990 levels)	–9.1%	–9.7%	10% below FY1990 levels by FY2010	○	36
For reference: CO_2 emissions (thousand tons-CO_2)*1	4,711	4,785			36
For reference: CO_2 emissions throughout life cycle (thousand tons-CO_2)	76,754	79,275			32
Fuel consumption by tanker trucks (compared with FY1990 levels)	–17%	–16.5%	20% below FY1990 levels by FY2004	△	41
Fuel consumption by coastal tankers (compared with FY1990 levels)	–15%	–15%	17% below FY1990 levels by FY2004	△	41
Sulfur oxide emissions per crude oil equivalent throughput (g/kl)*1	25.4	27.6	Compliance with regulatory limits*3	○	38
Nitrogen oxide emissions per crude oil equivalent throughput (g/kl)*1	17.3	16.6	Compliance with regulatory limits*3	○	38
COD discharges per crude oil equivalent throughput (g/kl)	0.72	0.71	Compliance with regulatory limits*3	○	38
Final disposal (landfill) of industrial waste compared with FY1990 levels*1	–78%	–83%	81% below FY1990 levels by 2002–04 (average)	○	36
Society					
Work accidents requiring time off (per million hours of work)*1	0	0.43			40
Cosmo the Card Eco Membership (thousand persons)	N/A	56			23
Economy					
Net sales (consolidated, billion yen)	1,814	1,903			45
Net income (consolidated, billion yen)	–5.2	3.4			45
Shareholders' equity (consolidated, billion yen)	194.3	193.6			45
Environmental expenses (billion yen)*2	47.2	44.5			49
Environmental investments (billion yen)*2	1.1	2.2			49

○ Good △ Needs improvement

***1.** See pages 35–38 for calculation methods of data on four oil refineries.
***2.** See page 47 for the scope of data regarding environmental accounting.
***3.** We duly comply with rules and regulations set by Air Pollution Control Law, Water Pollution Control Law, other ordinances, pollution control agreements, reporting requirements, pollution control memorandums, etc.

External recognition

In March 2003, Cosmo Oil became the first Japanese oil company included in the FTSE4Good Global Index, an internationally renowned stock index for socially responsible investment. In July 2003, our stocks were also included in the Morningstar Socially Responsible Investment Index. → P.46

To fulfill our social responsibility to provide a stable supply of energy, we work to build good relationships with our stakeholders.

Background—oil and Japan

Here are a few figures to put things into perspective. About half of Japan's energy consumption is supplied by oil. And Japan is the second-largest*1 oil consuming country in the world, importing 99.7% of its oil from overseas.

There are 22 oil refining and sales companies operating in the country and their total net sales amount to 17.782 trillion yen (fiscal 2001).*2 Cosmo's share of all petroleum products sales oils combined is 13.6% (ranking third in Japan's petroleum industry).

Meanwhile, petroleum products are subject to seven different oil-related taxes*3 in Japan. On a budget basis in fiscal 2003, the tax revenue is estimated to reach 4.890 trillion yen, about 87% of which will be used for roads and airports, and about 13% for energy-related activities. Combined with about 760 billion yen levied through consumption tax, the total tax collected from oil will be about 5.65 trillion yen.

Business activities of the Cosmo Oil Group

We believe that the mission of the energy industry is to provide a stable supply of energy and products that have low environmental impacts through their entire life cycle. In order to achieve a stable supply of oil, Cosmo Oil works to build good relations with oil-producing countries such as Abu Dhabi, and to expand activities with a diverse range of stakeholders in Japan, including our customers, shareholders, suppliers, and non-profit organizations that work for environmental and social causes, as well as with the organizations we assist, including those overseas.

***1.** Volume of consumption in 2001 was 5,427 thousand barrels a day, which corresponds to 7.2% of the world total. Japan is the second largest oil consuming country after the United States, which consumes 26.1% of world oil consumption.
***2.** From *Heisei 14 nen Sekiyu Shiryo* published by *KK. Sekiyu Tsushinsha.*
***3.** Petroleum duties, gasoline tax, local road tax, light oil delivery tax, liquefied petroleum gas tax, aviation fuel tax, and petroleum tax.

Our stakeholders and way of communication

Customers	
Cosmo the Card Eco cardholders	Collaboration through Living With Our Planet Project
Cosmo service station users	Customer center
Corporate and other institutional customers	Information exchange
Authorized dealers/retail shops	Information exchange at authorized dealers' meeting, education and learning
Employees	Labor-Management Council, training programs for different levels and positions
Shareholders/investors/financial institutions/rating agencies	Information disclosure for analysts and investors, investor's newsletter and questionnaires, communication on social responsibility activities
Government (METI, etc.)	Collaboration for oil storage and development, collaboration for international cooperation
Oil producing nations	
National oil companies	Technical assistance/human resource development assistance
Overall society	Social and environmental contributions
Local communities	Environmental impacts and environmental regulations/agreements, community activities
Non-profit organizations	Collaboration for social and environmental activities
Overall society	
Children and future generations	Environmental reports and questionnaires, education and learning through environmental advertising

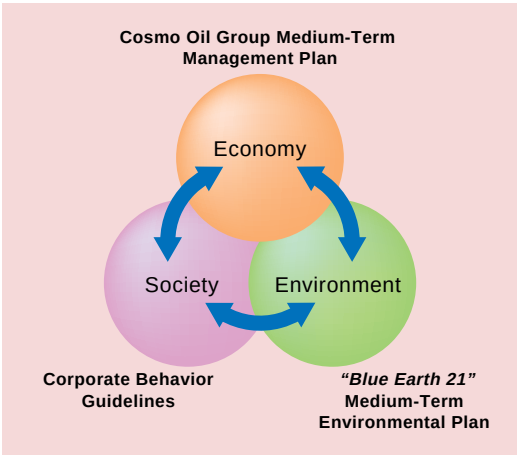
The Cosmo Oil Group aims for harmony and coexistence with the Earth, people and society. We are working toward sustainable development and a future without limits.

Our view of sustainable development

Oil-based energy has been driving the economic prosperity enjoyed in the much of the world today. But this prosperity has also created a gap between developed and developing countries, and major impacts on the global environment. The Cosmo Oil Group, as a group of energy-related companies, recognizes its responsibility to play a role in creating a sound and prosperous society for future generations—in other words, to help society achieve sustainable development.

The vision of the Cosmo Oil Group is sustainable development, and it is based on the key words of "harmony and coexistence" and "creation of future value." To fulfill our mission and responsibility of providing a stable supply of energy for society, we need to operate in a way that is in harmony with the Earth and society and be able to sustain this over the long term. We believe that by creating value for our customers in this way, we will raise the value of our company.

Our vision is consistent with the concept of the "triple bottom line"—the economic, environmental, and social dimensions of a business. Based on our management vision, we have developed three interlinking components to provide the roadmap for the Group—the Cosmo Oil Group Medium-Term Management Plan, which presents our business goals on the economic dimension; the *"Blue Earth 21"* Medium-Term Environmental Plan, which presents policies and targets on the environmental dimension; and the Corporate Ethics Regulations (inclucling Corporate Behavior Guidelines) which covers the social dimension. With these foundations, the Cosmo Oil Group aims to be sustainable as a company valued by all stakeholders in society.



Enhancing the value of the Cosmo Oil Group

The Cosmo Oil Group has formulated a new management plan based on its corporate management vision. Cosmo Oil Co. itself undertook a program of rationalization and value creation starting in fiscal 1996, and then implemented the management plan "Value Creation 21" in fiscal 2001 and 2002, improving profits by 43 billion yen in two years. We established a new three-year "Medium-Term Management Plan" that begins in fiscal 2003, with the aim of enhancing corporate value by utilizing the management resources of the entire Cosmo

Cosmo Oil Management Vision

We aim to realize sustainable development and unlimited future possibilities, in co-existence and harmony with the Earth, its people, and all society.

— Harmony and coexistence —

- with the global environment
- between society and energy
- between society and the corporation

— Creation of future value —

- by putting the customer first
- by encouraging diversity in ideas from each individual
- from organizational wisdom and knowhow

(excerpt)

Oil Group. By implementing the plan, we aim to improve Group profits over the three years ending in fiscal 2005 by 56.5 billion yen.

Under the plan, we will enhance the profitability of our core businesses of oil refining and distribution, while boosting oil exploration in the Middle East and Australia. We will transform ourselves into an "integrated energy company" by expanding into electricity generation and liquefied natural gas (storage and distribution). We will strengthen the profitability of our affiliates. And we will actively pursue the highest level of customer satisfaction by implementing ideas that will turn Group companies into environmental leading companies. Through all of these efforts, we will enhance corporate value, and strengthen the profitability of the entire Cosmo Oil Group. → P.46

The Cosmo Oil Group Medium-Term Management Plan

The Cosmo Oil Group will enhance its corporate value by making the best use of its management resources, while at the same time seeking harmony between the environment and society.

Committed to environmental excellence

One of the core components of our management plan is the drive for environmental excellence. The Cosmo Oil Group recognizes its responsibilities as a global citizen, and commits itself to implement the *Blue Earth 21* Medium-Term Environmental Plan for fiscal 2002–04. Under the slogan of "Cosmo Oil—the environmental choice," we have set objectives for each operational unit, for the nine core themes in the *Blue Earth 21* plan, and are executing the planned activities, such as reducing environmental impacts from business activities and petroleum products, developing environmental technologies, and promoting environmental communication. One feature of petroleum products is that they generate most of their environmental impacts at the consumption stage in vehicles and factories, etc. Because we see our responsibilities in that context—as a provider of those petroleum products—we are putting a considerable effort into environmental advertising and other methods to communicate with society, and are acting together with our customers in initiatives to protect the environment.

***Blue Earth 21* Medium-Term Environmental Plan**

Slogans

Cosmo Oil—the environmental choice

Committed to environmental excellence

Fulfilling our responsibilities as a corporate citizen

Simultaneously pursuing environmental protection and economic viability

9 Core Themes

1. **Prevention of climate change**
2. **Reduction of pollutant emissions**
3. **Prevention of soil pollution**
4. **Material reduction**
5. **Reduction of environmental impacts of products**
6. **Green purchasing**
7. **Research and development**
8. **Environmental conservation projects**
9. **Organization for environmental management**

Fairness and integrity

The Cosmo Oil Group recognizes the importance of acting with fairness and integrity as a member of society. We created the Cosmo Oil Group Corporate Ethics Regulations (including Corporate Behavior Guidelines) in April 2003 to reinforce legal and regulatory compliance in our business activities. The Behavior Guidelines illuminate how we should behave and what applicable laws and codes exist in relation to stakeholders, such as individuals and companies.

The Cosmo Oil Group Corporate Behavior Guidelines

Chapter 1: Consumers and users

○**Developing and providing high quality products and services**

○**Assuring quality and safety of products**
Applicable law: Product Liability Law
Applicable codes: Code of Quality Assurance Policies, Complaint Handling Policies and Procedures, Guidelines for Product Liability

○**Conducting fair transactions with customers**
Applicable laws: Law Against Unjustifiable Premiums and Misleading Representation Consumer Contracts Law
Applicable code: Compliance Manual for Law Against Unjustifiable Premiums and Misleading Representation

○**Managing customer information**
Applicable law: Act for Protection of Computer Processed Personal Data held by Administrative Organs
Applicable code: Information Management Provisions

Chapter 2: Suppliers and competitors

○**Relations with authorized dealers and allied companies**

○**Complying with antitrust laws**
Applicable law: Antimonopoly Law
Applicable code: Compliance Manual for Antimonopoly Law

○**Conducting fair transactions with suppliers**
Applicable law: Antimonopoly Law, Subcontracting Law
Applicable codes: Compliance Manual for Antimonopoly Law, Purchasing Code

○**Respecting privacy and intellectual properties of others**
Applicable laws: Unfair Competition Prevention Law, Copyright Law, Patent Law, Trademark Law

Chapter 3: Shareholders and investors

○**Disclosure of corporate information**

○**Prohibiting insider trading**
Applicable law: Securities Exchange Law
Applicable code: Code for Prohibition of Insider Trading

○**Prohibiting payoffs**
Applicable law: Commercial Code

Chapter 4: Society

○**Development of local communities**

○**Safety of operations**
Applicable codes: Environment and Safety Administration Code, Rules for the Environment and Safety Countermeasures Headquarters

○**Environmental protection activities**
Applicable codes: Environment and Safety Administration Code, Rules for the Global Environment Committee

○**Social actions**

○**Information disclosure**

○**Security and export control**
Applicable law: Foreign Exchange and Foreign Trade Law
Applicable code: Security and Export Control Policy

○**Breaking off relations with antisocial forces**
Applicable law: Anti-Organized Crime Law

○**Activities outside of Japan**

Chapter 5: Political and governmental affairs

○**Building healthy and normal relations**
Applicable law: National Public Official Moral Code

○**Compliance with regulations on political donation**

○**Prohibiting corrupt practices**
Applicable laws: Bribery charges (Criminal Law), Unfair Competition Prevention Law, OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions

Chapter 6: Employees

○**Respecting human rights and prohibiting discrimination**

○**Compliance with labor regulations**

○**Providing a safe and better working environment**

○**Respecting individuality**

Chapter 7: The company and corporate assets

○**Adequate accounting procedures**
Applicable code: Accounting manual

○**Adequate management and use of company assets**

○**Protecting intellectual property**

○**Control of confidential information**
Applicable code: Information Control Provisions

○**Proper management and use of information systems**
Applicable code: Code for Information System Control

○**Avoiding conflicts of interests**

(excerpt)

Promotion of corporate ethics

In April 2003, we created the Corporate Ethics Regulations (including Corporate Behavior Guidelines) and put them into effect. At the same time, to facilitate implementation of the Regulations, we created the Cosmo Oil Group Corporate Ethics Committee, which is chaired by the president of Cosmo Oil Co. We also established the Cosmo Oil Group Corporate Ethics Promotion Office to support the Committee, and a telephone and e-mail helpline managed by the office for employees to discuss or report their concerns. In each company of the Cosmo Oil Group, the president is responsible for promoting corporate ethics, and through these arrangements, we believe that the Group will maintain the public's trust.

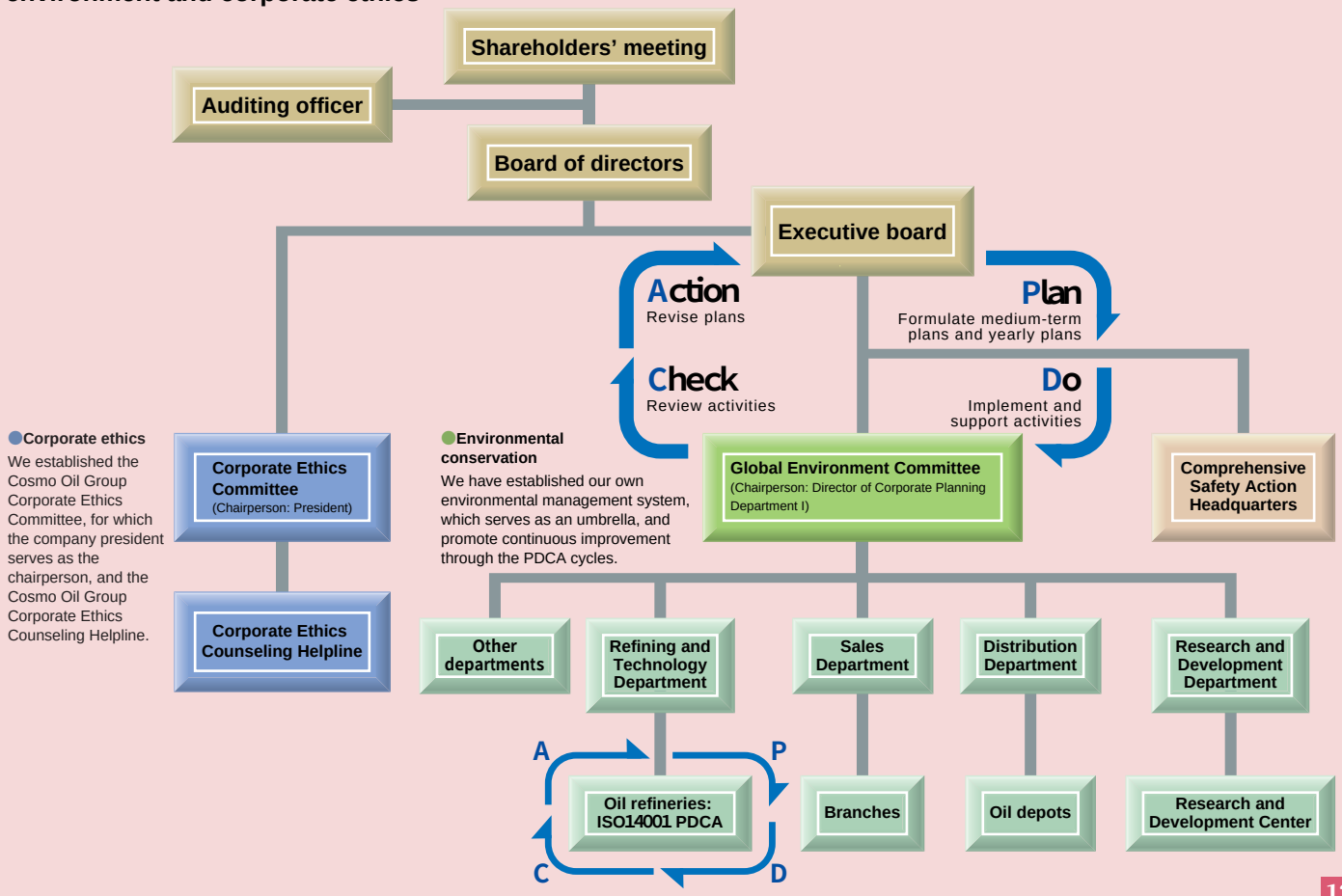
Organizational arrangements to promote environmental activities

In fiscal 2002, Cosmo Oil Co. introduced its own environmental management system, which serves as an umbrella for the entire company to strengthen and expand its environmental activities. We also placed the Global Environment Committee and the Comprehensive Safety Action Headquarters under the company's Executive Board. These organizational arrangements clarify decision-making processes involving environmental and safety issues, and facilitate the effective implementation of the plan-do-check-action (PDCA) cycle.

Risk management

We undertake risk management as a fundamental corporate social responsibility. The General Affairs Department takes the initiative in identifying potential risks in all business activities, assessing impacts, and conducting measures to address the risks. The Internal Auditing Office inspects progress with the risk management activities and reports to management every year, enabling the company to identify risks more thoroughly. In fiscal 2002, we started revising our various rules and policies for risk management.

Organizational structure for environment and corporate ethics



We aim to be known as "Cosmo Oil—the environmental choice." Promoting the effective use of energy resources is one way we are working to earn that title.

As a result of rapid social and economic changes that have occurred since the Industrial Revolution, humanity today consumes enormous quantities of fossil fuels. This consumption is thought to be one of the major causes of climate change. As global environmental problems have become more obvious and environmental awareness has grown, the world has been searching for practical sources of energy that involve lower environmental impacts.

Japan's energy in 2010

Japan's energy consumption in fiscal 1999 was 402 million kl in crude oil equivalent (see table below), an increase of 15.2% over 1990 levels, although the country has committed itself to reduce greenhouse gas emissions by 6% from 1990 levels under the Kyoto Protocol. In this context, the Ministry of Economy, Trade and Industry (METI) has set a target of 400 million kl for the year 2010, and is focusing its efforts on suppressing limiting increases of energy consumption in the industrial and transportation sectors.

Japan's final energy consumption, by sector —past and predicted (million kl, crude oil equivalent)

	1990	1999	2010 (target)
Industrial	183	197	185
Non-industrial: household	46	55	58
Non-industrial: commercial	39	50	63
Transport: passengers	39	53	50
Transport: freight, etc.	42	47	45
Total	349	402	400

Source: Based on the report "Energy Policies: Looking Ahead," General Energy Investigation Committee (METI), July 2001.

In 1999, Japan's total energy supply amounted to 593 million kl (crude oil equivalent), of which petroleum contributed 52% (see table below). Petroleum's proportion of the total energy supply has declined gradually from 77% at the time of the oil shock in 1973. The growing contributions of natural gas (today 13%) and nuclear power (13%) have been major factors in this change. Meanwhile, renewable energy (mostly hydro) accounts for 4.9% and "new energy" (examples include solar and wind power, refuse-derived fuel, fuel cells, etc.) for only 1.1%.

Government and industry are pinning great hopes on new forms of energy. A future energy scenario prepared by METI's General Energy Investigation Committee is based on the view that it will be feasible to boost new energy's share of the total energy supply to 3% by fiscal 2010, through increases in windpower generation (38 times current levels), photovoltaic generation (23 times), and other sources. Although petroleum's share declines to 45% in the committee's scenario, this still means that petroleum will continue to play an important role.

Japan's primary energy supply—past and predicted (million kl, crude oil equivalent)

	1990	1999	2010 (target)
Petroleum	307	308	271
Coal	87	103	114
Natural gas	53	75	83
Nuclear	49	77	93
Hydro†	22	21	20
Geothermal†	1	1	1
New energy†	7	7	20
Total	526	593	602

† indicate renewable energy.
Source: Based on the report "Energy Policies: Looking Ahead," General Energy Investigation Committee (METI), July 2001.

How is Japan tackling climate change?

Faced with rising energy consumption, it is obvious that Japan must shift toward forms of energy that emit fewer CO_2 emissions. In this context, the government has set targets to boost the use of clean energy vehicles (such as electric, fuel cell, hybrid and natural gas-powered vehicles) in fiscal 2010 to more than 50 times the number in fiscal 1999. Besides such plans to use alternative fuels, the government and industry now have many other technologies at the research and development phase. But the challenge is not just to design and promote new vehicles—changes in types of energy used will inevitably require extensive improvements in the infrastructure for provision of fuel and energy. For example, service stations that today supply only gasoline may in the future also have to sell hydrogen and electricity. It is clear that careful consideration is needed regarding decisions affecting which fuels and technologies will become mainstream in the future, because those decisions will have major implications for the government, industry and society.

Besides these factors, various policies are likely to be created to promote cogeneration and fuel cells, and further deregulation is expected in electricity and natural gas sectors, as the

government seeks ways to increase efficiency in the economy.

In the context of climate change, the Kyoto Mechanisms*1 (including emissions trading*2, the CDM*3, and JI*4) will probably become essential tools for Japan and other countries to achieve their targets under the Kyoto Protocol.

The Kyoto Mechanisms are flexible mechanisms under the Kyoto protocol that facilitate the efforts of industrialized countries to fulfill their national emissions reduction commitments.

Oil and the environment—our perspective

The Cosmo Oil Group is aware of its role and social responsibility in the context of energy and environmental issues. As stated above, even with the government's scenario of reducing petroleum's share of Japan's primary energy supply from 52% in 1999 to 45% in 2010, petroleum will continue being a major energy source for society. We are keenly aware of the need to provide a stable and efficient supply of petroleum through our business of producing, transporting, refining, and marketing petroleum products. And we know that we must balance these needs with our responsibility to reduce the environmental impacts arising from business activities and to make cleaner petroleum products.

For example, we have set concrete targets and are working to improve energy efficiency of production by 10% at our oil refineries in 2010 compared to 1990. And as we work to make our petroleum products cleaner, we are not content just to meet current regulations, but are working to keep well ahead of future regulations.

In addition, we are actively working on research, development and commercialization of alternative energies.*5 As an integrated energy company, we are also expanding into the businesses of distributed power generation, independent power production and liquid natural gas, and developing technologies for fuel cell systems, hydrogen fueling stations, and gas-to-liquid fuels. Not only that, we are also working to expand into new environmental businesses that provide products and services based on our own new environmental technologies.

We don't stop with the business areas we are directly involved in, but are also moving ahead with environmental initiatives in a broader sense. We believe it is our responsibility as an energy company to tackle climate change, through initiatives such as emissions trading and the conservation of tropical rainforests. And through efforts to raise environmental awareness, we are working together with customers and society to help protect the global environment.

Through such activities, the Cosmo Oil Group aims to contribute to the creation of sustainable society, and to be seen as "Cosmo Oil—the environmental choice" for customers, shareholders and investors.

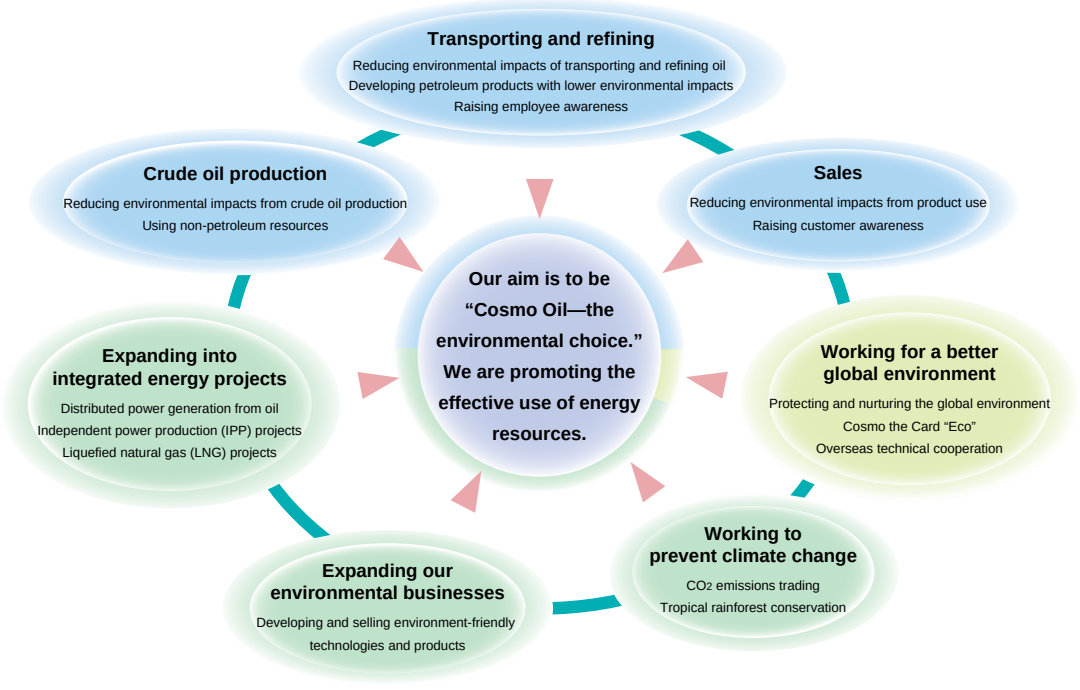
***1. Kyoto Mechanisms**
The Kyoto Mechanisms are flexible mechanisms under the Kyoto protocol that facilitate the efforts of industrialized countries to fulfill their national emissions reduction commitments. They include emissions trading, the CDM, and JI.

***2. Emissions trading**
Emissions trading allows industrialized countries that have made commitments for greenhouse gas emissions reduction targets to trade part of their emissions allowance (assigned amounts).

***3. CDM**
(Clean Development Mechanism)
The CDM allows industrialized countries that have committed to greenhouse gas emissions reduction targets to invest in projects in developing countries in order to reduce emissions (or enhance sinks), and to obtain credits for those reductions (or sinks). This mechanism offers merits for both sides—the industrialized country can apply the credits to meet its own reduction targets, while the developing country benefits from technology transfer and investment.

***4. JI** (Joint Implementation)
JI allows industrialized countries to transfer (or acquire from) other industrialized countries the emissions reduction units resulting from projects aimed at reducing emissions of (or increasing absorption of) greenhouse gases.

***5** See pages 19–20.



Working for a better global environment

●Activities with customers and society

We are working to reduce the impacts on the environment—not only at our own facilities, but throughout the entire product life cycle, from the production of crude oil through to the customer's actual use of petroleum products. Because the greatest environmental impacts in the entire petroleum product life cycle occur at the use stage,[*1] the Cosmo Oil Group is putting effort into communication with all our customers and stakeholders.

Under the slogan of "Living With Our Planet," in April 2002 we launched the Cosmo the Card Eco, a company credit card that gives customers the chance to join us in protecting the environment. Cosmo Oil supplements the contributions collected through this card, and our employees visit the actual sites where projects are being implemented. To date, the card has supported projects such as the Tropical Rainforest Conservation Project in Papua New Guinea and on the Solomon Islands. We have publicized these activities by television commercials to raise public interest.

At the same time, we are expanding awareness-raising activities.[*2] Cosmo Oil is conducting social contribution activities in which our employees participate under the themes of "international contributions," "environmental protection," and the "car society." We have conducted community activities for years, such as an annual event called kids camp for primary school children who have become orphans as a result of traffic accidents, and the Cosmo Kids' Green Workshop to raise environmental awareness. We have also boosted the amount of environmental content in our advertising.

Cooperation in international society is another important duty. To solve environmental problems in oil-producing and developing countries, we are working to spread environment-related technologies, for example by supporting exchanges of experts, both overseas and in Japan.

We believe that raising the environmental awareness of consumers and society as a result of these communication and social contribution activities will help protect the environment. It is also our belief that when they see the extent of our efforts, customers, shareholders and investors will be encouraged to choose the Cosmo Oil Group.

●Living With Our Planet —Our Commitment

To continue being valued in society, the companies of the Cosmo Oil Group are committed as corporate citizens to do as much as we can do and must do today for the Earth, not only in the petroleum industry but at any level.

●Taking on climate change through emissions trading, etc.

Climate change is a global issue that requires humanity's urgent response. We must go beyond the boundaries of individual companies or countries. While we work to reduce our own environmental impacts, we at Cosmo Oil are working to support the Kyoto Mechanisms, including emissions trading, the CDM and JI.

In May 2001 Cosmo Oil and 12 other companies helped to establish Natsource Japan, an agency for CO_2 emissions trading and consulting. Also, during fiscal 2002, we started a new initiative to make use of carbon sequestration rights. For example, based on 24,000 tons of Carbon Sequestration Rights we purchased, resulting from afforestation in Australia, we issued CO_2 sequestration certificates and developed a "CO_2-Neutral Gasoline" program.

Reducing the environmental impacts of business operations

We are working to improve technologies to help reduce the environmental impacts of our business operations. Priority topics include energy conservation, waste reduction, and reduction of hazardous substance emissions. Our achievements in fiscal 2002 are described here.

●Making catalysts last longer

Cosmo Oil has made many achievements in research and development of the catalysts that are necessary to produce a variety of petroleum

***1.** See pages 31–32.
***2.** See pages 25–26, 28.

products from crude oil. By extending the life of catalysts we can not only cut costs, we can also reduce industrial waste output. In fiscal 2002, our work on residue desulfurization catalysts that remove sulfur content from petroleum products succeeded in developing a catalyst that has 1.3 times the life of conventional catalysts. Trial operations started in the residue desulfurization unit at the Chiba Oil Refinery in November 2002. Our work on fluid catalytic crackers (FCC) established a production method for an FCC metal scavenger that can reduce the amount of catalyst used by half. Trials with this method started in November 2002 in the FCC unit of our Sakai Oil Refinery.

●Sludge reduction system

In the wastewater treatment unit of oil refineries, we break down the organic compounds of the oil component and other substances in wastewater. But the microorganisms used in this process multiply and create excess sludge, which accounts for the greatest volume of industrial waste discharged from oil refineries. The Cosmo Oil Research and Development Center developed a system to suppress the amount of sludge generated, by first crushing it and using a chemical treatment, then running it through the wastewater treatment unit again. In fiscal 2002, a test of this system at the Sakaide Oil Refinery (with assistance from the Petroleum Energy Center) achieved a 50% reduction in the amount of excess sludge, amounting to a total reduction of 400 tons per year. Because the equipment design is simple and easy to operate and maintain, we believe it will be an effectiveway for other companies to reduce wastewater discharge and environmental impacts.

●Soil conservation

Public awareness of soil pollution has increased in recent years and improvements have been made in national legislation. To help reduce the environmental risks associated with soil pollution, the Cosmo Oil Group drew up a policy on soil conservation in June 2002, and has set up group-wide organizational arrangements to protect the soil environment based on this policy.

Policy on soil conservation (excerpt)
We will conduct soil testing systematically at Cosmo Oil and affiliated facilities and the sales facilities of Cosmo brand products, and take measures as deemed necessary.

●Actions for soil conservation

We are carrying out the following activities to prevent leaks of petroleum products at service stations and minimize the environmental impacts in the event of a leak.

- During fiscal 2001, we conducted our own inspections at Cosmo Oil-owned service stations that were built 20 years ago or earlier. During fiscal 2002, we implemented risk assessments of the soil environment at all service stations (about 5,300 locations, including authorized dealers). At Cosmo Oil-owned service stations, we conducted independent inspections of equipment and carried out follow-up work depending on the level of risk identified. At authorized dealers we provided recommendations based on our findings. At stations where soil pollution was identified, we started clean-up operations.
- We improved the information on the soil environment in service station management manuals, and are currently developing new service station management standards.
- We established an expert team at the corporate head office. The team made about 20 training visits to company-owned stations and authorized dealers, created and distributed a training video, and is raising awareness about the importance of protecting the soil environment and the necessity of daily attention to these matters.

At other business sites, we are working to prevent soil pollution, through maintenance and daily inspections of the facilities. Also, we are developing inspection plans based on the type of site operations and history, and implementing inspections based on those plans.

●Development of soil pollution technologies

We are conducting ongoing research on the use of microorganisms for bioremediation to clean soil that has been polluted by oil. In fiscal 2002, we made progress with analytical technologies for investigating pollution conditions, and used them for soil analysis at facilities where petroleum is present, particularly service stations.

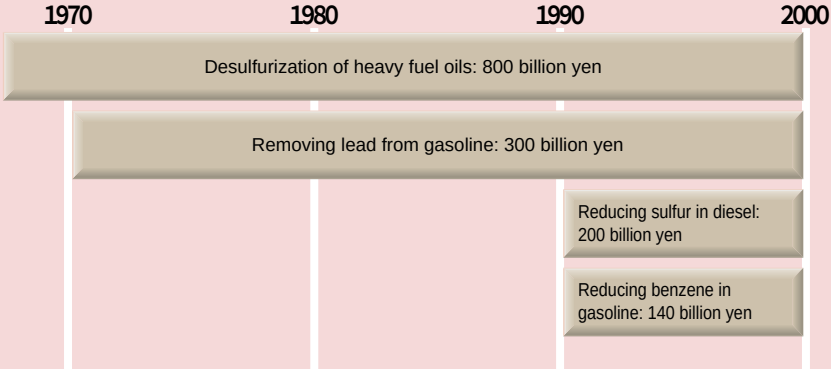
Enhancing the quality of petroleum products—to reduce environmental impacts during use

In the life cycle of petroleum products*1 the greatest environmental impacts occur during the usage phase. Because sulfur oxides (SOx) emitted into the atmosphere become a major cause of air pollution, the oil industry in Japan is working hard to reduce the sulfur content in products.

Japan relies heavily on the Middle East for its supply of oil. Because the sulfur content of Middle East crude is higher than African and North Sea crude, a considerable amount of secondary treatment equipment is needed during refining. Petroleum products used in Japan today have some of the lowest environmental impacts in the world, thanks to strict laws and regulations requiring low sulfur content, as well as investments by industry in desulfurization equipment. In addition, the Petroleum Energy Center is working with the automobile industry to improve air quality, and is working to consider the best improvement strategies for Japan (JCAP*2).

Meanwhile, Cosmo Oil is working to reduce the environmental impacts of the refining process and pouring resources into technological development, with the top priority given to areas such as reducing the sulfur content of fuels and improving fuel combustion. We will continue to put our effort into developing catalysts to reduce sulfur content, and to provide customers with products that have low environmental impacts during use.

Environmental measures and capital investment (by Japan's petroleum industry)



• Gasoline

To reduce the environmental impacts of gasoline, Japan's petroleum industry has worked to make gasoline lead-free, and to reduce benzene and sulfur content.

In 1975 regular gasoline became lead-free, followed by premium gasoline in 1986. Meanwhile, the government reduced the permitted benzene*3 content to less than 1 volume % in January 2000, paving the way for sales of low-benzene gasoline.

Sulfur content is regulated by JIS standards at 100 ppm (0.1 mass %) today, and this will be further reduced to less than 50 ppm in 2005. Cosmo Oil is already selling gasoline with sulfur content far better than the regulated standards, at 30 ppm for regular gasoline and 5 ppm for premium (both levels achieved during fiscal 2002).

In order to reduce emissions of hydrocarbon vapors, one cause of photochemical smog, as a part of voluntary efforts by the oil industry, starting in 2005 we will be reducing the Reid vapor pressure (RVP) of gasoline in summer from the current 72 kPa down to 65.

Improvements in gasoline quality by the Japanese petroleum industry

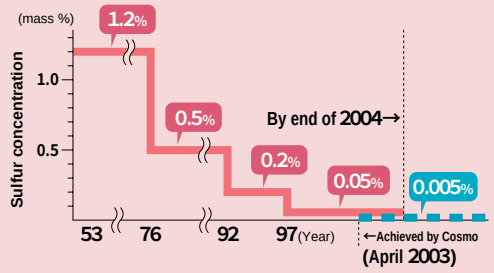
1950 Gasoline production begins
1970 Lead pollution (in air) incident in Shinjuku, Tokyo
1975 Regular gasoline becomes completely lead-free
1986 Premium gasoline becomes completely lead-free
1987 Sales of 100-octane premium gasoline begin
1991 Sales of methyl tertiary butyl ether (MTBE) blended premium gasoline begin*4
1996 Revision of JIS standards (benzene to less than 5 volume %, sulfur to less than 100 ppm, and MTBE to less than 7 volume %)
2000 Regulation of benzene content to 1 volume %

• Diesel

To reduce the amount of sulfur in diesel fuel, the Japanese petroleum industry began the installation of hydro-desulfurization equipment during the late 1950s. Sulfur levels in diesel fuel were reduced to 0.2 mass % in 1992, and then to less than 0.05 in 1997. In order to make emissions gases even cleaner, the government has decided to reduce sulfur in diesel to 0.005 mass % (50 ppm) by the end of 2004.

Using newly developed catalysts, Cosmo Oil was able to start supplying 50 ppm diesel in April

Regulated sulfur levels in diesel (Japan)



***1.** See page 31.

***2. JCAP**
Abbreviation for Japan Clean Air Program. This is an air quality improvement program promoted by the Petroleum Energy Center, with cooperation from the automobile and petroleum industries. Its focus is on promoting advanced automobile and fuel technologies. Japan's vehicle exhaust regulations are among the toughest in the world, but to improve air quality it is necessary to reduce emission gases even further. For this purpose, Cosmo Oil is considering air quality improvement strategies that would be the most appropriate for Japan, considering the specific conditions of the country's society, industrial structure, geography and climate, etc.

***3. Benzene**
Benzene has attracted concern for its adverse effects on human health. Japan's Ministry of the Environment has classified it as a priority substance and hazardous air pollutant, although the effects on living organisms of benzene at the levels found in gasoline are not yet fully known.

***4. MTBE**
Cosmo Oil applied the precautionary principle when considering the environmental impacts of MTBE, and stopped using it as a gasoline additive in fiscal 2001.

2003 nationwide (except in Okinawa and the outer islands), a year and nine months ahead of the government regulations. We are now participating in a New Energy and Industrial Technology Development Organization (NEDO) project to develop even more efficient catalysts.

●Kerosene

Current JIS standards for sulfur content in kerosene are at 80 ppm (0.008 mass %). Cosmo Oil started supplying kerosene at even cleaner levels (28 ppm) in fiscal 2002.

●Heavy fuel oil

The government ordered temporary shutdowns of nuclear power plants in Japan for inspections during fiscal 2002, which led to an increase in demand for heavy fuel oil C for electricity generation. Cosmo Oil adjusted production to meet these changing circumstances, but a decline in demand for this grade of oil is predicted in the future. We will increase production of higher value-added diesel and gasoline products by refining heavy oil further. Cosmo Oil is also entering into independent power production, generating electricity using heavy oil and asphalt fractions.

Progress toward sulfur-free automotive fuel

●Developing automotive fuels

The European Union is preparing for the complete phase-in of "sulfur-free" gasoline and diesel (sulfur content 10 ppm or less) by 2009. Oil refineries will have to make capital investments in order to produce sulfur-free automotive fuels, and more intensive processing will increase CO_2 emissions during the refining process. The new legislation will only succeed through the introduction and popular use of vehicles built with new technologies that can run on sulfur-free fuels.

Cosmo Oil and other members of the Petroleum Association of Japan believe that with the utmost effort, it will be possible to have all gasoline and diesel products sulfur-free by 2008. We are studying the possibility of having all diesel fuels sulfur-free by 2007, provided vehicles are on the market that can use it. Although conditions differ with each oil company, Cosmo Oil will be able to offer a partial supply of sulfur-free diesel in about 2005, and we are working hard to make it available at the earliest possible date.

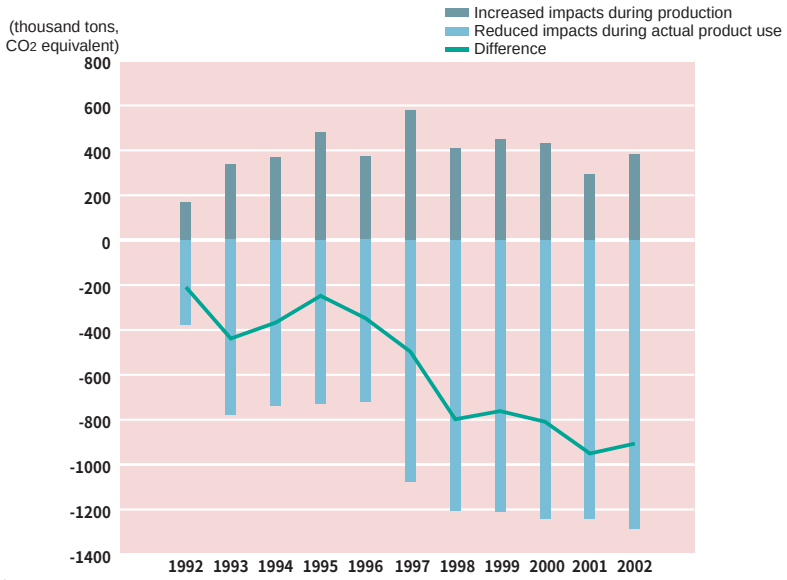
■Integrated assessment: Reduced diesel sulfur content and environmental impacts at refineries

It is impossible to reduce environmental impacts during the use phase of fuels by boosting the quality of petroleum products without more intensive refining—and this requires the use of more energy at refineries. To reduce the environmental impacts of petroleum over the entire life cycle, the decrease in impacts during use must be greater than the increase in impacts during refining. We used diesel as a case study of an integrated assessment to compare the net change in environmental impacts.

Sulfur content of diesel was reduced from 0.5% to 0.2% in October 1992, and then to 0.05% in July 1997. Cosmo Oil reduced it further to 50 ppm (0.005%) in September 2002.

The graph below shows the environmental impacts at the oil refinery and during use, with 1991 as the base year. Clearly the impacts at the refinery increased, but impacts during the use of diesel fuel declined an even greater amount. One can conclude that the environmental impacts over the entire life cycle have declined.

Reference "Environmental Priority Strategies in Product Design (2000)", Centre for Environmental Assessment of Products and Material Systems, Sweden.



Notes:

1. EPS weighting factors (CO_2=1): SOx=30.3, NOx=19.7, COD=0.00935.
2. This study uses CO_2, SOx, NOx and COD to assess environmental impacts.
3. The environmental impact of diesel fuel use was assessed in terms of SOx, calculated by multiplying production volume by sulfur content (using the JIS standard for diesel sulfur content until fiscal 1999, and our actual sulfur content thereafter), and then converting it to SO_2.

Status of ISO 9001 certification

Site	Prefecture	Certification body	Certification date
Cosmo Oil Co.			
Chiba Oil Refinery	Chiba	JQA	December 25, 1996
Yokkaichi Oil Refinery	Mie	JQA	February 18, 1997
Sakai Oil Refinery	Osaka	JQA	March 14, 1997
Sakaide Oil Refinery	Kagawa	JQA	May 10, 1996
Cosmo Matsuyama Oil Co.	Ehime	JQA	November 14, 1997
Cosmo Oil Lubricants Co.			
Osaka Plant	Osaka	JQA	March 31, 1997
Shimotsu Plant	Wakayama	JQA	May 9, 1997

ISO 9001 is a set of globally accepted standards created in 1987 by the International Organization for Standardization (ISO), to ensure the quality of products and services. An independent certification body verifies and judges if quality management systems established by companies meet international requirements set in ISO 9001.

Integrated energy projects —fuel cells, natural gas, and more

With the ongoing deregulation of the energy sector, the divisions between oil, electricity, and gas businesses are becoming less clearly defined. Cosmo Oil is expanding into energy business besides petroleum to foster more effective use of energy sources that are less harmful to the environment—such as distributed power generation, fuel cells, hydrogen fueling stations, and liquefied natural gas (LNG).

• Distributed power generation

The supply of electricity from power plants involves huge energy losses during power transmission. With distributed power generation, electricity is generated close to where it is needed for residential or business use, with significantly lower transmission losses, and heat from the generation process can be used effectively. Combined, these features help to significantly boost energy efficiency.

Cosmo Oil has developed a cogeneration system for power generation and the effective use of excess heat. The system has been installed in hotels, hospitals and other facilities. We have also been developing a kerosene-powered air-conditioner that runs on a heat pump*1. As the fuel source for those units and distributed power generation, we have the potential to build an efficient business model using our existing distribution network. New contracts in fiscal 2002 for this combined heat and electricity supply business amounted to 8,284 kW, with a total amount supplied of 11,872 kW.

• Independent power production*2

In the Kasumi area of Yokkaichi City in Mie Prefecture, we completed construction of an electrical power plant with a maximum output of 200,000 kW, which started operating in July 2003. We sell the electricity wholesale to Chubu Electric Power Co. We have designed the plant to run on oil residue (asphalt fractions) as fuel, supplied from the Yokkaichi Oil Refinery by pipeline. The plant naturally has environmental equipment installed, including denitrification and desulfurization equipment and electrostatic precipitators, and consideration of the natural environment was also incorporated in the overall design, with features such as green spaces, a conservation pond, and protection of endangered plant species and rare birds.

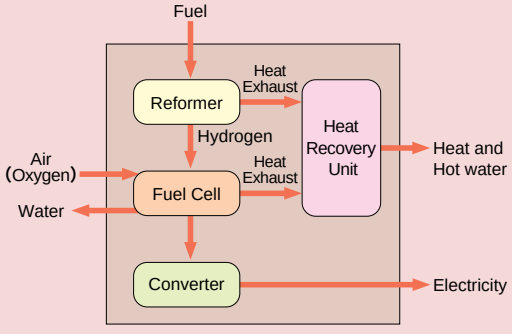
Yokkaichi Kasumi power plant

• Hydrogen production and fuel cells

Because fuel cells use hydrogen as their source of energy, they are attracting much interest as the next generation of distributed power systems that emit only small amounts of pollutants. Under contract from New Energy and Industrial Technology Development Organization (NEDO) and the Petroleum Energy Center, we are developing a stationary fuel cell system that uses hydrogen produced from petroleum-based fuels such as LPG and kerosene. In fiscal 2002, as a part of efforts to develop technologies to produce hydrogen from kerosene using the ATR*3 method, we constructed a hydrogen production unit that uses a reforming catalyst developed by Cosmo Oil.

We participated in “Hydrogen/Fuel Cell Demonstration Project” (funded by the Ministry of Economy, Trade and Industry) and in March 2003 opened a hydrogen refueling station in Yokohama for fuel cell vehicles, which includes a garage for work on those vehicles. Besides providing hydrogen fuel, Cosmo Oil will continue working to collect a variety of data and promote wider use of fuel cell vehicles.

Stationary fuel cell system



***1. Kerosene heat pump air-conditioning unit**
Heat pumps collect heat from a cool zone and move it to a warmer zone. In a kerosene-powered heat pump/air-conditioner, kerosene is used to run a compressor, and the heat transfer medium goes through a cycle of vaporization and condensation, providing both cooling and heat.

***2. Independent power production**
In 1995, Japan’s Electric Utilities Industry Law was partially amended to allow companies other than electric utilities to operate as independent power producers, and make it possible for them to sell electricity wholesale to the utilities.

***3. Auto Thermal Reforming**
To produce hydrogen, oxygen is mixed with raw materials (hydrocarbons and steam), oxidizing a portion of the raw materials and providing the heat for hydrogen generation.

Hydrogen refueling station

●Natural gas

Cosmo Oil holds an interest in the LNG Chubu Corporation, a liquefied natural gas provider set up by Chubu Electric Power Co., and other companies, and began to supply LNG to city gas utilities at the end of 2001. During fiscal 2002 the company reached the first agreement in Japan for LNG tanker truck deliveries to the industrial sector. Meanwhile, Sakai LNG Co., a joint venture we formed with Kansai Electric Power Co. and other companies, plans to construct an LNG shipping pier and facilities adjacent to our Sakai Oil Refinery for receipt, storage, and vaporization of LNG, and delivery of vaporized LNG.

Natural gas has the merit of creating relatively lower environmental impacts than other fuels during use, but to supply this fuel as LNG (i.e., in liquid form) huge amounts of energy are needed to liquefy and store it at extremely low temperatures (minus 162℃). Also, to supply natural gas in gaseous form, pipelines must carry it from the gas field to the market. To overcome such limitations, Cosmo Oil is working to develop gas to liquid (GTL) technologies*1 to convert natural gas to liquid fuel using chemical reactions. We are participating with other companies in Japan National Oil Corporation projects to develop catalysts for the production of liquid fuels from synthetic gases. Cosmo Oil succeeded with Japan's first-ever GTL oil production during testing in fiscal 2002 at a pilot plant in Hokkaido. We are also investigating DME*2 synthesis technologies.

Enhancing our environmental accounting system

The Cosmo Oil Group started collecting environmental accounting*3 data in 2001 to use in internal decision-making and as a tool for fulfilling our accountability to the public. To be effective in our efforts to protect the environment, it is essential to know clearly the environmental and economic costs and benefits. From this it is possible to measure costs versus benefits of each activity area, from both the environmental and economic perspectives. The ideal approach would be to ascertain these over the entire life cycle, but life cycle assessments in the petroleum industry are still at the developmental stage worldwide. Under these circumstances, the Cosmo Oil Group is implementing environmental accounting that includes not only the environmental impact of our actual business activities, but also the impacts of our products, and is attempting to calculate integrated environmental indicators and environmental productivity, using the EPS*4 approach. In addition, we have completed computerization of our environmental accounting system, and started its full operation during fiscal 2003. Below is a summary of our environmental accounting results for fiscal 2002. We are looking into ways to improve data accuracy and considering expanding the number of sites covered by data collection, and will continue working to improve on the categories covered in our reporting.

●Summary of the environmental accounting results for fiscal 2002.

Environmental protection costs: Include costs associated with pollution prevention, reducing sulfur content of products, environmental research and development, etc. Investments of fiscal 2002 amounted to 2.16 billion yen, and the expenses to 44.54 billion yen.

Environmental protection benefits: Environmental impacts arising from business operations, calculated by the EPS method, rose by 84,000 tons, to 5,176,000 tons (CO_2 equivalent), due to increased environmental impacts from the increase in the amount of crude oil processed and more intensive refining. Also, the environmental impacts during product use increased by 2,365,000 tons, to 77,114,000 tons (CO_2 equivalent), due to increased production volumes.

Economic benefits: The total economic benefits amounted to 2.3 billion yen, including 2.18 billion yen from the energy conserving effects of cogeneration equipment, the reduction in waste treatment costs (thanks to the recycling of used catalyst), and revenue from patents arising from research and development, etc.

***1. GTL (Gas to Liquid)**
Kerosene or diesel are produced by Fischer Tropsch (FT) synthesis after converting methane (the main constituent of natural gas) into synthetic gas (a mixture of hydrogen and carbon monoxide). Dimethyl ether is produced from synthetic gas by DME synthesis. Because liquid fuels produced by GTL technology contain no sulfur or aromatics they are being seen as the next generation of clean fuels.

***2. DME (CH_3OCH_3)**
Dimethyl ether is mainly used as an aerosol propellant. A chemically stable, colorless gas that is easily liquefied under pressure at room temperature, it is being seen as a clean alternative fuel for diesel engines.

***3.** See pages 47–50.
***4.** See page 48.

Expanding our environmental business

The companies of the Cosmo Oil Group have been working closely together to develop products with reduced environmental impacts and petroleum-related environmental technologies. Through these technologies and products we are helping to reduce the adverse impacts on the environment of companies in the petroleum and other industries.

● Basic dioxin test kit

We have developed and commercialized a testing kit we call "Imuno-Eco DXN," a product that uses biotechnology to detect even low concentrations of dioxins.

When measuring dioxin levels in soil, ash, and gas emissions, this kit produces results that correlate closely with official methods. A sales trial started in fiscal 2002 through a major reagent company.

Basic dioxin test kit "Imuno-Eco DXN"

● VOC*1 recovery unit

The Cosmo Oil Group has been developing a volatile organic compound (VOC) recovery unit and VOC adsorbents to recover hydrocarbon vapors that escape during pumping at oil refineries and storage depots.

In fiscal 2002, using special adsorptive silica gel developed at our Research and Development Center, we succeeded in developing a halogenated solvent, which is now being used by pharmaceutical manufacturers.

We will continue building our environmental business as we work on environmental protection through VOC recovery at petroleum facilities not only in Japan but also in Middle Eastern oil-producing countries.

***1. VOC (Volatile Organic Compound)**
VOCs dissipate rapidly in air. They not only cause photochemical smog and air pollution, but are also known to have an impact on climate change.
***2.** The SL is an international standard established by the American Petroleum Institute (API).
***3.** Filter that removes soot from diesel vehicle exhaust.

■Cosmo Oil Group's environmental technologies and products

●Automotive oil products (Cosmo Oil Lubricants Co.)

Oils for gasoline engines "Cosmo LIO SL*2 series"

Oil for diesel engines "Shinsei"
Eco Diesel "Kaisei"

Oil for natural gas engines "Cosmo CNG Oil"

●Oil products for other uses (Cosmo Oil Lubricants Co.)

Lubricating oil "Cosmo Terra series"

Metal cutting oil "Cosmo Clean Cut Cool series"

Lubricating oil for food machinery
"Cosmo Anderol" Series

●Cleaners and removers (Cosmo Eco Support Inc.)

High performance remover "Hakurisuto"

●Coating materials (Cosmo Trade & Service Co.)

Heat insulation coatings "Super Therm"

Concrete protector and strengthener
"Ashford Formula"

●Plant facilities

Hydrocarbon vapor recovery unit
(Cosmo Engineering Co.)

Volatile organic compound (VOC)
recovery unit (Cosmo Engineering Co.)

Dioxin removal unit for exhaust gases
(Cosmo Engineering Co.)

Dioxin removal unit for wastewater
(Cosmo Engineering Co.)

Process wastewater treatment technology
(Cosmo Engineering Co.)

Process wastewater treatment system
"Bioflora 01" (Cosmo Eco Support)

Benzene utilization (Cosmo Matsuyama Oil Co.)

●Natural gas fuels (Cosmo Oil Gas)

Liquefied Petroleum Gas

●Others (Cosmo Matsuyama Oil Co.)

Base material for neutrino detector,
"Pseudocumene" (Cosmo Matsuyama Oil Co.)

5-aminolevulinic acid
(Research and Development Center)

These oils keep the engine clean, increase heat resistance, and reduce fuel consumption. They also help reduce engine oil consumption.

Chlorine content is one-tenth that of conventional oils. Extends engine life and mileage between oil changes.
For use in engines with DPF (Diesel Particulate Filters)*3, this oil increases heat resistance and reduces wear.

Special oil for natural gas and LP gas engines, with increased heat resistance, high-temperature detergency and lower wear.
Extends engine life and mileage between oil changes.

Cosmo LIO SL series

Kaisei

This lubricating oil, which can be decomposed by microorganisms into carbon dioxide and water, has been certified as an Eco Mark (Japanese eco-label) product.
Has a wide range of applications, including construction and agricultural equipment, railway cars, outboard motors, chainsaws, and others.

This metal cutting oil is chlorine-free. Helps solve problems associated with chlorine in waste oil disposal and cleaning processes.

This lubricating oil meets the requirement of USDA/NSF HI.
Has been used extensively at HACCP-certified food factories around the U.S. and Europe.

Cosmo Anderol series

This high-quality remover has been developed for removing oil sludge. It is safe and meets regulations on chemical substances and prevention of organic solvent poisoning. Expected to be effective in the maintenance of vacuum diffusion pumps in state-of-the-art vacuum deposition.

A heat-insulating coating material first developed by NASA. We are developing a broad range of applications including insulation for railway cars, buses and trucks in addition to roofing and piping.

This product extends the life of concrete floors and suppresses concrete dust.
Has applications at distribution centers, home improvement centers, and factories, etc. Imported from the U.S.

A unit for recovering hydrocarbon vapors from gasoline, etc., using our unique “Cosmo adsorption method.”
Now used at petroleum facilities not only of Cosmo Oil Group but also of other companies.

Hydrocarbon vapor recovery unit

Recovery unit using the same technology as vapor recovery unit. Praised for its high recovery rate, space-saving size, and high level of safety, it is widely used in chemical, printing, and pharmaceutical industries.

This adsorption unit, when installed after the fly-ash collector of existing incinerators, can greatly reduce dioxin concentrations, with removal rates of 99% or more. This greatly decreases the dioxins generated by municipal and industrial waste incineration facilities.

Dioxin removal unit for exhaust gases

Uses our own independently-developed activated carbon for the treatment of wastewater contaminated with dioxins.
Helps remove dioxins in wastewater from final treatment facilities and in the discharge from the dismantling of incinerators.

A technology that combines a high-efficiency activated sludge unit, denitrification and phosphorus removal units.
It is being used for advanced treatment of effluent from not only oil refineries, but also pig farms and other facilities.

Using microorganisms, this product decomposes oil and organic materials in wastewater into water and carbon dioxide.
No chemicals or filtration films are necessary.

Bioflora 01

Takes benzene generated from the benzene separation process at oil refineries and uses it as an ingredient in chemical products by processing it with equipment such as aromatics extractors.

Cosmo Oil Gas supplies LP gas, a clean energy that has low environmental impacts similar to natural gas.
Also is working to boost demand for LPG by promoting advanced LPG -powered cars, basic LPG fueling stations, and LPG co-generation for houses.
We will work on other clean energies such as LNG and DME, promoting a stable supply of gas energies in harmony with the environment.

Aromatics extractor for processing petrochemical products

This product is used as a base material in a new method of neutrino detection at KamLAND, a neutrino detection facility for a research project organized by Tohoku University.

Cosmo has developed an efficient manufacturing method for the natural amino-acid, 5-aminolevulinic acid (ALA).
This amino-acid has a function to promote plant growth and has been used as a raw material of high-performance fertilizers.

We are working with our customers to protect the environment through a number of activities, with the message “Living With Our Planet.”

The greatest environmental impacts of petroleum products arise when they are used by customers.*1 Our company tries to provide petroleum products that have as little environmental impact as possible, but we also feel that it is important to join with our customers in pursuing environmental protection. With a view to increasing customer satisfaction, we are promoting interactive communication and carrying out various other activities with our customers.

Cosmo the Card Eco: Protecting the environment together with customers

We call our company credit card “Cosmo the Card.” At present, 2.25 million customers use these cards, which are issued and managed by our company. In response to our customers’ growing environmental awareness, we introduced a new card, Cosmo the Card Eco, in April 2002. By March 2003, only a year later, 56,000 people had joined the Eco card program.

Cosmo the Card Eco

Customers who join the Cosmo the Card Eco program donate 500 yen when they join, and continue to donate that amount every subsequent year in the month they joined. The company adds to this a percentage of purchases that customers make using the Cosmo the Card and Cosmo the Card Eco*2 and makes a contribution through non-governmental and non-profit organizations to support environmental protection activities.


Tropical rainforest protection project in Papua New Guinea

In fiscal 2002, Cosmo Oil donated funds to tropical rainforest protection projects and to domestic projects aimed at conserving endangered natural environments (see table). In order to effectively support activities through the Cosmo the Card Eco program that reflect our message, “Living With Our Planet,” project staff personally visits the actual project sites. They listen to the views of local people and look at how things are going with project partners, always keeping in mind our basic commitment to protecting and restoring the environment. We also send annual project reports to cardholders and tell them how their donations are being put to work.


Tropical rainforest protection project in the Solomon Islands


Eco-toilets donated for use at Mt. Fuji nature area

Cooperating with governments

Since fiscal 2001, we have been supporting a project in Papua New Guinea that aims to protect tropical forests and enhance food security through encouraging a switch from shifting agriculture to settled, organic agriculture. The government of Papua New Guinea (PNG) has shown great appreciation for our company’s activities, and we continue to pursue a close cooperative relationship. The PNG government has agreed to the continuation and further expansion of the project, and to that end we have signed a memorandum of understanding making this a joint project. We have investigated the potential of having local development assistance projects like

***1.** See pages 31–32.
***2.** Cosmo Oil donates 0.1% of purchases made using the Cosmo the Card Eco and 0.01% of purchases made using the Cosmo the Card.
***3. OISCA**
Organization for Industrial Spiritual and Cultural Advancement-International

Projects supported by Cosmo the Card Eco	Achievements in fiscal 2002
1.Environmental Restoration and Conservation in Developing Countries	
○Tropical Rainforest Protection Project (Papua New Guinea)	Set up rice polishing mills at three sites. Promoted rice growing jointly with an OISCA*3 agricultural extension and leadership training project.
○Tropical Rainforest Protection Project (Solomon Islands)	A training facility is under construction for organic agriculture, based on a sustainable model village. Access road 70% complete, shed for organic fertilizer nearly complete.
○Support Project for Environmental Refugees from Island Countries	Preparations complete for carrying out fiscal 2003 support program.
○Greening the Silk Road project	Preparations complete for tree planting in the vicinity of the tombs of Zhou Dynasty emperors Wen and Wu, and the ruins of the capital of Qin Dynasty emperor Wei Yan.
○Silkworm Project	Training session on raising silkworms held to encourage sustainable agriculture. Cocoon production increased.
2.Environment Restoration and Conservation in Japan	
○Endangered Natural Habitat Protection Project	Eco-toilets installed at two sites on the Yamanashi side of Mt. Fuji (Station 1 and Station 5).
3.Environmental Education	
○Rice Terrace Conservation Project	Preparations under way to make effective use of elective study classes at elementary schools in 2003.

this in developing countries counted under the Clean Development Mechanism (CDM)*1, which would be an international first. If it becomes possible to include such projects under the CDM, a wide array of private funding may become available for similar projects in developing countries.

Good Design Award for the Eco card!

In October 2002, Cosmo the Card Eco became the first credit card to be awarded the Good Design Award by the Japan Industrial Design Promotion Organization. The award was based on appreciation for the card's concept of linking the growing desire of consumers to do something for the environment together with our company's corporate commitment to protecting the global environment, and enabling customers to take part in environmental activities through the purchase of petroleum products.

• CO_2-neutral Gasoline

In view of the problem of climate change, we involved our Cosmo the Card Eco card members in a plan to provide "CO_2-neutral gasoline." This plan involves allocating carbon sequestration rights obtained by the company to offset CO_2 produced by our customers' use of gasoline. Cardholders purchased 4,846 kiloliters of gasoline during the month of December 2002, combustion of which would have produced 11,195 tons of CO_2. In September 2002, Cosmo Oil purchased 24,000 tons of Carbon Sequestration Rights (CSRs) resulting from afforestation in Australia. Based on the rights we issued "CO_2 Sequestration Certificates,"*2 some of which were allocated to provide our customers with "CO_2-neutral gasoline."

CO_2 Sequestration Certificate

Because we share everyone's concern about climate change, we have been selling CO_2 Sequestration Certificates, at 500 yen per ton of CO_2, at various events in Japan. The revenues are contributed during the next fiscal year to environmental activities under the Cosmo the Card Eco program.

Services for disabled customers

There are about 30,000 drivers with hearing disabilities in Japan. We have introduced a special Order Card to allow them to place their orders smoothly at Cosmo Oil service stations. This card was adopted at the suggestion of one of our employees who has a hearing disability.

Order Card

The Cosmo Customer Center

The 21st century is said to be the age of the interactive society, in which members of society actively influence one another, in an environment of interactive information exchange.

In October 2000, our company set up the Cosmo Customer Center as a place for interactive communication with customers. Three years later, we receive an average of 280 messages every month through a toll-free telephone line and e-mail: 57% of these are questions, 21% are complaints, 17% are requests, and 5% are miscellaneous.

By promptly communicating these messages to the appropriate department or affiliate, the Cosmo Customer Center seeks to enhance our customers' satisfaction.

Cosmo Customer Center website
www.cosmo-oil.co.jp (Japanese only)
Toll-free Number: 0120-530-372 (Calls within Japan only, Japanese only)

***1.** See page 13.
***2.** Also audited by Asahi & Co.

Cosmo Oil is working as a member of local communities in cooperation with many people to promote communication and activities that benefit society.

Three basic concepts guide our contributions to society on the themes of international contribution, environmental protection, and the car society: (1) long-term continuity of activities, unaffected by the company's financial performance, (2) voluntary participation by employees, and (3) "Cosmo Oil originality." Our oil refineries are also actively contributing as members of their local communities.

The Cosmo Kids' Green Workshop

In fiscal 2002 we launched a program aimed at raising the environmental awareness of children, the guardians of the next generation, called the Cosmo Kids' Green Workshop. On December 7, we invited the popular artist Katsuhiko Hibino to hold a "Nature Art Workshop for Kids."

Nature Art Workshop for Kids (Nature and Art Hibino Style)

Traffic Accident Orphan Support Program

Every year, about 9,000 people in Japan are killed in traffic accidents, making orphans of about 3,000 children. Our company holds a three-day nature discovery program for these children of elementary-school age, called Cosmo Camp Waku Waku, using volunteers recruited from among our employees. The volunteers are given special leave from work to participate in this program, which has been carried out every year since 1993.

Cosmo Camp Waku Waku

Cosmo Oil—Voice of the Earth

In pursuit of the theme of listening to sounds that bring people together with nature, we have initiated a series of events called "Cosmo Oil—Voice of the Earth." We invited violinist Eijin Nimura, chosen as a UNESCO Artist for Peace, to perform at the first event in this series, which took place in March 2003.

Eijin Nimura Violin Concert, 19 March 2003

Publications—*Dagian* and *The Earth Environment Book*

Cosmo publishes *Dagian—The Environmental Commentary Magazine*, a collection of commentaries in Japanese on current environmental themes contributed by leading writers in the field. This magazine is sent to natural history museums, etc. In 2002, two issues were published, No. 42 on the theme "Rain," and No. 43 on the theme "Turtles."

Also, in July 2002, we published *The Earth Environment Book—For Kids, Future Citizens of the Earth* in Japanese, and distributed it to 6,500 people who requested the book (as of the end of March, 2003). Elementary school teachers have been using this book as a reference material for elective study periods, which the national government recently introduced in school curriculums in Japan. So that elementary schoolchildren can understand and act on the information in the book, we asked people who are actually involved in environmental activities to contribute by writing about their own experiences and including a message to children.

The Earth Environment Book

Cosmo Earth Conscious Act

Cosmo Oil has linked up with Tokyo FM and the Japan FM Network (JFN) of 38 radio stations nationwide, in the Cosmo Earth Conscious Act campaign, which aims to bring together people around the world who are working to protect the Earth's environment. Specific activities and projects being carried out under this campaign are described below.

Please visit www.cosmo-oil.co.jp/earth/index.html (Japanese only)

● Clean-up Campaigns

In fiscal 2002, we sponsored outings to get close to nature while cleaning up 42 sites around Japan,

including mountains, rivers, beaches, lakes and parks. As the flagship event of this project, in August 2002 we sponsored and joined a team that climbed Mt. Fuji while collecting trash on its slopes. These clean-up campaigns were initiated in 2001, and over the course of two years, clean-ups have been held at 84 sites, involving a total of over 44,000 people and collecting 640,000 liters of trash.

Mt. Fuji clean-up campaign

●Lecture and exhibition

Alpinist Ken Noguchi, who is active in promoting the clean-up of Mt. Everest (Sagarmatha), was invited to give a talk and present an exhibition describing this campaign. In fiscal 2003 as well, Mr. Noguchi will be communicating what he has seen and felt in the course of his environmental protection activities.

Ken Noguchi's Mt. Everest Clean-up Campaign Lecture and Exhibition

●Picture book and CD "*Bua Forest*"

The picture book *Bua Forest*, written by author Kiri Segawa and illustrated by rock musician Kiyoshiro Imawano, aims to communicate to children how to get a feeling for the planet we live on. This book is on sale at bookstores all over Japan, and a CD with a related theme song is also being sold.

Bua Forest book explores environmental issues for children

●Radio show—"Living With Our Planet"

This show tells stories about examples of our precious natural and cultural heritage around the world that should be left for future generations, and urges listeners to learn how to enjoy their own immediate environment. It is narrated by musician Hitomi Toi and broadcast on Tokyo FM every Monday from 7:40 to 7:55 a.m., and also by 37 other radio stations of the nationwide Japan FM Network. Broadcast times for the network differ with each station.

●Earth Day Concerts

Since Earth Day on April 22, 1990, an Earth Day Concert has communicated the message of "Earth Consciousness—We Love Music, We Love the Earth" around the world every year at the Nippon Budokan, a famous and historic venue in Tokyo. This concert is broadcast by the 38 stations of the JFN radio network, by radio stations in countries around the world, and through the Internet.

Cinema Globe Theatre

Since January 2003, a Cosmo Oil-sponsored new television series titled *Cinema Globe Theatre* has been broadcast on TV Tokyo and syndicated stations. This program introduces beautiful nature spots that have appeared in movies worldwide, explaining environmental incidents and background information about the natural environments used as locations for movie scenes.

The Click Fund

Visitors to the Cosmo Oil website can choose an environmental protection project that they want to support, and by clicking its icon, make an automatic donation of one yen to the project. The Click Fund was launched on February 14, 2003. Cosmo Oil makes the donation on behalf of the visitor, and uses it to support environmental projects in the Cosmo the Card Eco program.
www.cosmo-oil.co.jp/kankyo/charity/index.html
(Japanese only)

The Click Fund page

Oil refineries—contributing to local communities

As corporate citizens in their local communities, Cosmo Oil refineries are engaged in the following activities.

Chiba Refinery: Youth baseball tournaments, Japanese tennis tournaments, visits to social welfare facilities, etc.

Yokkaichi Refinery: Mothers' volleyball tournaments, golf tournaments, etc.

Sakai Refinery: Tennis school, opening company grounds for community use, etc.

Sakaide Refinery: Clean-ups around the plant, softball tournaments, etc.

Cosmo Oil offers technical assistance and technology transfers to help solve environmental problems in oil-producing and developing nations.

The Cosmo Oil Group is putting its people and expertise to work in order to spread technologies for environmental protection, energy conservation and safety management in oil-producing and developing countries.

Most of these activities take place in the form of technical assistance for studies relating to various types of development projects and energy conservation model projects. Examples include training programs inside and outside of Japan and overseas studies funded by the Japan Cooperation Center, Petroleum (JCCP); dispatch of experts on both long- or short-term basis to overseas projects implemented by the Japan International Cooperation Agency (JICA); and studies relating to the global environment undertaken by the New Energy and Industrial Technology Development Organization (NEDO). The Cosmo Oil Group supports these activities by working with the relevant national governmental organizations.

Examples of overseas cooperation

• United Arab Emirates (UAE)—Studies of environmental protection technology for refineries, and consideration of resource and environmental protection technology

As an example of the Cosmo Oil Group's technical assistance to the Abu Dhabi National Oil Company (ADNOC), Cosmo Oil Co., Cosmo Research Institute and Cosmo Engineering Co. have jointly submitted practical technical recommendations for resource and environmental protection measures to be taken at the Ruwais refinery operated by TAKREER (the Abu Dhabi Oil Refining Company).

Studies on the feasibility of eliminating the burning of flare gas have been completed and practical problems are being addressed to move into the implementation phase. In addition, we are making progress in technical studies aimed at finding a way to recover vapors released into the atmosphere while loading naphtha tankers.

• Indonesia—Model project with the Indonesian State Oil Company

Cosmo Oil Co. and Cosmo Engineering Co. are working on a model project to recover flare gas and hydrogen at the Indonesian state oil company's Balikpapan refinery in East Kalimantan. Recovery of gas from the refinery's flare-gas system is expected to result in an annual reduction of about 110,000 tons of fuel consumption.

Flare at Balikpapan refinery, Indonesia

This project has been designated by NEDO as a "Model Project for Improvement of Energy Efficiency," the first such project involving an oil refinery. Not only does it aim at more efficient energy use, but it is also meaningful from the point of view of international cooperation for preventing climate change.

Training programs (FY2002) (Technologies for environmental protection, energy conservation, safety management)

	No. of courses	No. of persons	Country
Trainees accepted	8	38	UAE, Qatar, Iran, Indonesia, Mexico, China
Instructors dispatched	7	22	Iran, Indonesia, Vietnam, Thailand, China

Long-term dispatch of specialists (Technologies for environmental protection, energy conservation, safety management)

Country (Institution)	Field of expertise	Duration	No. of persons
Egypt (Egyptian Environmental Monitoring Center)	Water pollution analysis technology	Aug 2000–Aug 2002	1
Chile (National Environmental Center)	Industrial wastewater/water quality analysis technology	May 2000–May 2002	1

Dispatch of specialists to NEDO's "Model Project for Improvement of Energy Efficiency"

Country (Institution)	Project	Duration	No. of persons
Indonesia (Pertamina, the Indonesian State Oil Company)	Model project for refinery flare gas and hydrogen recovery	2002–2004	6

JCCP-commissioned surveys on "Basic Oil Industry, etc., Infrastructure in Oil-producing Countries"

Country (Institution)	Type of research	Duration	No. of persons
Iran (Bandar Abbas refinery)	Environmental protection technology in oil refining (vapor recovery)	2001–2004	6
UAE (Abu Dhabi National Oil Co.)	Environmental protection technology in oil refining (vapor recovery)	2000–2003	4
UAE (Abu Dhabi National Oil Co.)	Environmental protection technology in oil refining; health, safety,environmental management technology (zero-flare technology: flair gas reduction)	2002–2003	4 (To increase in 2003)

Cosmo Oil actively releases information to promote understanding of its policies and activities.

• Iran—Technical studies for environmental protection at an oil refinery

Since fiscal 2001, Cosmo Research Institute has been undertaking research on commission from the JCCP on environmental protection measures at the Bandar Abbas refinery in Iran. Cosmo Oil Co. has also been cooperating on these studies. Since fiscal 2002, we have also provided technical assistance for recovering vapor released into the atmosphere during loading of MTBE (methyl tertiary butyl ether) onto tanker trucks.

Project signing ceremony at Bandar Abbas, Iran

To demonstrate our commitment to environmental excellence, we publish and release information to our stakeholders—including customers, shareholders, investors, local communities and suppliers, etc. Our hope is that people will choose Cosmo Oil on the basis of its environmental record.

Television and newspaper ads

We are increasing the ratio of advertisements that have environmental content, with the aim of encouraging an interest in environmental protection among the general public. Our newspaper ads have won a number of awards, including the Yomiuri Advertising Award in the "Advertising Series" category.

One of our newspaper ads

Investor relations

Investor relations activities include meetings held twice a year to give financial reports, and publication of our quarterly shareholders' report, "*C's Mail*." For overseas investors, we also publish an English version of our annual report, *Fact Book* and *Shareholder's report*.

Annual report and shareholder report "*C's Mail*"

Exhibits

We took part in the "Eco-Products 2002" exhibition held in Tokyo, where we displayed awareness-raising materials. The booth was designed to produce no waste after the exhibition.

Cosmo Oil booth at the "Eco-Products 2002" exhibition in Tokyo

Environmental reports

We have published a *Cosmo Oil Environmental Report* every year since the first edition in 2001. In fiscal 2002, we also started publishing the *Green Report* (in Japanese), a simplified version of our environmental report.

Green Report, the summary version of the 2002 environmental report

Publication facts (as of March 2003)

	Published	Distributed
Environmental Report 2002 (Japanese)	5,000	4,690
Environmental Report 2002 (English)	3,000	2,560
Green Report 2002 (Japanese)	60,000	58,080

Recognition from outside the company

In March 2003, Cosmo Oil Co. became the first Japanese oil company to be listed on the Global Index, one of the family of FTSE4Good indices.* As of the end of March 2003 the index included 618 companies, of which 60 were Japanese.

* See page 46.

Here we report on progress with the *Blue Earth 21*, Cosmo Oil's Medium-Term Environmental Plan.

■ **Slogans of the Medium-Term Environmental Plan**

"Cosmo Oil—the environmental choice"
"Committed to environmental excellence"
"Fulfilling our responsibilities as a corporate citizen"
"Environment and economics —both are important"

The *Blue Earth 21* plan uses slogans to convey the message of the Medium-Term Environmental Plan, which covers nine themes. Each department sets objectives and works to achieve them.

Progress in fiscal 2002

Because 2002 was the first year of the plan, our activities this year involved building a foundation for future actions. Progress on each theme is summarized in the table.

Plan for fiscal 2003

After reviewing the results for fiscal 2002, we set new priorities for fiscal 2003, intensifying efforts that all employees can participate in and reinforcing risk management.
Specifically, we focus on reducing waste to zero at all facilities, promoting green purchasing and preventing soil pollution.

• Zero emissions at all facilities

At refineries and oil storage depots

The aim is to achieve zero emissions, with an emphasis on utilization of technologies of the Cosmo Oil Group, promotion of the 3Rs, and shifting to the use of recyclable materials through green purchasing.

At offices

The aim is to achieve energy conservation and zero emissions at each site by forming a company-wide "Office Clean-up Team" and setting up the organizational structure to promote the 3Rs.

• Green purchasing

Set guidelines for green procurement of materials, equipment and works.
Set standards for selection of green suppliers.

• Protecting the soil

Prevent soil pollution.
Implement systematic soil inspections and the appropriate measures to prevent contamination.

***Blue Earth 21* Medium-Term Environmental Plan 2002 performance review**

Theme
1. Prevention of climate change: reduction of CO_2 emissions from business activities and introduction of new energy
Energy conservation
Utilization of the Kyoto Mechanisms
Introduction of new energy
2. Reduction of pollutant emissions:control of emission levels for air and water pollutants below the regulatory standards and reduction of industrial waste, etc., based on voluntary standards
Air pollution control
Water pollution control
Industrial waste reduction
Management of chemical substances
Reduction of VOCs based on voluntary standards
3. Prevention of soil pollution: assessment of current situation and promotion of preventive measures
Service stations
Other facilities
4. Material reduction: promotion of 3R activities (reduction, reuse, and recycling) and reduction of municipal waste
Paper
Daily use items
Water
5. Reduction of environmental impact of products: providing petroleum products with lower environmental impacts
Diesel fuel
Gasoline
6. Green purchasing: expansion of items covered by green purchasing
Material, equipment, and works
Office supplies
Purchasing from green suppliers
7. Research & development: development of petroleum products and environmental technologies related to business activities
Petroleum product development
Environmental technology development
New energy development
8. Environmental conservation projects: continuous efforts to support projects, particularly those related to prevention of climate change
Technical cooperation in environmental protection
Cosmo the Card Eco projects
Social contributions
9. Organization for environmental management: continuous efforts in environmental management and communication with multiple stakeholders
Environmental management
Communication

◇ Objectives reviewed and set in fiscal 2002

Medium-term target (FY2004)	FY2003 Target	FY2002 Actual	See page
Reduce unit energy consumption at oil refineries by 9.2% from 1990 level.	–8.0% (vs. 1990)	–9.7% (vs. 1990)	35
Reduce fuel consumption for transportation. Tanker trucks –20%, Coastal tankers –17% (vs. 1990)	Tanker trucks –19% Coastal tankers –16%	Tanker trucks –16.5% Coastal tankers –15%	41
Promote energy conservation at offices◇	Preparing to expand to all business sites.	Assessed at head office.	36
Complete assessment of Kyoto Mechanisms utilization		Accumulated know-how on emission credits, CDM, etc.	15
Complete assessment of new energy		Initiated assessment of wind power generation.	–

Maintain the level of NOx, SOx and particulate emissions from oil refineries below the legal limit.		Maintained (complied with relevant regulations).	38
Maintain the level of COD discharge from oil refineries below the legal limit.		Maintained (complied with relevant regulations).	
Reduce amount of waste for 2002–04 (average) by 81% from 1990 level.	Build a system to achieve zero emissions at every site.	–83%	36
Implement and promote management of chemical substances in accordance with laws and regulations.		Reported in accordance with PRTR Law.	37
Complete assessment of countermeasures linking oil refineries, storage depots, and service stations.		–	–

Promote preventive actions. Service stations conduct self-inspections and take countermeasures.		Completed risk assessment, conducted training programs, started setting new standards forfacility management. Conducted self-inspections based on assessment results.	16
Soil contamination assessment and countermeasures conducted by each business site.	Conduct systematic assessments and countermeasures	Conducted review of records, initiated soil contamination assessment at selected sites.	

Reduce amount of paper purchased by 40% from 2002 level.◇	–18% (vs. 2002)	Established a sorting and collection system at head office.	30
Achieve zero waste through sorting, collection and recycling at every site.	Expand to the other sites.	Implemented at some sites.	
Introduce wastewater recycling systems at service stations (2 or more locations). ◇	4 locations	2 locations	–

Supply diesel oil that meets future regulations of sulfur content (50 ppm or lower).		Ready to supply	17
Develop capacity to supply products meeting the new long-term regulatory target (sulfur content 10 ppm or lower).		Assessed measures and directions.	18

Expand items covered under green purchasing to include more materials (e.g., construction materials), process supplies (e.g., chemicals and catalysts), and repair and maintenance works.	Set guidelines.	Investigated guidelines for green purchasing.	39
Increase percentage of items under green purchasing to 80%.	70%	Set guidelines for green purchasing and started purchasing	
Implement purchasing from green suppliers.	Set standards for green suppliers.	Investigated standards for green suppliers.	

Develop high-performance catalysts to reduce environmental impacts of products.	Developed catalysts for low sulfur diesel (residue, VGO and GO ultra - deep desulfurization).	16
Develop technologies to reduce and reuse catalysts and to reduce excess sludge in order to minimize waste.	Demonstrated a newly developed technology and confirmed a 50% reduction of sludge generation at a refinery.	
Develop a technology to analyze oil content in soil.	Now in process	
Develop technologies to adsorb and recover vapors including VOCs.	Sold two units of VOC recovery systems.	12
Develop fuel cell systems and technologies for the conversion of natural gas to liquid fuel (GTL: gas to liquid).	Demonstrated a pilot process for GTL.	19-20

VGO: vacuum gas oil GO: gas oil

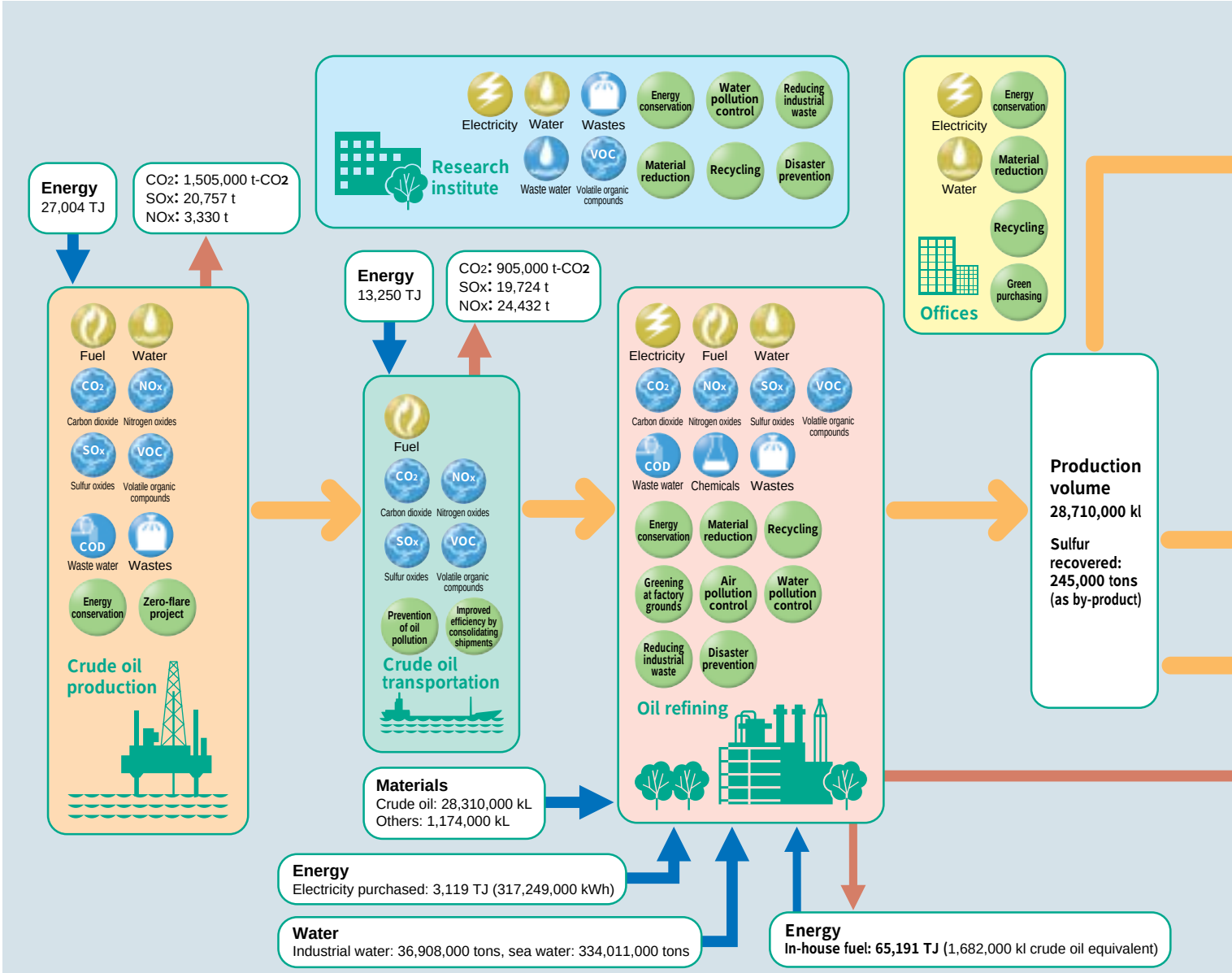
Transfer environmental technologies to other countries.	Provided technical assistance overseas.	27
Continuously implement or support projects for restoration and conservation of the environment in developing countries, environmental protection in Japan, and environmental education.	Implemented seven projects in various fields.	23
Continuously implement social action programs.	Continued various programs such as the clean-up campaign and Camp Waku Waku.	25-26

Share environmental awareness to develop human resources.	Incorporated environmental education into in-house training.	44
Effectively communicate environmental information with each type of stakeholder.	Actively promoted internal and external communication such as *Green Report*, environmental section on Web site, exhibition at Eco Products exhibition, and environmental advertisements.	28

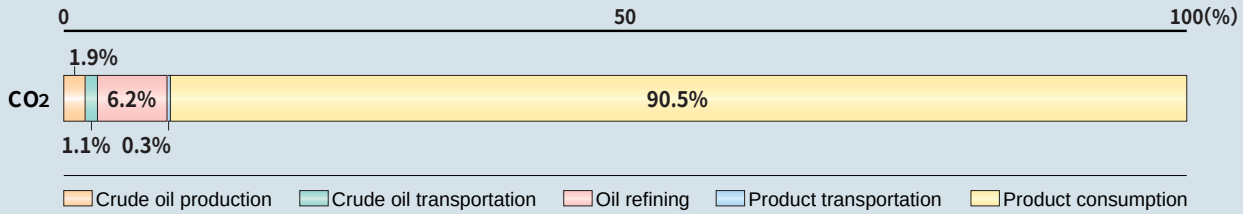
To be effective in our efforts to reduce environmental impacts, Cosmo Oil measures the trends of impacts in each process.

The Cosmo Oil Group's business activities encompass all processes in the life cycle, from exploration and production of crude oil in oil-producing countries, to the shipping and refining of crude oil, to the delivery of petroleum products and sales at service stations. To make continuous improvements and deliver products that have low environmental impacts throughout the life cycle, we recognize the importance of going beyond simply reducing environmental impacts in each of the processes. We must also understand how activities in one process interrelate with other processes, and how each activity affects the environmental impacts of each other process—in both absolute and relative terms.

In fiscal 2002, the amount of SOx (sulfur oxides) emissions from products use decreased by 126 tons from the previous year, despite increased

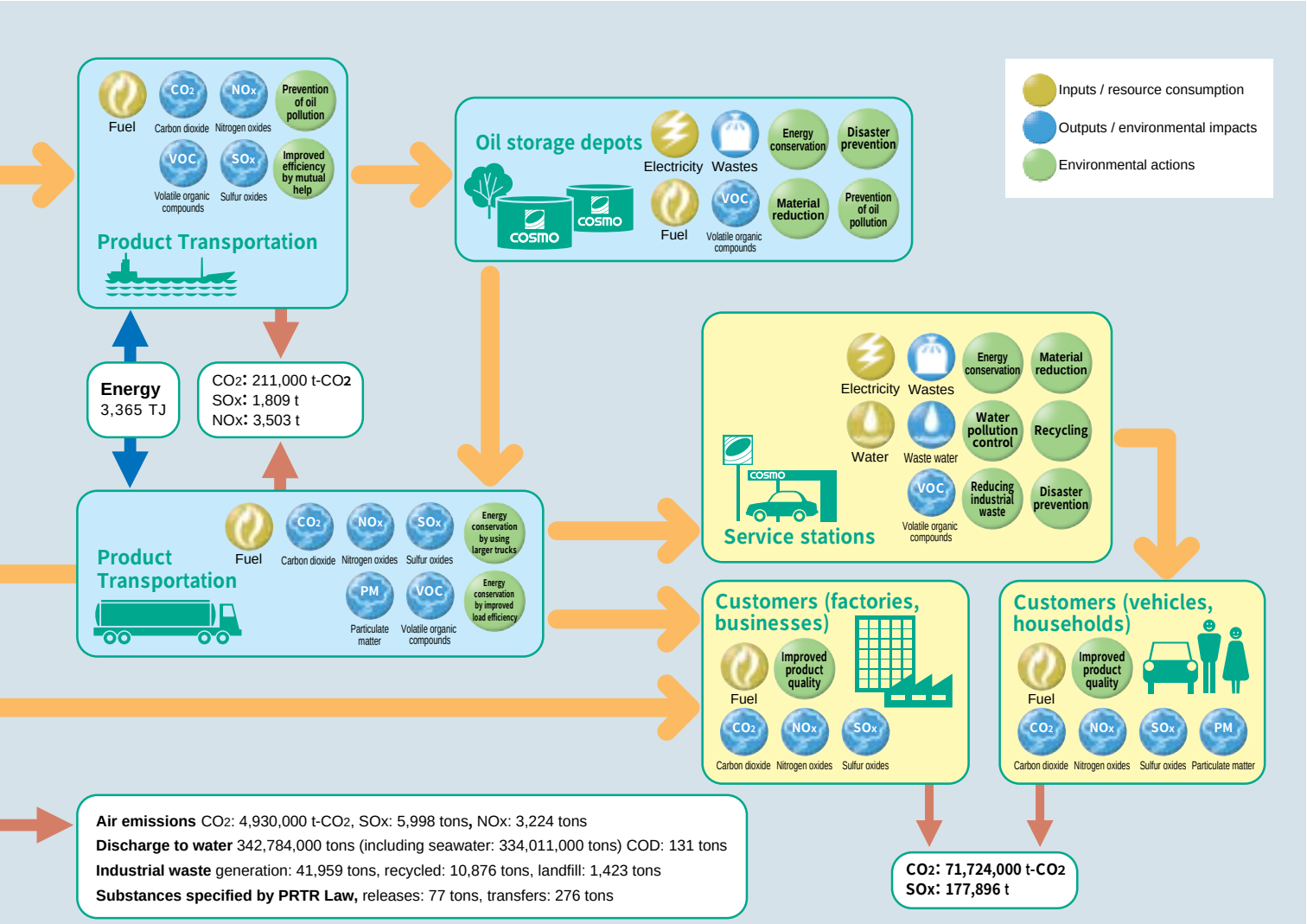


■Breakdown of CO_2 emissions during the life cycle of oil



production volume of petroleum products. This achievement was possible in part because many of the products have been converted to lower sulfur content, including the low-sulfur (50 ppm) diesel oil* that Cosmo Oil began selling on a pilot basis in Tokyo. Meanwhile, the amount of CO_2 emissions arising from use by the customer increased by 2,369,000 tons from the previous year, due to the increased sales volume. Despite the increased production volume and more stringent refining requirements, the amount of CO_2 emissions arising from production increased only a little thanks to our energy conservation efforts. The final outcome for CO_2 emissions during the product life cycle was that the proportion emitted during the refining process decreased by 0.1 point from the previous year to 6.2%, and the proportion emitted at the consumption stage increased by 0.1 point to 90.5% (see graph).

* See page 18 for the integrated assessment of environmental impacts of reduced sulfur content of diesel oil.



■Life cycle inventory of oil

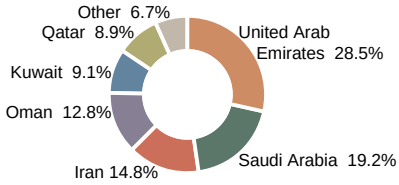
	Crude oil production	Crude oil transportation	Oil refining	Product transportation	Product consumption	Total
Energy consumption (TJ)	27,004	13,250	68,310	3,365	—	—
CO_2 emissions (1,000 t-CO_2)	1,505	905	4,930	211	71,724	79,275
SOx emissions (t)	20,757	19,724	5,998	1,809	177,896	—
NOx emissions (t)	3,330	24,432	3,224	3,503	—	—

Notes to table:
- Figures are estimated based on the actual production volumes of petroleum products in fiscal 2002.
- Figures for crude oil production, crude oil transportation, and product transportation are estimated based on LCI for Petroleum Products by Fuel and Environmental Impact Assessment for Petroleum Products, published in March 2000 by the Petroleum Energy Center.
- Figures for refining and product consumption are derived from environmental accounting. See the environmental accounting section in this report for the methods and basis of calculations.
- NOx gases emitted at the product consumption stage are formed mainly from nitrogen in the air. Because products are used in a variety of forms, it is difficult to arrive at figures for NOx emissions at the product consumption stage. Thus, we do not report the figures this time, leaving this as an issue to be resolved in the future. Also, methods to measure emissions of pollutants at oil storage depots and service stations remain as issues for the future.
- Figures here do not include environmental impacts associated with the construction of facilities.
- It should be noted that environmental impacts of SOx and NOx such as acid rain and photochemical smog are affected by regional characteristics. Thus, they cannot be assessed uniformly on a global scale in a way that can be done for CO_2.
- The figures for SOx emissions at the consumption stage are reported for reference. The figure indicates the potential SOx emissions based on sulfur content in products, and does not take into account SOx reductions resulting from desulfurization of emissions that occurs during use by customers. Thus, the actual figure for SOx emissions is expected to be lower than the figure reported here.
- The figures for CO_2 and SOx emissions at the consumption stage include potential impacts of naphtha. Naphtha is used as an ingredient in petrochemicals and fertilizers, which by themselves do not emit CO_2 or SOx.

We are working to build positive relations with oil-producing nations and secure a safe and stable oil supply.

Japan depends on imports from the Middle East and other areas for nearly all its oil. Cosmo Oil has always sought a stable energy supply by dividing its purchases among several countries (see graph). Starting in the 1960s, we pursued crude oil developments in the Emirate of Abu Dhabi, part of the United Arab Emirates, and established the Abu Dhabi Oil Co. in 1968.

Sources of Cosmo Oil's crude oil imports (FY2002)



Activities in Abu Dhabi

The Cosmo Oil Group has been promoting cordial relations with oil producing nations, particularly with the Emirate of Abu Dhabi, since the 1960s. The chairman of Cosmo Oil currently serves as vice-president of the United Arab Emirates-Japan Society. Besides taking part in international friendship activities and cultural exchanges, the company also actively provides technical personnel and services.

In fiscal 2002, Cosmo Oil participated in an exhibition with an environmental theme, "Japan Today in Abu Dhabi," sponsored by the Japan External Trade Organization (JETRO). We presented the whole series of environmental protection measures we are taking, from the development of crude oil resources right through to the act of serving gasoline at our service stations in Japan, and exhibited the environmental protection technologies and products provided by the Cosmo Oil Group. The exhibition opened on March 31, 2003 with a ceremony, attended by Sheikh Fahim bin Sultan Al Qasimi, Minister of Economy and Commerce of the UAE, who viewed our exhibit with great interest.

Sheikh Fahim bin Sultan Al Qasimi, Minister of Economy and Commerce at the "Japan Today in Abu Dhabi" Exposition

Abu Dhabi Oil Co.

Abu Dhabi Oil Co. employs about 320 persons, including 140 regular employees hailing from 18 different countries (50 from Japan), and full time employees under contract. To ensure safe operations, the company has set up a contact system for emergencies and enhanced its provision of oil booms and other safety equipment. During 2002, it succeeded in establishing a Health, Safety & Environment (HSE) Management System as well. The company also plays a central role in the local Japanese community in Abu Dhabi.

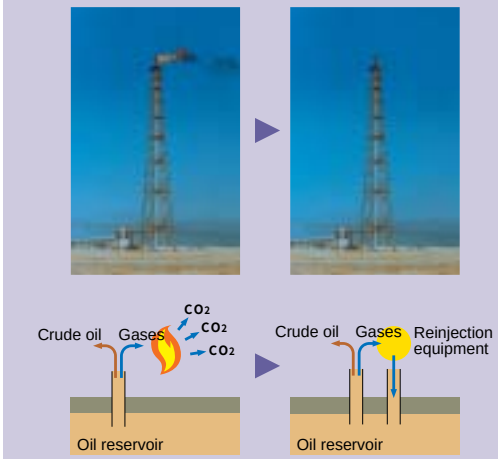
Office scene at Abu Dhabi Oil Co.

• Zero-Flare Project

Most oil fields around the world burn off gases that are emitted when crude oil is extracted, resulting in the familiar orange flame seen burning above oil wells, called the flare*1. This practice releases pollutants such as sulfur oxides into the atmosphere as well as CO_2, and a host of other substances that have environmental impacts.

At the Mubarraz, AR and GA oil fields*2 operated by Abu Dhabi Oil and its affiliates, all of the gases that were in the past burned off in the flare are today re-injected into the underground oil

The Zero Flare Project



***1. Flare gases**

Two kinds of gases are emitted when crude oil is extracted, called sweet gas and sour gas. Gas that contains a high proportion of acidic gases such as CO_2 and hydrogen sulfide are known as sour gas.

***2. AR and GA Oil Fields**

AR: Umm Al Ambar Oil Field
GA: Neewat Al Ghalan Oil Field

Abu Dhabi Oil operates the Mubarraz, AR and GA oil fields. Crude oil from these three fields is mixed together and shipped as the "Mubarraz Blend."

reservoir by a large compressor. This "Zero Flare" system, which emits no sulfur oxides or CO_2, was in operation at all three of these oil fields as of May 2001. The completion of this project helps to prevent air pollution in the Emirate of Abu Dhabi, and at the same time eliminates 200,000 tons of greenhouse gas emissions (CO_2 equivalent) annually.

●Mangrove afforestation

Abu Dhabi Oil is also working to protect the local environment. The company has planted mangrove trees, and by treating domestic wastewater with purification equipment and using the treated water for mangrove trees planted on Mubarraz Island, it is contributing to a cleaner and more natural local environment.

Mangrove forest planted by Abu Dhabi Oil

Crude oil transport

Crude oil is shipped in tankers that pass through the Strait of Malacca on their way to Japan. In a single trip of about 20 days, a VLCC (Very Large Crude Carrier) tanker in the 200,000 ton class carries enough oil to supply all of Japan for only one-third of a day.

●Safety in shipping

Safety is always the top priority in our shipping operations. Our VLCC tankers are manned by carefully selected, thoroughly experienced crews, and fitted with state-of-the-art technology and equipment, such as collision-avoidance systems, to ensure their safe passage through dangerous waters and severe weather.

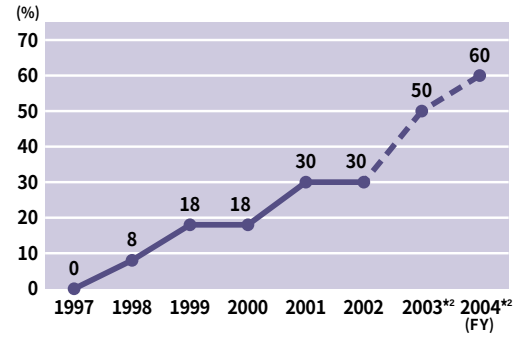
In order to avoid the unlikely chance of a potential oil spill, we have been changing over to double-hulled tankers[*1] starting in 1998. As of the end of March 2003, 3 of our 10 time-chartered tankers have been replaced with double-hulled tankers, and we plan to replace 6 more in fiscal 2004. We carefully consider other ways to protect the ocean environment, for example by ensuring that pollution-preventing oil booms are used during tanker loading and unloading.

Double-hulled tankers reduce the risk of oil spills

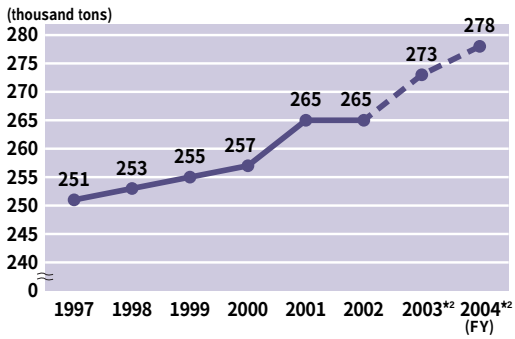
●Efficiency in transport

In order to increase the efficiency of our transport operations, we are pursuing economies of scale by switching from 200,000 ton class tankers to 300,000 ton class tankers, and by combining shipments with the Nippon Oil Corporation, with which Cosmo Oil set up the Nippon Global Tanker Co.

Double-hulled tankers in our time-chartered fleet



Average dead-weight of our time-chartered fleet



Oil storage

To secure a stable supply of oil during emergencies, oil importers and refining companies are required by law to store a 70-day supply of petroleum products, and as of the end of March 2003, they collectively held a 78-day supply. In addition, the Japan National Oil Corporation (JNOC) maintains 50 million kiloliters in storage, equal to a 91-day supply. This, combined with the supply stored by private companies, means that Japan has a 169-day supply.

***1. Double-hulled tankers**
These ships are built with two hulls in order to prevent oil from spilling out in case of an accident.

***2.** Figures for fiscal 2003 and 2004 are estimates.

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

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

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

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

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

Preventing climate change

● Efficient energy use

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

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

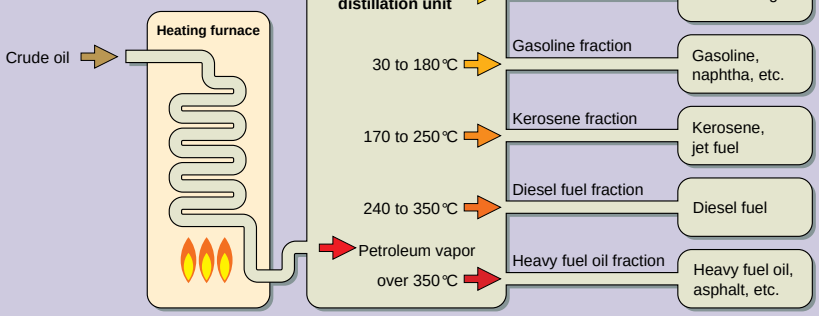
Co-generation unit at the Chiba Refinery

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

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

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

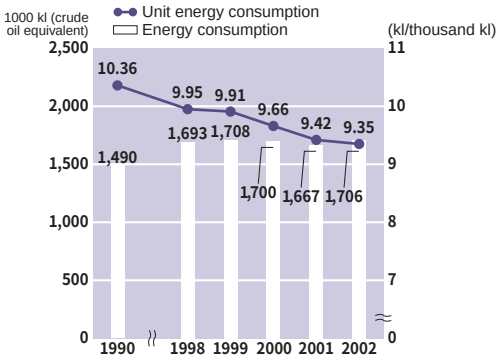
Mechanism of atmospheric distillation unit



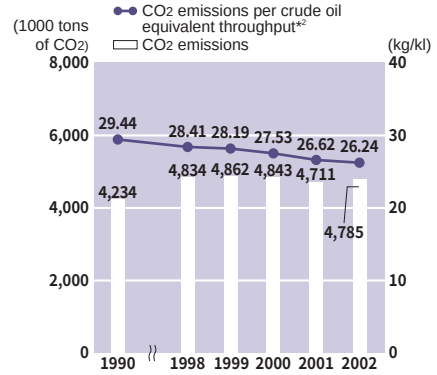
Petroleum refining process

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

Energy use



CO_2 emissions*1



●Energy conservation at offices

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

Efficient resource use

●Reducing industrial waste

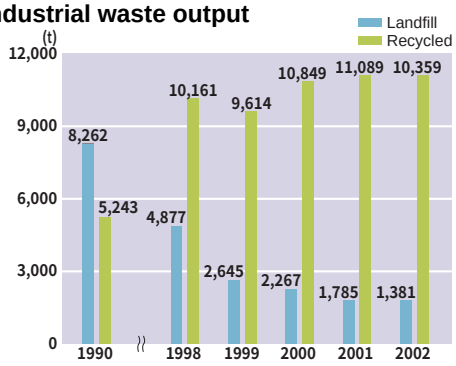
Spent catalysts produced during the refining process and sludge left over from wastewater treatment processes account for a large proportion of the industrial waste produced by refineries.

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

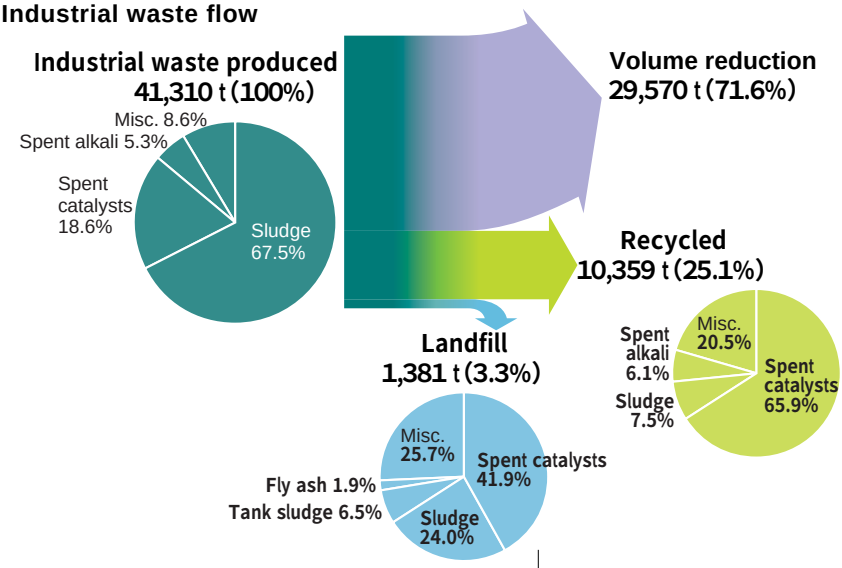
Excess sludge is dehydrated and its volume further reduced by burning in incinerators that comply with dioxin-related regulations, before it is discarded in an appropriate manner. At the Sakaide refinery, an excess sludge reduction system*3 utilizing biotechnology has now come fully on stream, and has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

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

Industrial waste output



Industrial waste flow



●Paperless offices and paper recycling

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

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

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

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

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

***3.** See page 16.

Pollution prevention

• Controlling chemical substances

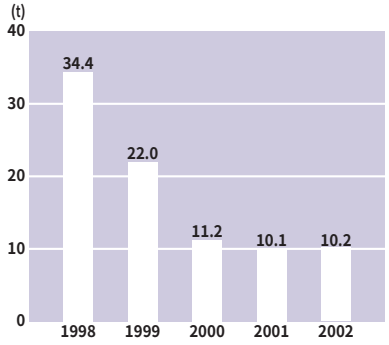
Oil refineries handle chemical substances found in petroleum products, such as benzene, xylene and toluene, as well as those found in catalysts used in the refining process, such as cobalt and molybdenum. To reduce atmospheric emissions of these substances during storage and shipping, we store petroleum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

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

*** The PRTR Law**

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

Benzene emissions to air†



† Include emissions from storage depots

Flue gas denitrification unit removes NOx emissions

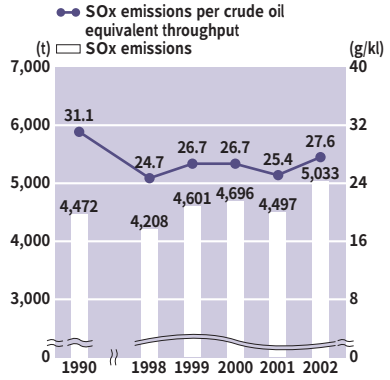
Releases and transfers of PRTR-controlled substances

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

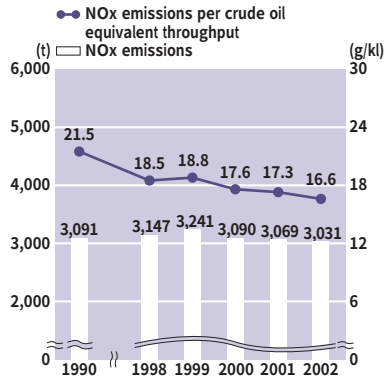
• Preventing air pollution

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

Sulfur oxide (SOx) emissions



Nitrogen oxide (NOx) emissions



• Reducing dioxins*2

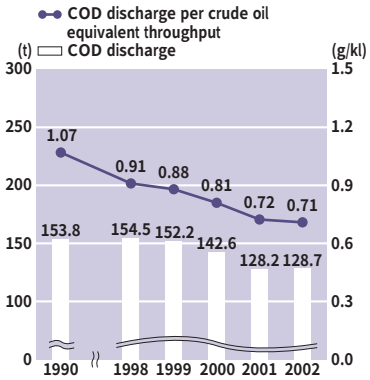
Those of our refineries that have waste incineration facilities managed to reduce their release of dioxins to levels well below emission standards some time ago. However, we decided to close some of these facilities, while tightening control over the ones still in operation.

• Preventing water pollution and using water resources efficiently

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

Wastewater treatment facility

COD*4 discharge



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

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

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

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

Green purchasing

• Green purchasing guidelines to be established

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

Safe operations

• Systems and action to ensure safe operations

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

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

• Safety and emergency response measures

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

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

Company fire brigade at oil refinery

Comprehensive emergency drill

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

Oil boom (stored)

• Promoting health

We arrange routine health checkups of our

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

Accident prevention and response

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

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

●Results of health and safety measures

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

Number of accidents

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

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

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

(As of December 2002)

●Awards

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

Secretary General's Prize from the Japan Energy Conservation Center

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

●Environmental management systems at our refineries

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

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

Status of ISO 14001 certification

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

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

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

(As of March 2003)

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

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

We are shifting to larger tanker trucks and ships to boost efficiency and energy conservation.

Petroleum products are transported to oil storage depots, the factories of corporate customers, and service stations nationwide by tanker trucks and coastal tanker ships. By shifting to the use of larger tanker trucks and ships, closing and consolidating oil storage depots and/or sharing them with other oil companies, Cosmo Oil has for many years promoted efficiency and energy conservation in distribution. We have already surpassed our original goal of reducing land and sea transport fuel consumption to 9% less than 1990 levels by 2010.

Also, to promote accident prevention, we request our distribution partners to conduct safety training for their employees, and we have established and take steps to ensure compliance with specifications for standard equipment on tanker trucks. We award commendations to partner companies that achieve good safety records.

Efficiency and energy conservation in land transport

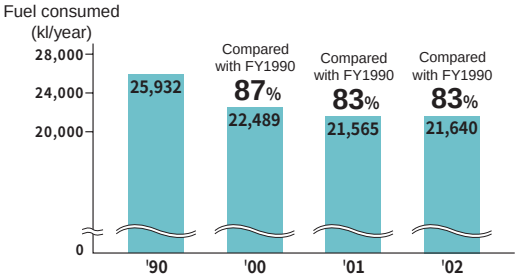
Cosmo Oil promotes energy conservation in land transport by shifting to larger vehicles, reducing the number of vehicles, and extending operating hours. Operating hours per vehicle are extended by increasing nighttime, Sunday and holiday deliveries. Despite increased volumes shipped we were able to maintain the same number of vehicles in fiscal 2002 as in the previous year. Accordingly, fuel consumption for the year remained the same as in fiscal 2001, at 17% less than the fiscal 1990 level.

Average tanker truck size and stowage factor

FY1990
Average truck
size: 15.0 kl
Stowage factor: 94.3%

FY2002
Average truck
size: 19.3 kl
Stowage factor: 94.3%

Tanker truck fuel consumption



We will continue to work hard to reduce energy consumption and achieve better distribution efficiency by increasing the stowage factor and expanding nighttime deliveries.

Large tanker truck

Efficiency and energy conservation in marine transport

Petroleum products are shipped from oil refineries in Japan to oil terminals, oil storage depots and other destinations by several-thousand-ton class coastal tankers. Although the volume shipped in fiscal 2002 increased slightly over the previous year, by using larger ships and improving loading and operating efficiencies, we maintained the same fuel consumption as in fiscal 2001, or 15% less than the fiscal 1990 level. Cosmo Oil will continue working for greater efficiency and energy conservation by eliminating mismatches in vessel allocation, increasing cargo handling at night and on holidays, and using larger tankers (made possible by our alliance with Nippon Oil Corporation, which allows the joint use of oil terminals).

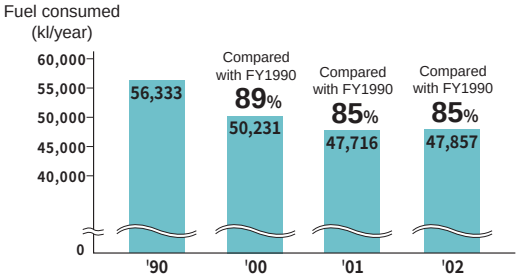
Large coastal tanker

Average coastal tanker size and stowage factor

FY1990
Average ship
size: 1,536 kl
Stowage factor: 90.0%

FY2002
Average ship
size: 2,809 kl
Stowage factor: 94.3%

Coastal tanker fuel consumption



We are committed to winning a high level of customer satisfaction at our service stations.

Every day large numbers of customers visit Cosmo Oil's 5,300 service stations nationwide, and as such they serve as the "face" of the company to the public. Taking care of the environment and acting as a member of the local community are indispensable parts of service station management today, in order to fit in with the community. Cosmo Oil has started introducing new, environmentally conscious self-serve stations, while we strive to gain ever more customer support through various projects for teaching and practically applying measures to prevent pollution and promote health and safety, as well as the Cosmo the Card Eco* program for environmental protection through company-customer partnership.

Employee training programs

Cosmo Oil trains its employees to win a high level of customer satisfaction in our service stations. As part of our "NAVI2003" training program, we have developed a service station risk management course that aims to promote safe service station operation by imparting emergency management know-how. It consists of two parts, one that deals with methods for accident prevention and emergency management on service station premises, and another on health, safety and environment (HSE) that deals with storage tank leakage incidents and other aspects of safe service station management.

Our Tokyo Training Center won recognition for its highly effective education programs for the employees of authorized dealers and service stations, and received the Minister of Health, Labour and Welfare Award for 2002. This is the highest honor awarded in Japan for employee training programs.

The Minister of Health, Labor and Welfare Award for our employee training programs

Service station safety

To ensure safety at service stations for our customers, we created a Service Station Safety and Emergency Management Manual that lays out detailed directions on how to comply with relevant laws and regulations, equipment safety and maintenance, fire prevention and crime prevention, as well as how to deal with environmental issues and communicate with the local community. Cosmo Oil has its own supervisors who provide consulting on service station management, and their guidance to individual service stations is based on this Manual.

In April 2003, we launched an evaluation system in which service stations win "environmental management points" for proper routine inspections of their facilities, control of product stock, handling of industrial waste, and other items. This system is helping to promote safety and environmental management at service stations.

* See page 23

Environmentally friendly service stations

By the end of fiscal 2002, Cosmo Oil had fitted service stations in 11 locations with solar panels that generate electricity, as a way of making our service stations more environmental friendly. Plans call for four more stations to be equipped with solar panels during fiscal 2003.

Solar panels at a service station

Barrier-free service stations

We believe that service stations play a role in the local community by providing a supply of fuel. As familiar features of the local community, service stations should be accessible to everyone. Based on this thinking, we have added sloped entrances and other features to service stations in various locations, in order to promote barrier-free access. For details please see our website (in Japanese only) at:
www.cosmo-oil.co.jp/ss/society/index.html

Cosmo Oil's style of corporate culture promotes regard for the individual and harmony with the organization.

Inside the company, Cosmo Oil uses mottos such as "The Cosmo corporate network—valued by our customers" and "In harmony with society." We believe that can we achieve those aims by fulfilling our social responsibilities as a good corporate citizen, and that it is important for every employee to have the willingness and ability to fulfill his or her own social responsibilities. Committed to respect for the individual and harmony within the organization, Cosmo Oil works to create its own style of corporate culture. Our personnel department draws up our personnel plan, consults with the labor union, and with the approval of the Board of Directors, puts it into practice.

To get an idea of our employees' ambitions, motivation, and feelings about their working environment, we carried out an opinion poll of all employees during fiscal 2002. The results of this survey are now reflected in personnel policies that aim to create a pleasant and appealing workplace. In April 2003, we also set up the Corporate Ethics Regulations (including Corporate Behavior Guidelines)* and created a Corporate Ethics Promotion Office as well as a telephone and e-mail helpline for employees to discuss or report their concerns.

* Please refer to page 11.

Respecting human rights

Peace, human rights and the environment are often used as key words in the 21st century. To continue being valued in a society that is becoming increasingly affected by international standards, our aim is to be a robust, generous and positive company. To realize this goal, we feel it is important for all employees to have a correct understanding of human rights, and to create positive human relations without discrimination, not only within the company, but in the local community as well. Cosmo Oil conducts awareness-raising trainings based on the following approach (20 days of training sessions were carried in fiscal 2002, with a total of 1,217 participants):

- Examine the meaning of respect for human rights in the context of our company's activities.
- Build on concepts of respect for human rights as part of Cosmo Oil's corporate culture.
- Conduct awareness-raising activities to help put into practice this respect for human rights.

Personnel system

Cosmo Oil aims to offer a workplace where every employee can strive for self-realization, and also be workplace where achievements are evaluated fairly. To these ends, we plan and carry out various types of programs for employees. We launched a new performance- and competency-oriented personnel system in January 2000 that aims to provide every employee with an opportunity to take on challenges, and realize their greatest potential.

• Aims

The aims of our personnel system are as follows:

- Clear roles and responsibilities for each person
- Fair evaluation of work performance, based on the job description
- Fair remuneration that reflects this evaluation
- Education and development of employees' abilities by providing feedback based on this evaluation

When setting goals and evaluating performance, superiors and subordinates consult together until they reach agreement, in order to ensure coherence between the management plan and individual work goals. This allows for fair evaluations and encourages employees to be self-motivated.

Simplified classifications of job titles and positions have enabled Cosmo Oil to be more flexible in deploying personnel, in a way that reflects management conditions and changes in society.

Educational programs

Cosmo Oil has created an educational program for newly-hired employees and regular staff that aims to foster regard for the individual in the organizational framework and nurture self-motivated workers. We also have an educational program for core employees and managers that teaches them how to create value through their work.

In the field of environmental education, we provide opportunities for all employees to receive

instruction, by including environmental education as part of training programs at some employee levels, for example in the new executive training course, and by setting up a new environmental course in our program of correspondence courses. During fiscal 2003, we plan to include environmental education in training programs at all levels.

Training programs in FY2002

■For managers	Total hours	Number of trainees
For selected managers	112.5	13
For new managers	22.5	35
For new managerial levels	15.0	48
Total	150.0	96

(For reference: Total number of management-level staff of Cosmo Oil, including employees on temporary loan to other organizations: 922)

■For management candidates	Total hours	Number of trainees
For core employees	30.0	56
For new 3rd-level employees	52.5	62
For new employees	157.5	9
Total	240.0	127

(For reference: Total number of Cosmo Oil's management candidates, including employees on temporary loan to other organizations: 558)

※Cosmo Oil conducts trainings in addition to the above, including trainings in specific departments, and in courses outside the company.

Support for career growth

In order for every employee to be personally motivated and enjoy a fulfilling life in society, it is important for each person to think about what kind of career he or she wants as a member of society, and then to make it happen. Our company carries out career consultations once a year, in which each person's career is discussed by superiors and subordinates. The results are taken into consideration by the company, and when personnel transfers are made, the company considers the results of consultations, to ensure that the transfers enhance career growth. Starting in 2000, we also instituted an in-house system of announcing job openings, to support personal motivation and career building.

Labor union

Our company's labor union is formed on the union shop system, and presently has 2,878 members*. A labor agreement exists between the company and the labor union that covers all employees, and representatives of the company hold consultations twenty to thirty times per year in various councils, including the Management Policy Council, the Central Labor-Management Council, the Regional Labor-Management Councils, the Health and Safety Committee, the Hygiene Committee, and so on. As a result of these arrangements, Cosmo Oil has a health and benefit system in place that more than meets the government's requirement that companies make voluntary efforts to support employees both at work and as members of their families.

Item	Cosmo Oil	Legal requirement for employer
Overtime work for employees engaged in child care or nursing care (after employees apply for special status)	No overtime work is expected	Maximum 24 hours/month and 150 hours/year
Child nursing leave	Five days special paid leave	Companies are expected to make an effort but are not obligated to grant leave

Equal Opportunity Employment Law

Among female employees at the managerial level, one woman is already working as a department head at Cosmo Oil. We will work to further expand opportunities for female employees.

Career support for retired employees

Due to changes in pensions, employment insurance, and other aspects of social security, workers in Japan today are increasingly concerned about life after retirement. Cosmo Oil conducts a Life Planning Program for employees to help give confidence and peace of mind about life after retirement. For employees about to retire, we also hold Pre-Retirement Seminars, and for those who wish to find another job after retiring from Cosmo Oil, we hold Second Career Seminars. We provide information from the Cosmo Oil Group Career Center to participants of our Second Career Seminars, and we have also set up a counseling service at the Career Center.

Employment of the disabled

We carry out employee training and awareness-raising to create an atmosphere in the company that allows disabled employees to work without hindrance. We make an effort to create a working environment where disabled employees can realize their full potential.

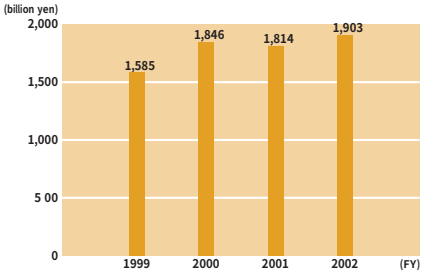
* Including employees on temporary loan to other organizations

We have started implementing the Cosmo Oil Group Medium-Term Management Plan, with the aim of enhancing corporate value.

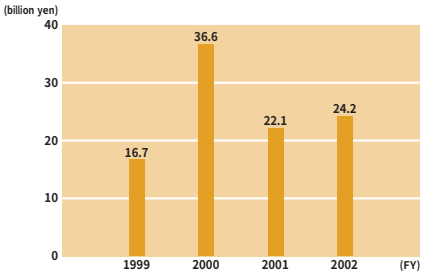
In fiscal 2002, our sales and profits increased on both a consolidated and unconsolidated basis. Higher average selling prices and volume contributed to an increase of 4.9% in sales, to 1,903 billion yen. Rationalization and value creation amounted to 16 billion yen added value, contributing to increases in each profit line, and the resulting bottom line was 3.4 billion yen. Shareholders' equity decreased by 0.7 billion to 193.6 billion yen after dividends. The Cosmo Oil Group implemented the "Value Creation 21" plan during fiscal 2001 and 2002, and realized a total of 43 billion yen in profit improvements through rationalization and value creation, achieving 86% of our target of 50 billion yen. From fiscal 2003, the Cosmo Oil Group started a new three-year "Cosmo Oil Group Medium-Term Management Plan" to enhance its corporate value by fully utilizing the management resources of the entire group. Our target is to generate a total of 56.5 billion yen in added value over three years through rationalization and value creation, as follows: rationalization and enhanced efficiency of oil refining and marketing businesses (21.2 billion yen), value creation (27.4 billion yen), oil exploration (2.0 billion yen), and affiliated companies (6.0 billion yen).

Selected financial performance indicators (consolidated)

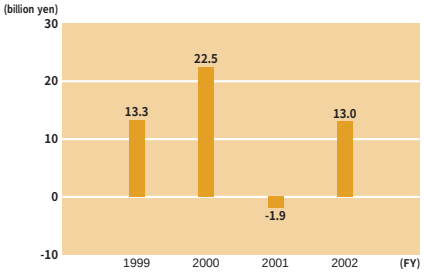
Sales



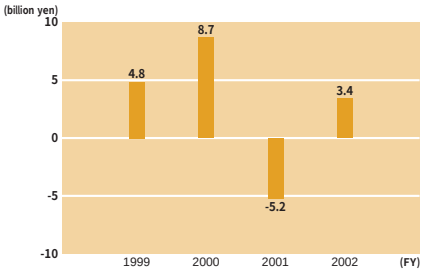
Operating profits



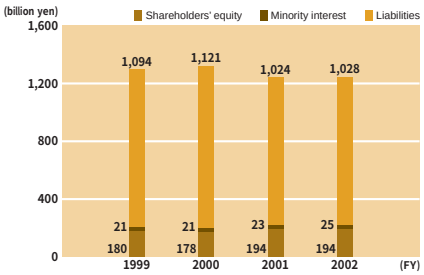
Income before tax and minority interests



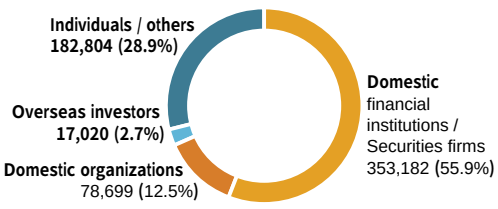
Net income



Shareholder's equity and liabilities



Total stock issued 631,705 (thousand)



Cosmo Oil Group Medium-Term Management Plan

■ Cosmo Oil Group profit structure vision

• Today

Operating profits: 24.2 billion yen

• Fiscal 2005

Expansion of existing businesses and strengthening our electricity and gas businesses.

Operating profits: 66 billion yen

• Long-term

Business expansion of electricity and gas, oil exploration, new energy, and affiliates to establish a robust profit structure.

We plan to invest 111 billion yen in capital investments over the next three years. Strategic investments to enhance profitability will amount to 58.6 billion yen or about 53% of the total investment, and include installation and renovation of self-service gas stations operated by Cosmo Oil and its subsidiaries (14.7 billion yen), electricity and gas businesses (16.9 billion yen), and oil exploration (19.3 billion yen). The investment for upgrading facilities to respond to tougher regulations on sulfur content for gasoline (13.9 billion yen) and for capacity maintenance (38.5 billion yen) will be 52.4 billion yen.

We are undertaking two major initiatives in upgrading service stations to enhance customer satisfaction. One initiative is to expand the number of self-service stations, which have been deregulated in Japan since 1998. The other is to set up what we call “Auto B-Cle” branded shops in large-scale service stations at key locations, which offer automobile inspection and maintenance services, premium car washes, and automotive products, and to develop an “Auto B-Cle Network” with small- and medium-sized satellite service stations.

As a further effort to strengthen our sales infrastructure to enhance customer satisfaction, we will increase the users of the “Cosmo the Card,” credit card operated by our group. The member in force reached 2,250,000, as of March 2003, and we find that cardholders tend to buy twice as much fuel as regular customers and to buy car care products more often. By utilizing the card effectively, we will provide optimal service for customer needs for self-service fueling and car care.

In April 2002, we started a new program called “Cosmo the Card Eco,” and the number of cardholders climbed to 56,000 during the first year. Through this card, customers can support efforts to build a sustainable society. We will continue striving to enhance corporate value by staying ahead of the needs of customers and society, and by being proactive in our initiatives.

Socially responsible investment

Cosmo Oil has been given recognition as a socially responsible investment since fiscal 2001 when Cosmo Oil shares were included in the Midori-no-Tsubasa (“Green Wings”) fund of the UFJ Partners Asset Management Co. In March 2003, Cosmo Oil became the first Japanese oil company to make it to the FTSE4Good Global Index, an internationally-known index of socially responsible investments. Since July 2003, Cosmo Oil has been also included in the Morningstar Socially Responsible Investment Index.

***1. FTSE4Good Global Index:**
FTSE4Good Global Index is a socially responsible investment index, one of many indices provided by FTSE Group, an independent company co-owned by the London Stock Exchange and the Financial Times. Aside from the Global Index, there are also U.K, U.S. and pan-European indices in the FTSE4Good family.

***2. Morningstar Socially Responsible Investment Index:**
This is Japan’s first socially responsible investment index, based on the share prices of 150 Japanese publicly-traded companies selected for excellent social performance by Morningstar Japan KK.

We are working to enhance our environmental accounting system, an important tool for management decision-making and information disclosure.

Environmental accounting at the Cosmo Oil Group

The Cosmo Oil Group started environmental accounting in fiscal 2001, making this the third year of using the system. To put our commitment to environmental excellence into action, we are using the system as a tool for internal decision-making and for accountability to the public. In preparing this environmental accounting report, we made an effort to determine both the costs and benefits of efforts to protect the environment, keeping in mind the unique characteristics of the petroleum industry. One characteristic is that substances causing environmental impacts are generated by combustion when the product is used by customers. The other is that huge investments have been made over many years to mitigate environmental impacts, because we produce petroleum products from Middle East crude oil, which is high in sulfur content (see graph of "Costs of environmental equipment acquisitions (at year end)"). In preparing this report, we referred to the *Environmental Accounting Guidelines* (2002) from Japan's Ministry of the Environment and the same ministry's 2003 *Guide to Environmental Protection Cost Classifications* (March 2003).

As in the past, environmental costs were calculated in a way that covers all the categories stated in our financial accounting.

This year, the Cosmo Oil Group created the *Blue Earth 21* Medium-Term Environmental Plan. Through it, all group companies are working together to tackle environmental issues. To improve our transparency and breadth of coverage, in our environmental accounting this year we have added such costs as the purchase of recycled paper.

In addition, we continue to include environmental indicators this year.

Period and scope of environmental accounting report

◎Period

Fiscal year 2002 (April 1, 2002 to March 31, 2003)

◎Scope

The report covers the four oil refineries owned by Cosmo Oil Co., as well as the corporate head office and branch offices, the Research and Development Center, Cosmo Matsuyama Oil Co., and Cosmo Oil Lubricants Co.

Cosmo Oil Co., Ltd.

Chiba Oil Refinery, Yokkaichi Oil Refinery, Sakai Oil Refinery, Sakaide Oil Refinery, Corporate head office, some branch offices (only the purchases of recycled paper), the Research and Development Center (only the costs and benefits of research and development in the area of environmental protection)

Cosmo Matsuyama Oil Co., Ltd.

Cosmo Oil Lubricants, Co., Ltd.

Chiba Factory, Yokkaichi Factory (environmental costs and benefits for these two are included with Cosmo Oil's refineries in Chiba and Yokkaichi). Green purchasing costs for raw materials to produce lubricating oils are covered.

Environmental accounting by site

Environmental accounting is prepared separately for Cosmo Oil Co.'s four refineries, Cosmo Matsuyama Oil Co., and other sites. The data is available at the following website:
www.cosmo-oil.co.jp/eng/envi/2003/index.html

Changes from previous year

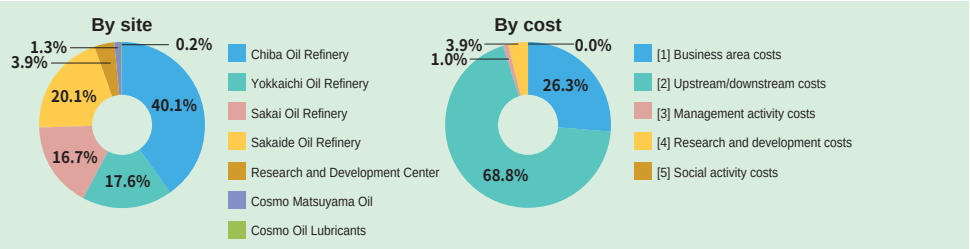
Major changes in environmental accounting from the previous year are described below.

◎Expansion of data categories and sites covered

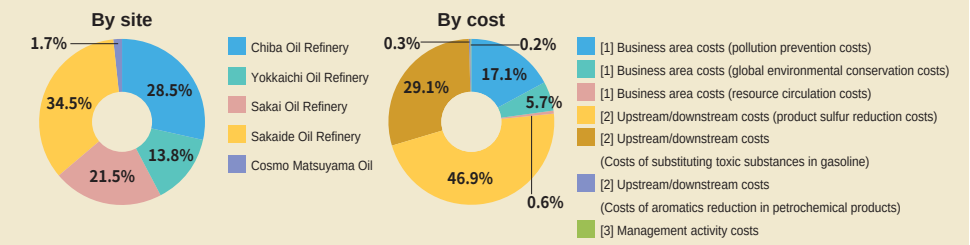
To increase transparency and coverage this fiscal year, we collected data and report on the following categories:

1. Environmental protection costs
   (Cosmo Oil Co., Ltd., entire company)
   a. Cost of purchasing recycled paper
   b. Donations relating to the environment
   c. Cost of preparing environmental reports
2. Economic benefits (Cosmo Oil Co., Ltd. head office)
   Electricity costs of the offices of the corporate head office.

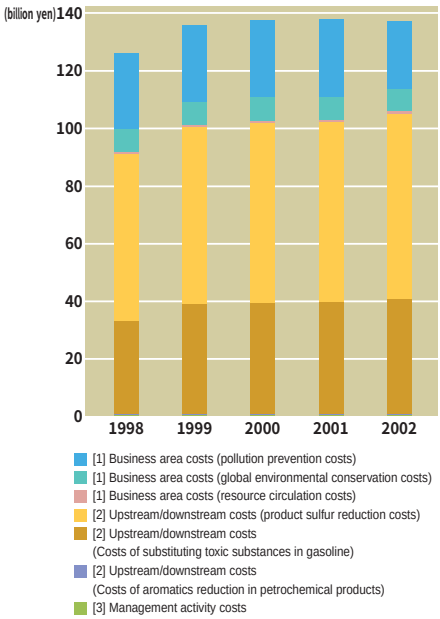
Environmental cost



Year-end acquisition costs



Costs of environmental equipment acquisitions (at year end)



Environmental accounting results

For fiscal year 2002, on the environmental cost side, investments amounted to 2.160 billion yen and expenses 44.54 billion. Compared with the previous year, investments increased by 1.098 billion yen, and expenses decreased by 2.651 billion. Year-end acquisition costs of environmental equipment were 137.109 billion yen, a decrease of 695 million from the previous year.

With regard to environmental benefits, the absolute figures for environmental impacts rose due to increased demand for fuels for heating and electricity generation in the cold winter, as well as the effects of responding to tougher 50 ppm standards for diesel. But the environmental impacts per crude oil equivalent throughput was lower than last year in almost all categories. In addition, for upstream and downstream benefits, as a result of the increased demand, the environmental impacts increased in absolute figures, but the concentrations and amounts per unit were lower than last year for many categories.

Future issues

We are now in our third year of our environmental accounting system. For calculations, we made an effort to keep in mind the issues raised last year, and to improve the transparency and coverage, in order to be more accountable to the outside. Internally, the data has been helpful with decision-making, as we used plant-specific cost data as a basis for calculations of values in connection with various company contracts.

Cosmo Oil Co. created the *Blue Earth 21* Medium-Term Environmental Plan in fiscal 2002. The computerization of environmental accounting systems is a part of this plan and we have been working to implement it. Development of the computer system was completed at the end of fiscal 2002, and actual implementation started in April 2003, covering Cosmo Oil Co.'s four refineries, and the Yokkaichi Kasumi power generation plant, which started commercial operation in July.

In the future, we will consider ways to improve data accuracy and expand the sites covered, and to improve the range of coverage in reporting.

Integrated environmental indicators and environmental productivity

Since last fiscal year the Cosmo Oil Group has been calculating integrated environmental indicators and environmental productivity on a trial basis—as a part of environmental accounting.

The environmental impacts in the business area (calculated based on EPS methods) increased in fiscal 2002 because of a greater volume of crude oil processed and more sophisticated refining. Because the production volume has increased, the environmental burden of products also increased, and this resulted in an increase in the totals.

Environmental productivity improved in the business area, but declined in the product area, with the outcome being a net decline. A major reason for this was that, while the sulfur content of products declined, the proportion of heavy fuel oil C production (which has high CO_2 emissions per unit) increased due to an increase in demand for this fuel for electricity generation.

■ Integrated environmental Indicators

Item		CO_2 equivalent using EPS	
		FY 2002	Reduction (compared with FY 2001)
Business area	SOx	182	–16
	NOx	64	0
	Benzene	0	0
	COD	0	0
	CO_2	4,930	–68
Business area total		5,176	–84
Product use: potential SOx emissions		5,390	4
CO_2 emissions from product use		71,724	–2,369
Product use total		77,114	–2,365
Business area total + Product use total		82,290	–2,449

(Unit: thousand t-CO_2 equivalent)

*Calculated using EPS methods.
Weighting coefficients (CO_2=1): SOx=30.3, NOx=19.7, benzene=33.8, COD=0.00935.
Note: EPS stands for "Environmental Priority Strategies in Product Design" (Version 2000), by the Centre for Environmental Assessment of Products and Material Systems, Sweden.

■ Environmental productivity

Item	Production volume per unit of integrated environmental impacts	
	FY 2002	Improvement (compared with FY 2001)
Business area total	5.469	0.012
Product use total	0.367	–0.005
Business area total + Product use total	0.344	–0.004

(Unit: kl/t-CO_2 equivalent)

Methods of compiling environmental accounting data

■ **Measurement of Environmental Costs**

Investments: Capital investment for depreciable assets acquired for the purpose of environmental protection
Expenses: Expenses during the period associated with environmental protection activities (includes depreciation)

[1] Business area costs

Global environmental conservation costs: Costs associated with energy conservation equipment (for co-generation, etc.)

Pollution prevention costs:

Costs to prevent air pollution (sulfur recovery equipment, nitrogen oxides control equipment, etc.)

Costs to prevent water pollution (wastewater treatment equipment, sour water treatment equipment, etc.)

Compensation fund under the Pollution-related Health Damage Compensation Law

Resource circulation costs: Costs related to waste treatment and recycling

[2] Upstream/downstream costs

Product environmental impact reduction costs: Costs associated with providing customers products that have lower environmental impacts

Product sulfur reduction costs: Costs associated with reducing SOx emissions 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 the raw materials of petrochemical products

[3] Management activity costs:

Costs incurred for employees' environmental education; for operating and maintaining the environmental management system; for maintaining green spaces at business establishments; and for monitoring and measuring environmental impacts

[4] Research and development costs:

Costs incurred for research and development related to environmental protection

[5] Social activity costs:

Costs related to greening and other activities that are not related to business activities

∗ The classification of funds levied under the Pollution Related Health Damage Compensation Law was changed from last fiscal year's classification as "social activity costs" to "pollution prevention costs" in the "business area cost" category in accordance with the 2003 Guide to Environmental Protection Cost Classification (Japan's Ministry of the Environment, March 2003). As a result, the fiscal 2001 social activity cost category dropped from 820 million yen to 6 million, and the pollution prevention cost category rose from 3.794 billion yen to 4.608 billion.

■ **Measurement of Environmental Benefits**

"Reduction benefits" and "reduction": the fiscal 2001 figure minus the 2002 figure

[1] Business area benefits

Concentrations/unit values: Environmental impacts per unit of crude oil equivalent throughput

Environmental impacts: Environmental impacts generated through business activities

∗ Concentrations/unit values of "business area" benefits do not include figures for Cosmo Matsuyama Oil Co. (crude oil equivalent throughput is not a relevant measure, as no crude oil is processed there).

[2]Upstream/downstream benefits

Reduction effect of environmental impact of products due to improvements in refining processes at refineries

● **Concentrations/unit values:**

Products sulfur reduction: Sulfur content of products

Benefits of substituting toxic substances in gasoline (reducing benzene content): Benzene concentration in gasoline

CO_2 emissions from product use: Number calculated from impacts stated below divided by the volume of petroleum products produced

● **Environmental impacts:** Potential environmental impact expected when the product is used, after the reduction of product environmental impacts at the oil refinery level

Products sulfur reduction: Amount of target substance calculated by multiplying the average sulfur content in our products by production volume

Benefits of substituting toxic substances in gasoline (benzene): Amount of potential benzene emissions, calculated by multiplying the average benzene concentration in gasoline by production volume

■ Environmental accounting

Item	Environmental cost (million yen)			
	Investment amount		Expenses amount	
	FY 2002	Changes	FY 2002	Changes
1 Business area costs	**24**	**−179**	**11,693**	**−32**
Global environmental conservation costs	**0**	**−1**	**6,944**	**450**
Pollution prevention costs	**24**	**−161**	**4,104**	**−504**
Resource circulation costs	**0**	**−17**	**645**	**22**
2 Upstream/downstream costs	**2,136**	**1,277**	**30,662**	**−2,884**
Product environmental impact reduction costs	**2,136**	**1,277**	**30,570**	**−2,876**
Product sulfur reduction costs	**1,905**	**1,436**	**21,867**	**−1,950**
Gasoline	**556**	**423**	**5,810**	**−687**
Naphtha	**121**	**92**	**1,525**	**−72**
Jet fuel oil	**34**	**18**	**1,332**	**35**
Kerosene	**317**	**235**	**3,542**	**−574**
Diesel fuel	**451**	**335**	**5,249**	**−686**
Heavy fuel oil A	**339**	**273**	**2,457**	**−247**
Heavy fuel oil C	**10**	**2**	**1,216**	**436**
LPG	**77**	**58**	**736**	**−155**
Costs of substituting toxic substances in gasoline (benzene, etc.)	**223**	**−166**	**8,587**	**−927**
Costs of aromatics reduction in petrochemical products	**8**	**7**	**116**	**1**
Green purchasing costs	**0**	**0**	**92**	**−8**
3 Management activity costs	**0**	**0**	**432**	**−20**
4 Research and development costs	**0**	**0**	**1,751**	**289**
5 Social activity costs	**0**	**0**	**2**	**−4**
Total	**2,160**	**1,098**	**44,540**	**−2,651**

Benefits of aromatics reduction in petrochemical products: Amount of aromatics in raw materials of petrochemical products reduced at business establishments

CO_2 emissions from product use: CO_2 emissions calculated by multiplying the CO_2 emission factor set by the Petroleum Association of Japan for each product by the corresponding production volume

∗ Actual SOx emissions will be less than the potential emissions, as reductions in SOx emissions by desulfurization units at the time of customer use are not accounted for here.

∗ Because we employ the most suitable production methods to strike a balance between costs and environmental protection, the sulfur content of each product is well below the levels set by JIS.

∗ Naphtha is used as an ingredient in petrochemicals and fertilizers. Although they do not directly emit SOx and CO_2, we include them in figures here.

∗ To increase transparency and coverage, starting with fiscal 2002, we report high octane and regular gasoline separately.

Item	Environmental benefits			
	Concentrations/unit value		Environmental impacts	
	Reduction benefit	FY 2002	Reduction	FY 2002
1 Business area benefits				
Benefits of reduction in resource input	(kL-crude oil/thousand kl)	(kL-crude oil/thousand kl)	(TJ)	(TJ)
• Energy input	0.07	9.35	–1,586	68,310
	(kg/kl)	(kg/kl)	(thousand t)	(thousand t)
• Water input	1	189	14	36,908
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**	0.38	26.24	–68	4,930
	(g/kl)	(g/kl)	(t)	(t)
• SOx	–2.2	27.6	–520	5,998
• NOx	0.7	16.6	32	3,224
• Benzene	0.00	0.03	3.35	10.19
Release to water	(g/kl)	(g/kl)	(t)	(t)
• COD	0.01	0.71	–0.5	131.1
Industrial waste emissions	(g/kl)	(g/kl)	(t)	(t)
• generated	74	227	11,625	41,959
• recycled	6	57	328	10,876
• landfill	2	8	458	1,423
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	0.0133	0.3950	126	177,896
High octane gasoline	0.0000	0.0005	0	10
Regular gasoline	0.0000	0.0030	–4	231
Naphtha	–0.0013	0.0284	–66	823
Jet fuel oil	0.0042	0.0213	36	465
Kerosene	0.0011	0.0028	68	157
Diesel fuel	0.0175	0.0234	1,502	1,931
Heavy fuel oil A	0.0162	0.4503	–1,615	28,672
Heavy fuel oil C	0.1372	1.6174	209	145,602
LPG	–0.0002	0.0005	–2	5
Benefits of substituting toxic substances in gasoline (reducing benzen in gasoline)	(vol %)	(vol %)	(t)	(t)
	–0.0155	0.5556	–1,594	32,189
Benefits of aromatics reduction in petrochemical products			(kl)	(kl)
			184	3,468
CO_2 Emissions from Product Use	(t-CO_2/kl)	(t-CO_2/kl)	(thousand t-CO_2)	(thousand t-CO_2)
	–0.0063	2.5428	–2,369	71,724

■Environmental protection costs (Cosmo Oil Co., Ltd, entire company)

(million yen)

Item	FY 2002	Change
Cost of purchasing recycled paper (full price)	14	–1
Donations for environmental causes	31	25
Costs of preparing environmental reports	37	12

■Economic benefits (summary)

(million yen)

Item	Amount
Cost savings through energy conservation (cogeneration)	2,181
Cost savings from recycling of catalyst (reduction in disposal costs)	33
Benefits of R&D (royalty revenues, etc.)	81
Electrical cost savings at headquarters	3
Total	2,298

● Notes on calculation of economic benefits

1. Savings achieved through cogeneration = savings from steam generation + reduction of electricity costs – cost of fuels (LPG, heavy fuel oil, etc.).
2. Calculated as costs avoided through recycling of catalyst (including cost of purchasing new catalyst and cost of disposing of used catalyst).
3. Income from royalties is the actual amount received. Savings from research and development include costs avoided through R&D achievements.
4. Reduction of electricity costs: the FY2001 cost minus the FY2002 cost.

Environmental Activities—Milestones

	The Cosmo Oil Group and the petroleum industry	Japan and the world
1986	● Cosmo Oil Co., Ltd. established ● Cosmo Oil "Regulations on Environment and Safety Management" and "Regulations for the Corporate Office on Comprehensive Safety Measures" established ● All premium gasoline sold in Japan becomes unleaded	
1987	● FCC exhaust gas desulfurization unit at Sakai Oil Refinery completed	● Montreal Protocol (of the international Convention for the Protection of the Ozone Layer) adopted
1989		● Exxon Valdez runs aground, causes huge oil spill off the coast of Alaska
1990	● Cogeneration facilities at Yokkaichi Oil Refinery completed	● Gulf Crisis begins ● Massive oil spills in the Persian Gulf
1991	● The Cosmo Oil Group dispatches oil spill prevention expert team to the Persian Gulf	● Keidanren adopts "Keidanren Global Environmental Charter"
1992	● Atmospheric distillation flue gas denitrification unit installed at Sakai Oil Refinery ● Sulfur content in diesel sold in Japan reduced to less than 0.2 mass %	● United Nations Framework Convention on Climate Change adopted ● United Nations Conference on the Environment and Development (Earth Summit) ● Japan's Ministry of International Trade and Industry requests companies to prepare Voluntary Environmental Plans
1993	● The Cosmo Oil Group's "Global Environment Action Program" submitted to Japan Ministry of International Trade and Industry ● Cosmo Oil establishes Global Environment Committee, adopts committee regulations	● Japan's Basic Environment Law enacted
1994	● First annual Global Environment Committee meeting held, eight subcommittees created ● Cosmo Oil starts creating environmental targets annually, based on "Global Environmental Initiatives" document ● Diesel fuel desulfurization unit at Chiba Oil Refinery completed	● United Nations Framework Convention on Climate Change (UNFCCC) enters into force ● Cabinet decision approves Japan's Basic Environment Plan
1995	● Cogeneration facilities at Sakai Oil Refinery completed ● Sakai Oil Refinery receives National Resources and Energy Agency's Director-General's Award for excellence in industrial energy management	● First Session of the Conference of the Parties (COP1) to the UNFCCC (Berlin) ● The Great Hanshin-Awaji Earthquake
1996	● *Environmental Action Plan Follow-Up Report* submitted to Ministry of International Trade and Industry ● Cogeneration facilities at Chiba Oil Refinery completed ● Diesel fuel deep desulfurization unit at Sakai Oil Refinery completed ● Petroleum Association of Japan prepares "Voluntary Program to Control Hazardous Air Pollutants" ● Benzene content in gasoline reduced to less than 5 volume %	● COP2 of the UNFCCC (Geneva) ● ISO 14001 (international standard for environmental management systems) created ● Japan's Law on the Quality Control of Gasoline and Other Fuels enters into force Keidanren Appeal on Environment is formulated (Declaration on Voluntary Action of Japanese Industry Directed at Conservation of Global Environment in the 21st Century)
1997	● Cosmo Oil establishes Nakhodka Oil Spill Support Team in response to major oil spill on the coast of the Sea of Japan caused by Russian tanker Nakhodka ● Sakaide Oil Refinery obtains ISO14001 certification ● Environmental impact assessments begin at Cosmo Oil's Yokkaichi Kasumi Electric Power Plant (IPP) ● Sakaide Oil Refinery receives Energy Conservation Center's Chairman's Prize ● Sulfur content in diesel fuel reduced to less than 0.05 mass % ● Petroleum Association of Japan creates "Voluntary Action Program for Global Environmental Conservation"	● COP3 of the UNFCCC (Kyoto) ● Nakhodka oil spill ● Amendment of Law concerning the Rational Use of Energy ● Amendment of Waste Disposal and Public Cleansing Law ● Environmental Impact Assessment Law enacted, followed by amendment of Electric Utilities Industry Law ● Petroleum Association of Japan prepares "Voluntary Action Program for Global Environmental Conservation," in response to the Keidanren Appeal
1998	● Cosmo Oil introduces double-hulled tankers on regular routes ● Chiba, Yokkaichi, and Sakai refineries and Cosmo Matsuyama Oil Co. obtain ISO 14001 certification ● Gasoline benzene reduction unit completed ● No. 2 atmospheric distillation unit heating denitrification unit completed at Chiba Oil Refinery	● COP4 of the UNFCCC (Buenos Aires) ● Cabinet decision adopts national Guideline of Measures to Prevent Global Warming ● Law Concerning the Promotion of Measures to Cope with Global Warming enacted
1999	● Sales launch of "Terra Series" biodegradable lubricating oil ● Sales launch of "Shinsei" chlorine-free diesel engine oil	● COP5 of the UNFCCC (Bonn) ● First Follow-up of Keidanren Voluntary Action Plan on the Environment ● PRTR Law (on pollutant release and transfer registers) promulgated ● Law Concerning Special Measures against Dioxins promulgated
2000	● Sakaide Oil Refinery receives National Resources and Energy Agency's Director-General's Award ● Cosmo Customer Center opens ● The Cosmo Oil Group "Industrial Waste Management Regulations" established ● Benzene levels in gasoline reduced to less than 1 volume %	● COP6 of the UNFCCC (the Hague) ● Basic Law for Establishing a Recycling-Based Society is promulgated in Japan ● Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities is promulgated ● Waste Disposal and Public Cleansing Law is amended
2001	● *Cosmo Oil Environmental Report 2001* published ● Chiba Oil Refinery receives commendation from Minister of Health, Labour and Welfare ● 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 Fire Defense Agency's Director-General's Award at Convention on Hazardous Materials ● Gasoline vapor pressure during summer lowered to 72 kPa	● COP7 of the UNFCCC (Marrakech) ● Law Concerning Special Measures against PCB Waste is promulgated ● Central Environment Council (Japan's top government advisory body on the environment) issues recommendation on soil conservation methods
2002	● "Cosmo the Card Eco" credit card program launched ● Sales of diesel with 50 ppm sulfur content launched	● COP8 of the CNFCCC (New Delhi) ● Soil Pollution Countermeasures Law enters into force ● Japan ratifies the Kyoto Protocol ● Iraq War ● World Summit on Sustainable Development (WSSD) in Johannesburg

Oil Refining—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 compounds to "crack" crude oil into separate fractions—gasoline, kerosene, diesel fuel, fuel oil, and other components—at normal atmospheric pressure. In general, the scale of an oil refinery is defined by the process capacity of its atmospheric distillation unit.

Vacuum distillation unit
A unit that distills under reduced pressure. When oils with a high boiling point, such as heavy fuel oils, are heated, they may break down before vaporization can happen. By reducing the pressure in the unit, the boiling point of the oil is reduced, allowing for efficient cracking of fractions.

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

Industry has installed new gas oil desulfurization units to respond to tougher regulations on sulfur content and to meet voluntary targets. Heavy fuel oil desulfurization units are further divided into residue and vacuum gas oil (VGO) desulfurization units. The former removes sulfur from heavy oil fractions that have been cracked in an atmospheric distillation unit. The latter removes sulfur from heavy oil fractions after the asphalt fractions have been cracked in a vacuum distillation unit.

Catalytic reformer
A unit that raises the octane number of naphtha that has been cracked by the atmospheric distillation unit, producing a basic ingredient for gasoline. Hydrogen, a by-product of chemical reactions in this unit, is used in desulfurization.

Fluid catalytic 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 accounts for a high proportion of ingredients mixed in other 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 emitted when gases containing hydrogen sulfide are directly used in 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 components, adjusted to the desired qualities for the given application, then shipped. Each component flows at a fixed volume, mixed on a continuous basis using pipes, then is moved to a tank and mixed further.

Petroleum Product Quality

Octane number
The octane number is one gauge of motor gasoline quality. The higher the octane number, the less engine knocking will occur. JIS standards specify an octane number of at least 89.0 for regular gasoline, and at least 96.0 for premium gasoline.

Other Topics

Conversion to distillates
Distillates are the general term for gasoline, kerosene and diesel fuel. The process of conversion to distillates produces more distillates by the decomposition of heavy fuel oil, or black oil. The proportion of white and black oil depends on the type of crude oil, but various equipment at the refinery can be used to increase the production ratio of distillates.

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

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

Third-Party Comment

We asked Mr. Toshihiko Goto, a specialist in initiatives relating to corporate social responsibility and information disclosure, to read and comment on the Cosmo Oil Environmental Report 2003.

Comments on the *Cosmo Oil Environmental Report 2003*

I evaluate this report highly because, although it is titled the *Cosmo Oil Environmental Report*, it also includes information about safety, work conditions and contributions to the community. In this sense, I perceive Cosmo Oil's movement toward "sustainability reporting," a direction that fits well with the expectations of the international community for corporate social responsibility (CSR).

The fact that the world is calling for CSR does not need to be interpreted as an attack on corporate responsibility, but rather a hope that corporations will fulfill their roles as institutions in society.

Two key issues that humanity must address in the twenty-first century are the failures of the market, and the failures of governments. If the market economy were perfect, today's environmental problems would not have emerged, and inequity in income distribution—that is, poverty—would not exist. International inequity in income distribution is particularly a problem. But despite the consensus reached at the Rio Summit in 1992 that poverty was at the root of environmental degradation in developing countries, the problem has continued to worsen, and in fact has become one of the root causes of terrorism. Meanwhile, corporations have grown even larger and become more global, and move freely around in what is for them in many ways a borderless world. In this context, through corporate social responsibility, corporations are being expected to play a role in solving the two problems mentioned above.

There are a number of new concepts and initiatives with the aim of supporting corporations that are actively dealing with CSR. One of these is Social Responsibility Investment (SRI), and I am happy to see that Cosmo Oil has been included in the FTSE4Good Global Index, because this will have a positive financial impact directly on a company's cost of capital. But because it has been included, I believe that the company will need more systematic efforts and must provide more complete information. On the other hand, activities that contradict CSR will be severely criticized by society. Because of that, risk management is becoming increasingly important. Thus, I think it is a good thing that in this report, Cosmo Oil provides information about strengthening its organizational structure for risk management and for implementing the corporate code of ethics. The challenge for the future is in improving its performance in these areas.

As my overall impression of this *Cosmo Oil Environmental Report*, I think it would be good to reduce the amount of textual information and increase the amount of numerical information. For this I think that one good solution would be to reduce the descriptions of operating processes of the facilities by shifting them to the terminology section. In terms of report structure, in order to guarantee consistency between the corporate principles, corporate code of conduct, and the *Blue Earth 21* plan, and to make the report easier for readers to understand, I think it would be better to show and explain their interconnections a bit more precisely. In terms of each individual initiative, I think it would be better to say less about the overall industry and more about your own company. Your cooperative activities in oil-producing countries are commendable, but I would urge you to give more of a human face to activities for cooperation with the local society in those countries. A company's reputation is ultimately an evaluation of the people who work for it. Cosmo Oil is undertaking a variety of initiatives for communication with local society and with customers. Without a doubt, such activities will be positive for the company's reputation. But because the relationship between the corporation and society is always changing, it is probably necessary to strengthen frameworks for the corporation to listen to society and to hear the needs of various stakeholders, and to reflect them in your policies. In this context, many companies have begun efforts such as stakeholder dialogue in which top management participates.

After the middle of the nineteenth century, oil became the core source of energy for humanity, and it has played a major role in raising standards of living. But during the twenty-first century, we face the possibility of depletion of oil reserves. And even if they don't run out, if one considers climate change, we probably cannot continue burning and using oil as we are today. As energy suppliers, BP and Shell have made the commitment to shift toward providing renewable energy. Over 20% of shareholders at the Exxon Corporation's annual shareholder's meeting voted in favor of a similar shift (although the resolution did not pass). This trend toward renewable energy is a sign of the times. In the midst of this all, I hope that in the near future, Cosmo Oil and other Japanese companies too will take on the challenge of "sustainability" in a serious way and make similar commitments.

Toshihiko Goto
Chair, Environmental Auditing Research Group
Member, Board of Directors, Global Reporting Initiative (GRI)

Independent Review Report

Asahi & Co

Independent Review Report on the "Cosmo Oil Environmental Report 2003"

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 2003" (the "Environmental Report ") of Cosmo Oil Co., Ltd. (the "Company") for the year ended March 31, 2003. 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 third 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. Results of the Procedures Performed

As a result of the procedures performed, 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.

Asahi & Co

Tokyo, Japan
August 7, 2003

Chiba Oil Refinery

Address: 2 Goi-Kaigan, Ichihara-shi, Chiba-ken
Start of operations: July 1963
Area: 1,209,585 m^2
Employees: 370
Crude oil processing capacity: 240,000 barrels/day
(as of March 2003)

■Regulated pollutants

	Pollutant	Regulation	Type of control	Standard	Actual performance	
					Maximum	Average
Air pollutants	Nox (m3n/hour)	Pollution control agreement	Total pollutant load	141.1	117.8	84.8
	Sox (m3n/hour)	Pollution control agreement	Total pollutant load	189.7	151.4	116.0
	Particulate (boiler) (g/m3n)	Pollution control agreement	Concentration	0.07	0.029	0.023

	Pollutant	Regulation	Type of control	Standard	Actual performance	
					Maximum	Average
Water pollutants	COD (kg/day)	Pollution control agreement	Total pollutant load	223	168.4	100.3
	COD (mg/l)	Prefectural ordinance	Concentration	25	3.6	3.1
	SS (mg/l)	Prefectural ordinance	Concentration	50	8.4	6.6
	Oil content (mg/l)	Prefectural ordinance	Concentration	3	0.8	0.7
	Nitrogen (mg/l)	Prefectural directive	Concentration	(10)	2.2	1.9
	Phosphorus (mg/l)	Prefectural directive	Concentration	(1)	0.16	0.09
	Phenol (mg/l)	Prefectural ordinance	Concentration	0.5	Below measurement threshold	

Figures in parentheses = daily average

■Environmental performance

	Amount	Amount per unit of production
Energy	678,632 kl-crude oil/year	8.81 kl-crude oil/thousand kl
CO2	1,967,623 t-CO2/year	25.55 kg-CO2/kl
SOx	2,900 t/year	37.7 g/kl
NOx	1,524 t/year	19.8 g/kl
COD	36.6 t/year	0.48 g/kl
Industrial waste generated	15,862 t/year	
Industrial waste recycled	4,722 t/year	
Industrial waste sent to landfill	391 t/year	

PRTR Law designated chemical substance	Releases/transfers
Ethyl benzene (atmospheric releases)	380 kg/year
Xylene (atmospheric releases)	1,400 kg/year
1,3,5-trimethylbenzene (atmospheric releases)	22 kg/year
Toluene (atmospheric releases)	6,200 kg/year
Benzene (atmospheric releases)	870 kg/year
Nickel compounds (transfers)	60,000 kg/year
Molybdenum and its compounds (transfers)	100,000 kg/year
Dioxins (atmpspheric releases)	2 mg-TEQ/year
Dioxins (releases to water bodies)	49 mg-TEQ/year
Dioxins (transfers)	0.0098 mg-TEQ/year

■Environmental accounting

Item	Environmental costs (million yen)	
	Investments	Expenditures
1.Business area costs	6	3,815
Global environment costs	6	1,216
Pollution prevention cots	0	2,299
Resource circulation costs	0	300
2.Upstream/downstream costs	156	13,845
Green procurement costs	0	0
Product environmental impact reduction costs	156	13,845
Product sulfur reduction costs	89	11,741
Gasoline	19	2,557
Naphtha	8	1,063
Jet fuel	7	938
Kerosene	14	1,866
Diesel fuel	20	2,601
Heavy fuel oil A	9	1,127
Heavy fuel oil C	9	1,203
LPG	3	386
Cost of substituting toxic substances in gasoline	67	2,104
Cost of reducing aromatics in petrochemical pruducts	0	0
3.Management activity costs	0	194
4.Research and development costs	0	0
5.Social activity costs	0	1
Total	162	17,855

Cost of purchasing recycled paper 2 (million yen)

Item	Environmental protection effects	
	Reduction of environmental impacts (2001 value minus 2002 value)	
	Intensity/unit	Environmental impact
1.Business area effects		
Effects of reduction in resource inputs	(kl-crude oil /thousand kl)	(TJ)
Energy input	0.18	-1,164
	(kg/kL)	(thousand t)
Water input	2	-435
Effects of reduction in emissions and waste generation		
Releases to the atmosphere	(kg-CO2/kL)	(thousandt-CO2)
CO2	0.50	-85
	(g/kL)	(t)
SOx	-1.7	-299
NOx	1.6	26
Benzene	0.00	0.12
Releases to water bodies	(g/kL)	(t)
COD	-0.08	-7.9
Industrial waste emissions	(g/kL)	(t)
Generated	133	8,608
Recycled	13	624
Sent to landfill	2	114
2.Upstream/downstream effects		
Effects of reducing environmental impacts of products		
Reduction of sulfur in products	(% sulfur by weight)	(potential SOx emissions, t)
High octane gasoline	0.0000	0
Regular gasoline	0.0002	6
Naphtha	-0.0010	-73
Jet fuel	0.0056	4
Kerosene	0.0012	27
Diesel	0.0172	615
Heavy fuel oil A	-0.0138	-850
Heavy fuel oil C	0.2590	2,413
LPG	0.0000	0
Total	0.0269	2,142
	(% by weight)	(t)
Reducing benzene in gasoline	0.0603	1,478
	(kL)	(kL)
Effects of reducing aromatics in petrochemical products	0	0
	(t-CO2/kL)	(thousandt-CO2)
CO2 emissions from product use	-0.0109	-1,950

■Economic effects (408 million yen)

Cost savings through energy conservation (cogeneration) : 848
Cost savings from recycling of catalyst (reduction in disposal costs, etc.) : 22
Effects of R&D (royalty revenues, etc.) : 0

Yokkaichi Oil Refinery

Address: 1-1 Daikyo-cho, Yokkaichi-shi, Mie-ken
Start of operations: July 1943
Area: 1,188,075 m^2
Employees: 335
Crude oil processing capacity: 155,000 barrels/day
(as of March 2003)

■Regulated pollutants

	Pollutant	Regulation	Type of control	Standard	Actual performance	
					Maximum	Average
Air pollutants	Nox (m3n/hour)	Pollution control agreement	Total pollutant load	78.4	61.1	34.8
	Sox (m3n/hour)	Pollution control agreement	Total pollutant load	108.21	58.0	28.9
	Particulate (boiler) (g/m3n)	Pollution control agreement	Concentration	0.049	0.037	0.028

	Pollutant	Regulation	Type of control	Standard	Actual performance	
					Maximum	Average
Water pollutants	COD (kg/day)	Pollution control agreement	Total pollutant load	535	419.6	172.5
	COD (mg/l)	Water Pollution Control Law	Concentration	160(120)	5.4	4.0
	SS (mg/l)	Water Pollution Control Law	Concentration	200(150)	9.0	4.0
	Oil content (mg/l)	Prefectural ordinance	Concentration	1	Below measurement threshold	
	Nitrogen (mg/l)	Municipal guidance	Concentration	15	Below measurement threshold	
	Phosphorus (mg/l)	Municipal guidance	Concentration	1.5	0.11	0.06
	Phenol (mg/l)	Prefectural ordinance	Concentration	1	0.061	0.061

Figures in parentheses = daily average

■Environmental performance

	Amount	Amount per unit of production
Energy	424,782 kl-crude oil/year	10.58 kl-crude oil/thousand kl
CO_2	1,112,417 t-CO_2/year	27.69 kg-CO_2/kl
SOx	718 t/year	17.9 g/kl
NOx	622 t/year	15.5 g/kl
COD	62.6 t/year	1.56 g/kl
Industrial waste generated	6,550 t/year	
Industrial waste recycled	2,556 t/year	
Industrial waste sent to landfill	494 t/year	

PRTR Law designated chemical substance	Releases/transfers
Ethyl benzene (atmospheric releases)	320 kg/year
Xylene (atmospheric releases)	1,300 kg/year
1,3,5-trimethylbenzene (atmospheric releases)	29 kg/year
Toluene (atmospheric releases)	4,400 kg/year
Benzene (atmospheric releases)	1,500 kg/year
Cobalt and its compounds (transfers)	7,600 kg/year
Nickel compounds (transfers)	1,000 kg/year
Molybdenum and its compounds (transfers)	32,000 kg/year

■Environmental accounting

Item	Environmental costs (million yen)	
	Investments	Expenditures
1.Business area costs	1	3,519
Global environment costs	1	1,244
Pollution prevention cots	0	2,095
Resource circulation costs	0	180
2.Upstream/downstream costs	1,459	4,223
Green procurement costs	0	0
Product environmental impact reduction costs	1,459	4,223
Product sulfur reduction costs	1,423	2,475
Gasoline	408	708
Naphtha	102	177
Jet fuel	14	25
Kerosene	233	405
Diesel fuel	320	557
Heavy fuel oil A	288	501
Heavy fuel oil C	0	0
LPG	58	102
Cost of substituting toxic substances in gasoline	36	1,748
Cost of reducing aromatics in petrochemical pruducts	0	0
3.Management activity costs	0	98
4.Research and development costs	0	0
5.Social activity costs	0	1
Total	1,460	7,841

Cost of purchasing recycled paper 1 (million yen)

Item	Environmental protection effects	
	Reduction of environmental impacts (2001 value minus 2002 value)	
	Intensity/unit	Environmental impact
1.Business area effects		
Effects of reduction in resource inputs	(kl-crude oil /thousand kl)	(TJ)
Energy input	0.05	164
	(kg/kL)	(thousand t)
Water input	-18	-632
Effects of reduction in emissions and waste generation		
Releases to the atmosphere	(kg-CO_2/kL)	(thousandt-CO_2)
CO_2	0.67	35
	(g/kL)	(t)
SOx	0.8	38
NOx	2.9	123
Benzene	0.00	0.00
Releases to water bodies	(g/kL)	(t)
COD	0.14	6.1
Industrial waste emissions	(g/kL)	(t)
Generated	53	2,191
Recycled	-6	-193
Sent to landfill	3	129
2.Upstream/downstream effects		
Effects of reducing environmental impacts of products		
Reduction of sulfur in products	(% sulfur by weight)	(potential SOx emissions, t)
High octane gasoline	0.0000	0
Regular gasoline	-0.0002	-10
Naphtha	-0.0017	-6
Jet fuel	-0.0002	0
Kerosene	0.0013	15
Diesel	0.0142	265
Heavy fuel oil A	0.0338	-825
Heavy fuel oil C	0.1316	1,643
LPG	-0.0004	-1
Total	0.0383	1,080
	(% by weight)	(t)
Reducing benzene in gasoline	-0.0169	-695
	(kL)	(kL)
Effects of reducing aromatics in petrochemical products	0	0
	(t-CO_2/kL)	(thousandt-CO_2)
CO_2 emissions from product use	-0.0110	-878

■Economic effects (870 million yen)

Cost savings through energy conservation (cogeneration) : 397
Cost savings from recycling of catalyst (reduction in disposal costs, etc.) : 11
Effects of R&D (royalty revenues, 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: 198
Crude oil processing capacity: 80,000 barrels/day (as of March 2003)

■Regulated pollutants

	Pollutant	Regulation	Type of control	Standard	Actual performance	
					Maximum	Average
Air pollutants	Nox (m3n/hour)	Municipal notification	Total pollutant load	48.82	16.9	10.2
	Sox (m3n/hour)	Municipal notification	Total pollutant load	45.6	0.9	0.5
	Particulate (boiler) (g/m3n)	Prefectural ordinance	Concentration	0.05	Below measurement threshold	

	Pollutant	Regulation	Type of control	Standard	Actual performance	
					Maximum	Average
Water pollutants	COD (kg/day)	Water Pollution Control Law	Total pollutant load	186.8	86.7	50.2
	COD (mg/l)	Prefectural ordinance	Concentration	15(10)	9.8	7.1
	SS (mg/l)	Prefectural ordinance	Concentration	40(30)	Below measurement threshold	
	Oil content (mg/l)	Prefectural ordinance	Concentration	2	Below measurement threshold	
	Nitrogen (mg/l)	Prefectural directive	Concentration	35	4.0	3.0
	Phosphorus (mg/l)	Prefectural directive	Concentration	1.5	0.443	0.133
	Phenol (mg/l)	Prefectural ordinance	Concentration	2	Below measurement threshold	

Figures in parentheses = daily average

■Environmental performance

	Amount	Amount per unit of production
Energy	251,051 kl-crude oil/year	8.94kl-crude oil/thousand kl
CO2	699,747 t-CO2/year	24.93kg-CO2/kl
SOx	14 t/year	0.5g/kl
NOx	183 t/year	6.5g/kl
COD	18.3 t/year	0.65g/kl
Industrial waste generated	4,158 t/year	
Industrial waste recycled	918 t/year	
Industrial waste sent to landfill	307 t/year	

PRTR Law designated chemical substance	Releases/transfers
Ethyl benzene (atmospheric releases)	140 kg/year
Xylene (atmospheric releases)	600 kg/year
1,3,5-trimethylbenzene (atmospheric releases)	20 kg/year
Toluene (atmospheric releases)	1,700 kg/year
Benzene (atmospheric releases)	720 kg/year
Nickel compounds (transfers)	1,500 kg/year

■Environmental accounting

Item	Environmental costs (million yen)	
	Investments	Expenditures
1.Business area costs	0	3,213
Global environment costs	0	603
Pollution prevention cots	0	2,550
Resource circulation costs	0	60
2.Upstream/downstream costs	3	4,173
Green procurement costs	0	0
Product environmental impact reduction costs	3	4,173
Product sulfur reduction costs	0	2,216
Gasoline	0	758
Naphtha	0	134
Jet fuel	0	183
Kerosene	0	304
Diesel fuel	0	563
Heavy fuel oil A	0	241
Heavy fuel oil C	0	0
LPG	0	33
Cost of substituting toxic substances in gasoline	3	1,957
Cost of reducing aromatics in petrochemical pruducts	0	0
3.Management activity costs	0	63
4.Research and development costs	0	0
5.Social activity costs	0	0
Total	3	7,449

Cost of purchasing recycled paper 2 (million yen)

Item	Environmental protection effects	
	Reduction of environmental impacts (2001 value minus 2002 value)	
	Intensity/unit	Environmental impact
1.Business area effects		
Effects of reduction in resource inputs	(kl-crude oil /thousand kl)	(TJ)
Energy input	-0.26	212
	(kg/kL)	(thousand t)
Water input	-4	183
Effects of reduction in emissions and waste generation		
Releases to the atmosphere	(kg-CO2/kL)	(thousandt-CO2)
CO2	-0.56	21
	(g/kL)	(t)
SOx	-0.1	-2
NOx	-0.4	-3
Benzene	0.00	0.03
Releases to water bodies	(g/kL)	(t)
COD	0.03	1.8
Industrial waste emissions	(g/kL)	(t)
Generated	22	878
Recycled	2	110
Sent to landfill	0	16
2.Upstream/downstream effects		
Effects of reducing environmental impacts of products		
Reduction of sulfur in products	(potential SOx emissions, t)	(potential SOx emissions, t)
High octane gasoline	0.0001	0
Regular gasoline	0.0003	5
Naphtha	-0.0079	-14
Jet fuel	-0.0095	-6
Kerosene	-0.0006	0
Diesel	0.0158	270
Heavy fuel oil A	0.0291	-6
Heavy fuel oil C	-0.0504	-2,336
LPG	-0.0002	0
Total	-0.0651	-2,087
	(% by weight)	(t)
Reducing benzene in gasoline	-0.0809	-455
	(kL)	(kL)
Effects of reducing aromatics in petrochemical products	0	0
	(t-CO2/kL)	(thousandt-CO2)
CO2 emissions from product use	-0.0061	655

■Economic effects (936million yen)

Cost savings through energy conservation (cogeneration) : 936
Cost savings from recycling of catalyst (reduction in disposal costs, etc.) : 0
Effects of R&D (royalty revenues, 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: 223
Crude oil processing capacity: 120,000 barrels/day (as of March 2003)

■Regulated pollutants

	Pollutant	Regulation	Type of control	Standard	Actual performance	
					Maximum	Average
Air pollutants	Nox (m3n/hour)	Municipal notification	Total pollutant load	190.0	58.0	39.0
	Sox (m3n/hour)	Municipal notification	Total pollutant load	164.0	74.7	56.0
	Particulate (boiler) (g/m3n)	Prefectural ordinance	Concentration	0.05	0.005	0.005

	Pollutant	Regulation	Type of control	Standard	Actual performance	
					Maximum	Average
Water pollutants	COD (kg/day)	Prefectural ordinance	Total pollutant load	120.0	54.3	30.6
	COD (mg/l)	Prefectural ordinance	Concentration	15(10)	5.0	3.2
	SS (mg/l)	Prefectural ordinance	Concentration	15(10)	13.0	4.8
	Oil content (mg/l)	Prefectural ordinance	Concentration	2	Below measurement threshold	
	Nitrogen (mg/l)	Water Pollution Control Law	Concentration	120(60)	1.8	1.3
	Phosphorus (mg/l)	Water Pollution Control Law	Concentration	16(8)	0.05	0.03
	Phenol (mg/l)	Prefectural ordinance	Concentration	1	0.008	0.008

Figures in parentheses = daily average

■Environmental performance

	Amount	Amount per unit of production
Energy	351,116	9.46
CO2	1,005,332	27.08
SOx	1,401	37.7
NOx	702	18.9
COD	11.2	0.30
Industrial waste generated	14,740	
Industrial waste recycled	2,163	
Industrial waste sent to landfill	189	

PRTR Law designated chemical substance	Releases/transfers
Ethyl benzene (atmospheric releases)	500 kg/year
Xylene (atmospheric releases)	2,200 kg/year
1,3,5-trimethylbenzene (atmospheric releases)	44 kg/year
Toluene (atmospheric releases)	8,200 kg/year
Benzene (atmospheric releases)	2,500 kg/year
Nickel compounds (transfers)	35,000 kg/year
Molybdenum and its compounds (transfers)	39,000 kg/year
Dioxins (atmpspheric releases)	0.027 mg-TEQ/year
Dioxins (releases to water bodies)	0.15 mg-TEQ/year
Dioxins (transfers)	0.000053 mg-TEQ/year

■Environmental accounting

Item	Environmental costs (million yen)	
	Investments	Expenditures
1.Business area costs	17	1,067
Global environment costs	17	969
Pollution prevention cots	0	0
Resource circulation costs	0	98
2.Upstream/downstream costs	508	7,854
Green procurement costs	0	0
Product environmental impact reduction costs	508	7,854
Product sulfur reduction costs	393	5,435
Gasoline	129	1,787
Naphtha	11	151
Jet fuel	13	186
Kerosene	70	967
Diesel fuel	111	1,528
Heavy fuel oil A	42	588
Heavy fuel oil C	1	13
LPG	16	215
Cost of substituting toxic substances in gasoline	115	2,419
Cost of reducing aromatics in petrochemical pruducts	0	0
3.Management activity costs	0	37
4.Research and development costs	0	0
5.Social activity costs	0	0
Total	525	8,958

Cost of purchasing recycled paper 1 (million yen)

Item	Environmental protection effects	
	Reduction of environmental impacts (2001 value minus 2002 value)	
	Intensity/unit	Environmental impact
1.Business area effects		
Effects of reduction in resource inputs	(kl-crude oil /thousand kl)	(TJ)
Energy input	0.06	-858
	(kg/kL)	(thousand t)
Water input	10	177
Effects of reduction in emissions and waste generation		
Releases to the atmosphere	(kg-CO2/kL)	(thousandt-CO2)
CO2	0.59	-46
	(g/kL)	(t)
SOx	-5.2	-273
NOx	-1.8	-108
Benzene	-0.01	-0.30
Releases to water bodies	(g/kL)	(t)
COD	0.01	-0.5
Industrial waste emissions	(g/kL)	(t)
Generated	36	281
Recycled	10	189
Sent to landfill	5	145
2.Upstream/downstream effects		
Effects of reducing environmental impacts of products		
Reduction of sulfur in products	(potential SOx emissions, t)	(potential SOx emissions, t)
High octane gasoline	0.0001	0
Regular gasoline	0.0001	-6
Naphtha	-0.0011	21
Jet fuel	0.0012	2
Kerosene	0.0019	23
Diesel	0.0219	351
Heavy fuel oil A	0.0072	88
Heavy fuel oil C	-0.1194	-1,511
LPG	0.0000	-1
Total	0.0030	-1,033
	(% by weight)	(t)
Reducing benzene in gasoline	-0.0879	-1,851
	(kL)	(kL)
Effects of reducing aromatics in petrochemical products	0	0
	(t-CO2/kL)	(thousandt-CO2)
CO2 emissions from product use	0.0121	-330

■Economic effects (0million yen)

Cost savings through energy conservation (cogeneration) : 0
Cost savings from recycling of catalyst (reduction in disposal costs, etc.) : 0
Effects of R&D (royalty revenues, 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: 102 Business activities: Production and sales of fuel oils, petroleum products, petrol solvents and liquefied gases (as of March 2003)

■Regulated pollutants

	Pollutant	Regulation	Type of control	Standard	Actual performance	
					Maximum	Average
Air pollutants	Nox (m3n/hour)	–	–	–	16.18	12.47
	Sox (m3n/hour)	Pollution control agreement	Total pollutant load	208	68.30	46.44
	Particulate (boiler) (g/m3n)	Pollution control agreement	Concentration	0.17	0.05	0.04

	Pollutant	Regulation	Type of control	Standard	Actual performance	
					Maximum	Average
Water pollutants	COD (kg/day)	Note 1	Total pollutant load	363.3	66.7	6.6
	COD (mg/l)	Prefectural ordinance	Concentration	15(10)	5.1	3
	SS (mg/l)	Prefectural ordinance	Concentration	20	5	3
	Oil content (mg/l)	Prefectural ordinance	Concentration	2	Below measurement threshold	
	Nitrogen (mg/l)	Water Pollution Control Law	Concentration	120(60)	0.89	0.53
	Phosphorus (mg/l)	Water Pollution Control Law	Concentration	16(8)	0.17	0.11
	Phenol (mg/l)	Prefectural ordinance	Concentration	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	55,574 kl-crude oil/year
CO2	145,380 t-CO2/year
SOx	965 t/year
NOx	193 t/year
COD	2.4 t/year
Industrial waste generated	649 t/year
Industrial waste recycled	517 t/year
Industrial waste sent to landfill	42 t/year

PRTR Law designated chemical substance	Releases/transfers
Ethylene Glycol (atmospheric releases)	2,200 kg/year
Xylene (atmospheric releases)	33 kg/year
Xylene (atmospheric releases)	11,000 kg/year
Xylene (releases to water bodies)	0.5 kg/year
1,2-Dichloroethane (atmospheric releases)	5,600 kg/year
1,3,5-trimethylbenzene (atmospheric releases)	290 kg/year
1,3,5-trimethylbenzene (releases to water bodies)	1.6 kg/year
Toluene (atmospheric releases)	20,000 kg/year
Toluene (transfers)	0.1 kg/year
Phenol (atmospheric releases)	68 kg/year
Phenol (releases to water bodies)	2.5 kg/year
Benzene (atmospheric releases)	4,600 kg/year
Benzene (transfers)	0.6 kg/year
Dioxins (atmospheric releases)	0.06 mg-TEC/year
Dioxins (releases to water bodies)	1.0 mg-TEC/year
Dioxins (transfers)	0.32 mg-TEC/year

■Environmental accounting

Item	Environmental costs (million yen)	
	Investments	Expenditures
1.Business area costs	0	79
Global environment costs	0	72
Pollution prevention cots	0	0
Resource circulation costs	0	7
2.Upstream/downstream costs	10	475
Green procurement costs	0	0
Product environmental impact reduction costs	10	475
Product sulfur reduction costs	0	0
Gasoline	0	0
Naphtha	0	0
Jet fuel	0	0
Kerosene	0	0
Diesel fuel	0	0
Heavy fuel oil A	0	0
Heavy fuel oil C	0	0
LPG	0	0
Cost of substituting toxic substances in gasoline	2	359
Cost of reducing aromatics in petrochemical pruducts	8	116
3.Management activity costs	0	40
4.Research and development costs	0	0
5.Social activity costs	0	0
Total	10	594

Cost of purchasing recycled paper 0 (million yen)

Item	Environmental protection effects Reduction of environmental impacts (2001 value minus 2002 value) Environmental impact
1.Business area effects	
Effects of reduction in resource inputs	(TJ)
Energy input	59
	(thousand t)
Water input	721
Effects of reduction in emissions and waste generation	
Releases to the atmosphere	(thousandt-CO2)
CO2	6
	(t)
SOx	16
NOx	-6
Benzene	3.5
Releases to water bodies	(t)
COD	0.0
Industrial waste emissions	(t)
Generated	-333
Recycled	-402
Sent to landfill	54
2.Upstream/downstream effects	
Effects of reducing environmental impacts of products	
Reduction of sulfur in products	(potential SOx emissions, t)
High octane gasoline	0
Regular gasoline	1
Naphtha	6
Jet fuel	36
Kerosene	3
Diesel	1
Heavy fuel oil A	-22
Heavy fuel oil C	0
LPG	0
Total	24
	(t)
Reducing benzene in gasoline	-71
	(kL)
Effects of reducing aromatics in petrochemical products	184 (thousandt-CO2)
CO2 emissions from product use	135

Research and Development Center

Address: 1134-2 Gongendo, Satte-shi, Saitama-ken
Start of operations: April 1969
Area: 86,200 m2
Employees: 102

Cosmo Oil Lubricants Co., Ltd.

Address: 4-9-25, Shibaura, Minato-ku, Tokyo
Start of operations: April 1988
Employees: 181
Business Activities: Manufacturing, research and sales of lubricating oils and other products

Research and Development Center

■Regulated pollutants

	Pollutant	Regulation	Type of control	Standard	Actual performance	
					Maximum	Average
Water pollutants	COD (mg/l)	Water Pollution Control Law	Concentration	160(120)	14.3	8.8
	SS (mg/l)	Prefectural ordinance	Concentration	60(50)	11	7
	Oil content (mg/l)	Water Pollution Control Law	Concentration	5	1	Below measurement threshold
	Nitrogen (mg/l)	Water Pollution Control Law	Concentration	120(60)	7	6
	Phosphorus (mg/l)	Water Pollution Control Law	Concentration	16(8)	0.8	0.8
	Phenol (mg/l)	Prefectural ordinance	Concentration	1	Below measurement threshold	

Figures in parentheses = daily average

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

■Environmental accounting

Item	Environmental costs (million yen)	
	Investments	Expenditures
1.Business area costs	0	0
Global environment costs	0	0
Pollution prevention cots	0	0
Resource circulation costs	0	0
2.Upstream/downstream costs	0	92
Green procurement costs	0	92
Product environmental impact reduction costs	0	0
Product sulfur reduction costs	0	0
Gasoline	0	0
Naphtha	0	0
Jet fuel	0	0
Kerosene	0	0
Diesel fuel	0	0
Heavy fuel oil A	0	0
Heavy fuel oil C	0	0
LPG	0	0
Cost of substituting toxic substances in gasoline	0	0
Cost of reducing aromatics in petrochemical pruducts	0	0
3.Management activity costs	0	0
4.Research and development costs	0	1,751
5.Social activity costs	0	0
Total	0	1,843

Cost of purchasing recycled paper 0 (million yen)

■**Economic effects** (81million yen)

Effects of R&D (royalty revenues, etc.) : 81

Head office and branch offices

Address: 1-1-1, Shibaura, Minato-ku, Tokyo, Japan
Employees: 711 (head office and branch offices)
(as of March 2003)

	(million yen) FY2002
1 Environmental costs	
①Cost of purchasing recycled paper	8
②Donations related to environmental activities	31
③Cost of making environmental report	37
2 Economic effects (head office)	
Electricity cost	3