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Editorial Policy and Report Coverage

This environmental report describes the environmental protection activities of Cosmo Oil Co., Ltd., for 2000¹.

This report covers the period from April 1, 2000 to March 31, 2001; some content from later in 2001 has also been included.

The scope of the data in this report is the Cosmo Oil Group.

The reporting on environmental accounting and environmental impact covered in this report is limited to oil refineries and other related business activities.

To provide better understanding for our readers, the *GRI Guideline*² was used as a reference for reporting on social and economic performance. In addition, the *Environmental Report Guideline* released by the Japanese Ministry of the Environment was followed for the fair disclosure of environmental conservation performance on our business activities.

Cosmo Oil aims to be a multi-energy firm.

While actively participating in environmental conservation activities, we also are working to develop environmentally-friendly technologies. This report discusses our efforts in reusable energy development and new energy businesses.

¹The year 2000, as used in this report, refers to the period from April 1, 2000 to March 31, 2001.

²The GRI (Global Reporting Initiative) Guideline is a guide to ongoing reporting which reflects not only the environment, but also social and economic performance.

Corporate Profile

Name	Cosmo Oil Co., Ltd.
Headquarters address	Toshiba Bldg., 1-1-1, Shibaura, Minato-ku, Tokyo 105-8528, Japan
Telephone	+81 (3)-3798-3211
Established	April 1, 1986
Capital	51,887 million yen
Major business activities	Petroleum refining and sales
Net Sales	1,605,883 million yen
Ordinary Profit	12,906 million yen
Current term net profit	5,223 million yen
History	On April 1, 1986, Cosmo Oil Co., Ltd. was formed through the merger of Daikyo Oil Co., Ltd., Maruzen Oil Co., Ltd., and the former Cosmo Oil (Cosmo Refining), a subsidiary of both companies. In 1989, Asian Oil Co., Ltd. was merged into Cosmo Oil.
Employees	1,970
Branches	Fukuoka, Hiroshima, Kanto, Nagoya, Osaka, Sapporo, Sendai, Takamatsu, Tokyo
Refineries	Chiba, Sakai, Sakaide, Yokkaichi
Service Stations	5,779

Cosmo Oil Co., Ltd. Group

Oil refining and sales Cosmo Oil Co., Ltd.
97 subsidiaries, 55 affiliates

Crude oil development and production
Abu Dhabi Oil Co., Ltd.; Mubarraz Oil Co., Ltd.; United Petroleum Development Co., Ltd.; four other companies

Import and export of crude oil and petroleum products Cosmo Oil International Pte., Ltd.; Cosmo Oil (UK) Plc.; two other companies

Ocean transport of crude oil and petroleum products Cosmo Tanker Co., Ltd.; Nippon Global Tanker Co., Ltd.

Production and sales of lubricating oil
Cosmo Oil Lubricants Co., Ltd.

Petrochemical product production
Cosmo Matsuyama Oil Co., Ltd.; Maruzen Petrochemical Co., Ltd.

Petroleum product sales Cosmo Petroleum Gas Co., Ltd.; Cosmo Asphalt Co., Ltd.; Cosmo Oil Service Co., Ltd.; Toyo Kokusai Oil Co., Ltd.; 72 other companies

Crude oil and petroleum product storage
Hokuto Kogyo Co., Ltd.; Ohgishima Oil Terminal Co., Ltd.; Okinawa CTS Corp.; four other companies

Cargo handling and transport Cosmo Kaiun Co., Ltd.; Tokyo Cosmo Logistics Co., Ltd.; Kansai Cosmo Logistics Co., Ltd., 22 other companies

Real estate Cosmo Ventures Inc.; two other companies

Other business Cosmo Engineering Co., Ltd.; Cosmo Trade & Service Co., Ltd., 30 other companies

Product sales

(units: thousand kiloliters/thousand tons)

Gasoline, naphtha	15,969
Diesel fuel, kerosene	14,047
Heavy fuel oil	10,552
Others	3,755

Major sales locations

Cosmo Oil special agents, public utility corporations, consumers, others

Major shareholders

The Industrial Bank of Japan, Ltd.	4.99%
Japan Trustee Services Bank, Ltd.	4.03
The Sanwa Bank, Ltd.	3.99
Cosmo Oil Employees Shareholding Association	3.31
The Kansai Electric Power Co., Inc.	2.94
The Tokio Marine and Fire Insurance Co., Ltd.	2.58
The Sumitomo Marine and Fire Insurance Co., Ltd.	2.52
The Yasuda Fire and Marine Insurance Co., Ltd.	2.29
The Bank of Tokyo-Mitsubishi, Ltd.	2.12

Note: all data for fiscal year 2000

The Japanese Oil Refining and Sales World

Number of companies 27 (as of March 31, 2001)

(16 refinery companies, three wholesale companies, eight companies with refining and wholesaling as secondary businesses)

Annual sales 17.474 trillion yen (for fiscal year 2000)

Dependence on petroleum imports 99.7% (for fiscal year 2000)

Message from the Chairman

Society today is encountering a difficulty never before faced. For the first time, there is strong concern about the limitations of our global environment—something always seen as nearly infinite—and that the Earth can no longer bear many of our human activities. To hand down a healthy Earth to future generations, it is our duty to find effective solutions and implement them.

A first step toward creating solutions to environmental problems is to fully grasp the present condition, and to understand the seriousness of the difficulties being faced. Japan first confronted serious pollution problems during the nation's period of rapid economic development, with such famous cases as Yokkaichi asthma, Itai-itai disease and Minamata disease. For the petroleum industry, a turning point was the serious air pollution in the Shinjuku area of Tokyo caused by lead in automobile exhaust gases.

In general, these cases of pollution occurred in relatively restricted areas, so it was possible to find the causes and thereby come to an effective solution. But the potential impact and causation of today's environmental problems—global warming, acid rain, desertification, destruction of the ozone layer, the decrease of diversity of species and others—are not as clearly identifiable. To make matters worse, results will take a long time to be seen, even if countermeasures are found.

To find effective solutions for these global issues, the international community must come to a consensus—and then act. Although overcoming differences of opinion and conflicts of interest can be very difficult, we can still surmount these problems through a strong will and high ethical purpose. Clear understanding of the facts will help to strengthen both the will and the high ethical position.

Cosmo Oil's main business activity is the importing of crude oil from the producing nations of the Middle East, refining this crude oil and selling oil-based products in Japan. In our business activities, the single greatest environmental impact comes in the refining processes at our refineries. The use of our oil-based products by our customers also have environmental impacts, even though these products are the essential energy sources of today's society. The major impact from oil-based products is in car-

bon dioxide gas, a substance tied to the problem of global warming. Understanding this fact, we are advancing our environmental conservation activities through three key concepts: technological innovation, changing values and global activity.

"Technological innovation" means the production of oil-based products with reduced environmental impact, and research and development into new energy systems. Cosmo Oil has long been involved in technological developments to reduce lead and sulfur in our products. Recently we have developed new catalysts for refinery processes which help us produce cleaner products, and have advanced new energy technologies, such as fuel cells, which make it possible for us to be a true integrated energy company. We have also focused on new technologies for the environment.

"Changing values" refers to a major shift occurring in Japanese society. An increasing number of people are "green consumers"—those with a stronger sense of the environment as a key value in their lives. To meet their needs, and to contribute to the reduction of environmental impact, we are providing much cleaner products, as well as services such as Cosmo the Card ETC (Electronic Toll Collection system), which, by reducing traffic jams at toll booths, also reduces CO₂ emissions. While on one level these efforts might seem small, it must be remembered that the CO₂ generated through consumer use of our products is some 20 times greater than that generated in refinery processes. Therefore, all our efforts in fact make a major contribution to the prevention of global warming.

Environmental issues concern the entire world, so actions by global partnerships are very important. One such global activity can be seen in our Zero Flare Project at oil fields in Abu Dhabi. In this, the gas which emerges during crude oil drilling is not burned, as has been done in the past. Instead, the gases are returned to the ground, contributing to the reduction of CO₂ generated in the country. Although the project is only in its initial stage, it has already resulted in our being awarded the Grand Prix commendation by the Abu Dhabi National Petroleum Organization.



To support developing nations, we work in partnership with NPOs in projects such as introducing paddy field cultivation as an alternative to slash and burn agriculture. Also, while Japan has agreed under the Kyoto Protocol to reduce greenhouse gas emissions over the period 2008 to 2012 by six percent below 1990 figures, it is seen that this cannot be achieved solely by self-initiated reductions by homes and industry. Since the Kyoto Protocol allows for CO₂ emissions trading as a supplementary measure for the reduction of greenhouse gas emissions, we see taking a leading role in emissions trading as an important part of our risk management activities.

To build a sustainable society, citizens, corporations and governments must both understand each other and work closely together. Corporations recognize their important role in supporting and leading the activities of governments and NPOs, playing their role in accordance with the circumstances. To meet our corporate responsibility, we act both locally and globally on environmental issues, and do our part to build a sustainable society.

Finally, I would like to touch on our thinking on business management and environmental protection. We created a two-year plan for 2001 and 2002 called Value Creation 21, under which we first declared Cosmo Oil to be an "environmentally advanced company." We are taking a positive role in dealing with environmental issues, actively speaking and acting on

behalf of both national interests and the citizens of the world, while taking an environmental view in appropriating management resources and restructuring the corporation.

We believe that our actions can both build a sustainable society and build on our corporate foundation at the same time. This is because our business is supported by our customers, and by society as a whole.

This report is our first full-scale environmental report. To provide comprehensive information, we have referred to GRI and Ministry of the Environment guidelines in its preparation. To ensure the correctness and transparency of the information contained here, the report has been verified by an independent review. To help us to continuously improve our environmental protection activities, we welcome your opinions and comments.

Chairman and Chief Executive Officer
Global Environment Committee Chairman
Cosmo Oil Co., Ltd.

Keiichiro Okabe

Year 2000 Highlights

The goal of building a sustainable society is a common theme around the world; helping to create this lasting society also helps us as we work to build a sustainable company. Thus environmental and social performance join financial performance as the standards by which a truly excellent company is judged.

As a member of the petroleum industry, Cosmo Oil is keenly aware that the production of petroleum products, and the use of these products by consumers, results in environmental impacts such as CO₂ emissions. This is why we are implementing a number of activities to decrease these environmental impacts.

Here are some of the special activities of fiscal year 2000:

Environmental Performance

Zero Flare Project

This ongoing project in Abu Dhabi began during the year. Gases emerging from oil fields are not burned off, but instead returned to the ground, reducing the amount of CO₂ discharged into the global environment. The Sour Gas Reinjection Project, the first step in this endeavor, was completed during 2000.

→ page 25

Decrease of environmental impact

Oil refineries have the largest environmental impact of any part of our business. In order to decrease CO₂ emissions and prevent global warming, a number of energy-saving and waste-reduction methods are being applied.

In 2000, this resulted in a reduction of energy used by 6.7 percent from the figure for 1990.

The separation, reuse and reduction of waste materials meant that the amount finally disposed of was a full 73 percent below that

of 1990. → page 15

To deal with the need to reduce emissions of sulfur oxides (SO_x) and nitrogen oxides (NO_x), we are working to make further reductions by using low-sulfur fuel, improving the denitration of flue gas, and strictly observing all

regulations. → page 15

Development of environmental technology

To meet stricter sulfur content regulations (less than 50ppm by 2005), we are engaged in research into improving the performance of desulfurization catalysts. → page 31

We successfully developed technology which drastically reduces the amount of excess sludge discharged from wastewater treatment facilities. Performance evaluation is scheduled from 2001. → page 31

Promotion of ETC with Cosmo the Card

Customers can join in environmental protection activities simply by using Cosmo Oil's Cosmo the Card credit card. By using ETC Cosmo the Card, customers can take advantage of ETC's (Electronic Toll Collection) ability to reduce traffic jams, and thus CO₂ emissions. Point collection campaigns also allow card users to convert points collected to actual donations to nature preservation organizations. → page 29

Social Performance

Establishment of the Cosmo Customer Center

The creation of the Cosmo Customer Center, a unified customer inquiry reception center, makes possible swifter communications. → page 37

Social contribution

Long-term, ongoing contributions to society must be independent of the changes in corporate performance; our employees' voluntary participation is a critical factor; and our participation illustrates Cosmo Oil's originality. These are the themes for our contributions to the local and global community. These include headquarters-based activities such as Cosmo Waku Waku Camp, an activity for children who have lost parents in traffic accidents, and local charitable activities centered around the oil refineries, such as youth baseball games, soccer schools and other actions. → page 36

Economic Performance

Distributed power business

To realize the potential of petroleum-fueled fixed fuel cell systems, research and development is being carried out—and actual results being seen—in micro gas turbines and cogeneration systems. → pages 9, 31

Cooperative tanker company efforts

In November of 2000, Cosmo Oil joined with Nippon Mitsubishi Oil Corp. to create Nippon Global Tanker Co., Ltd., for joint tanker operations. This will help to decrease fuel consumption by more efficient tanker deliveries and operations. → page 25

Integrated Performance

Basic policies on the environment and safety

To make clearer future policies on the environment and safety, the company's Global Environment Committee established the Basic Policy on Safety and the Environment in February, 2001. → page 11

Introduction of environmental accounting

Established during 2000, environmental accounting is scheduled to go into effect and be enforced from 2001, and will serve as a tool for environmental management, allowing for greater precision. → page 19

Creating Effective, Environmentally-Harmonious Use of Energy Resources

The business of supplying petroleum-based energy is akin to the flow of a river from its headwaters to the ocean; from crude oil development in the oil-producing nations and its import into Japan, through the production of products such as fuel oil and lubricating oil in domestic refineries and distribution locally within Japan, to wholesale sales to the special agencies managing our service stations and service station consulting. We handle all of this, on an ongoing, consistent basis. The great progress of civilization in the 20th century was made possible by petroleum energy; the old century has now come to an end and a new one has begun. The relationship between people and petroleum has reached an entirely new phase. Due to the progress of technology, petroleum reserve levels have actually been increasing—but the inescapable reality is that petroleum resources are finite. If consumption continues at the current pace, the nearly unanimous prediction is that the crisis of the exhaustion of supplies will be met during the 21st century. With today's increasingly important environmental impact viewpoint, there is greater concern about the CO₂ emissions that accompany petroleum energy use. So rather than simply seeing the situation as the cut off of existing resources, there is an increasing awareness that using these resources in the first place is unacceptable. But nuclear energy and other alternatives to petroleum also have a variety of problems to be overcome, so the widespread use of new energy sources will take some time. Petroleum is indisputably the most beneficial energy resource for society at the current time.

Cosmo Oil provides a stable supply of petroleum energy, and is aware that we must

actively take on these energy challenges to be able to respond to global environmental problems. We are engaged in developing the thinking and methods needed for further development. In our production and distribution processes, as well as the end-use of our products, our major concern has been on the materials that create environmental impacts such as pollution, and in reducing waste to a minimum. These will continue to grow in importance into the future.

Global warming is a central theme for the future. We began our new management plan, Value Creation 21, in 2001, which advances our goal to become an environmentally advanced company. This sets the decrease of CO₂ as the principal objective, so that the objectives of COP*3 (the Kyoto Protocol) can be precisely met, for the realization of a sustainable society and where the harmony of the global environment and corporate activities becomes a basic position.

Our thinking on the problem of CO₂ reduction is to use petroleum in the most effective way possible. In our business activities and in every location related to our products, energy conservation will be fully understood, and a systematic approach will be made to spread the message to society about new ways of using petroleum which reduce energy usage. We will pursue methods which use petroleum energy more efficiently, and put them into practice.

There are many different facets to the business of reducing environmental impact and increasing the efficiency of petroleum, but we have begun a variety of approaches to these many issues.

*COP
 (Conference of the Parties to the United Nations Framework Convention on Climate Change)
 COP, begun in 1992 and held annually since, is the top-level organization of the United Nations Framework Convention on Climate Change. At COP3, held in Kyoto in December of 1997, the Kyoto Protocol was adopted, setting targets for the reduction of greenhouse gases. Compared to 1990 levels, for the period 2008 to 2012 Japan is to reduce greenhouse gas emissions by six percent, the US by seven percent, and Europe by eight percent. At COP6, held in Bonn, Germany in July, 2001, basic agreement was made on concrete curtailment measures; the details of international rules will next be established.



Effective Recovery and Transport: New Energy Development Technologies

The development of resources means that recovery is the main point—resources such as crude oil must be recovered in the most efficient way possible, leaving the least material behind while making the smallest environmental impact possible on the location where energy resources are being developed. Cosmo Oil has been independently developing the crude oil business of the UAE nation of Abu Dhabi since the 1960s. Today the company is the majority shareholder of Abu Dhabi Oil Co., Ltd.; through the ongoing introduction of new technologies, production today is stable.

In many oil fields around the world, the associated gas which emerges as a byproduct of crude oil drilling is normally burned off at the site. In the Abu Dhabi fields where we carry out our business, associated gas likewise has been burned; however, we succeeded in 2001 in the completion of introducing new technology to pressurize the gas and reinject it into the ground. This Zero-Flare technology, a first for the Japanese petroleum industry, decreases CO₂ emissions and, through the reinjection of the pressurized gas into the ground, increases recovery efficiency. The project won an award from the Abu Dhabi National Oil Company, and gained worldwide attention as the first project of its type in the Middle East.

Another new technology is Gas to Liquid, which involves the conversion of natural gas to a liquid form. Natural gas has a variety of advantages such as low levels of impurities such as sulfur, but transportation costs are expensive. Existing liquefaction technology requires large-scale facilities, and extremely low temperatures must be maintained onboard ships as well. Recently, however, chemical synthesis using catalysts has made it possible for gas to be liquefied at ordinary temperatures. We are also carrying out research and development on the liquefaction of natural gas fuel, and in the near future will begin testing at a pilot plant in Hokkaido.

The clean liquid fuels made possible by Gas to Liquid have great potential, for while there is

the possibility of stricter regulations in the future for aromatics and olefins, these new regulations will not include liquid fuels, making them the most environmentally suitable new energy source. If these facilities are constructed near gas fields, transport by existing tankers is also possible, meaning that large new infrastructure costs can be kept down, adding to energy conservation.

Thorough Energy Management, Catalyst Development, Environmental Protection Technology

Refining is energy intensive, and results in the emission of CO₂ and other environmental impacts.

At Cosmo Oil, we realize the importance of controlling materials with environmental impact, and of the need for careful system checks and detailed control of facility operations, actions which also advance energy conservation. We will be further strengthening these activities in the future. In oil refinery management, our greatest efforts have been placed into the development of catalysts which contribute to the improved quality of our products, such as through desulfurization. Technological development continues in the search for higher performance catalysts.

Regulations for the sulfur content of diesel fuel are scheduled to become stricter, mandating a level of 50 ppm. Responding to this, Cosmo Oil has developed a high-performance desulfurization catalyst which can reduce levels to a super-low 50ppm or less.

Japanese gasoline already has the lowest sulfur levels in the world, but there are discussions on stricter sulfur regulations. To respond to this, we are engaged in research into simultaneous isomerization and desulfurization during the production of isomerized gasoline. Isomerized gasoline not only contains virtually no sulfur, but the substituting of butane or other hydrocarbon materials makes possible the reduction of gasoline vapor pressure. There is also the possibility of further technology to reduce gasoline vapor emission, one of the causes of photochemical smog.

Even in the case of heavy fuel oil, we are proceeding on catalyst technology research for conversion to distillates and the highest possible levels of desulfurization.

The development of catalysts which can comply with new standards for quality is also tied to the effective use of existing facilities as well. We are also grappling with the development and application of new technologies for the reduction of industrial wastes at oil refineries.

Excess sludge¹ is a by-product of process wastewater treatment at oil refineries. Cosmo Oil has made use of our biotechnology knowledge to develop technology which dramatically reduces the amount of sludge generated. Performance evaluation at our refineries is planned. After the examination, we will begin application of this technology within our company, but also see applications for the same effluent treatment facilities not only in the petroleum industry but in other industries as well.

We are also involved in the development of technology for the measurement and remediation of oil in the soil. One major contribution in this area comes from Cosmo Oil's microbiological technology.

¹ **Excess sludge**

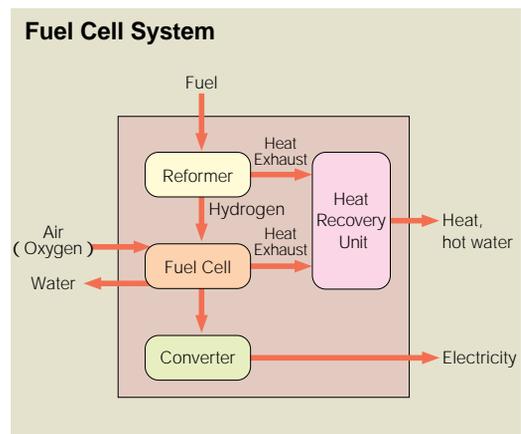
A precipitate resulting from the use of microorganisms in the activated sludge method of process wastewater treatment. Microorganisms adsorb organic materials in the wastewater, decompose them through oxidization, multiply and settle. A portion of the settled sludge can again be used in process wastewater, but the rest is disposed of as excess sludge.

² **Kerosene heat pump air conditioning unit**

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

Highly-Efficient Distributed Energy Supply

In increasing the efficiency of petroleum-based energy, one important area is the business of developing and popularizing new ways of using petroleum resources. In particular, we are placing special efforts in distributed power generation, in which electricity is generated on the spot at homes and businesses. The supply of electric power from power plants brings with it major waste through energy lost during power



transmission. With distributed power generation, not only is electricity generated directly where it is needed but power transmission loss is almost zero, heat is available in a more effective form for use, and energy savings can be realized.

For Cosmo Oil, a major priority is in distributed power supply activities which are closest to people—fuel cells for home, car and similar uses. While the mainstream approach is to use natural gas as the fuel to be converted to hydrogen, which in turn is used in the generation of electricity, we are focused on the development of fuel cell systems using liquid fuels such as gasoline and diesel fuel. We are applying our hydrogen-production catalyst technology to this system as well. We are now involved in ongoing performance evaluation testing using a test unit which represents the middle stages of our research, a butane fueled fuel cell. Performance evaluation of a micro gas turbine fueled by kerosene and intended for stores and similar locations is now being conducted.

In hotels, hospitals, etc., a cogeneration system which effectively recovers heat for use has already been developed and is in use.

Cosmo Oil has been engaged for some time on a



Kerosene heat-pump air-conditioning unit²

kerosene heat pump air-conditioning unit²; we can increase efficiency through our existing supply network in using this fuel supply in a distributed power system.

We are also proceeding with the preparations for large-scale electrical generation and electric wholesaling³ in lands adjoining the Yokkaichi Oil Refinery. It will use asphalt, which currently has a very low market value, as fuel, an important example of our goal to use petroleum in the most effective way possible.

In a fresh approach to energy diversification, we have begun LNG supply in the Chubu region of central Japan.

CO₂ Reduction at the Global Level

Discussion has been growing worldwide on the greenhouse gas reductions adopted with COP3. The goal set for Japan is a reduction by six percent from the level of 1990 by the years 2008 to 2012. To provide flexibility in achieving the discharge quantity reduction goals, the Kyoto Mechanism has been established, in which nations can use emissions volume trading⁴, CDM⁵ and JI⁶. Cosmo Oil understands the need for energy conservation in its oil refining and distribution business, but also sees the risk management implications for the future, so it has begun CO₂ emissions volume trading. In June 2001, for example, we entered into an emissions volume trading contract with a private Australian firm for the discharge rights of 2.8 million tons of CO₂. This was an exchange for the planting of eucalyptus trees and the amount of CO₂ which can be absorbed. We believe that emissions volume trading, when seen as an indirect support for the maintenance of forests, can be a major contribution to the absorption of CO₂.

In May, 2001, the new company Natsource Japan was founded by 12 major corporations as an emissions trading agency. This company is involved in consulting on CO₂ discharge reductions and the development of the trading

agency business.

Also, through mock testing on emission reduction, it is expected that important know-how on contributions to CO₂ emission reduction can be designed into the Japanese domestic system.

Becoming an Environmentally Advanced Enterprise

Using petroleum as efficiently as possible, engaging in thorough energy conservation, undertaking research and development for new ways to successfully save energy through using petroleum, and making the needed investments in management resources and managing the resulting business all directly support Cosmo Oil's fundamental business of the supply of petroleum-based energy.

In dealing with environmental problems, Cosmo Oil is not simply thinking about the costs involved. We believe that dealing with environmental problems is not a contradiction with the company's activities as a commercial entity pursuing profit, when both are proceeding toward the same goal.

³ Electrical Wholesaling

In 1995, the Electric Utilities Industry Law was revised to allow corporations with electrical generation capabilities to sell electrical power to utilities; in 2000, further revisions allow for the direct sales of electricity to major users. By using reserve electrical generating equipment and our own fuel, relatively inexpensive electricity can be supplied.

⁴ Emissions Volume Trading

Emission limits, or allotment volumes, have been set for the industrial nations; allowance has been made for the exchange of these emission limits.

⁵ CDM

(Clean Development Mechanism) CDM allows industrialized nations, which have green house gas emissions limits, to invest in emission-saving projects in developing countries, which have not had limits established, and gain credit for the savings achieved. This allows both nations to benefit: the industrialized nation can use the credits received to achieve its goals, while the developing nation acquires technical transfer and investment.

⁶ JI

(Joint Implementation) This allows for industrialized nations to exchange reduction units, the amount resulting from the reduction of greenhouse gas discharges or promotion of adsorption business activities, with related countries.

Policy/Action Plan and Results

The 21st century is the Century of the Environment. Cosmo Oil's activities are deeply tied to environmental protection, and are expanding to include accelerated corporate reform and the implementation of a new two-year program called Value Creation 21, which has the creation of an environmentally advanced enterprise as its core function.

Decreasing the environmental impact resulting from our business activities, responding to the needs of the green consumer, and working to preserve the global environment are the demands of society today. Society's support is a necessary condition for the company to in turn be able to continue to contribute to building a lasting society.

Basic Policy on Safety and the Environment

At present, more than 50 percent of the energy used in Japan is supplied by petroleum products such as gasoline. The source material, crude oil, is almost entirely imported from the Middle East and other areas.

Cosmo Oil, as a member of the petroleum industry which refines and sells petroleum, has worked hard to make safety integral to providing a stable supply of energy. As a member of the energy industry, we know our mission for both regional and global environmental protection. To further clarify the policies already in place, the Earth Environment Committee* created the Basic Policy on Safety and the Environment in February, 2001—an intra-office, commonly understood and publicly-declared commitment to society.

*See pages 13 and 14

Basic Policy on Safety and the Environment

Basic Recognition

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

Basic Safety Policy

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

Basic Environmental Policy

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

Action Plan and Results for 2000

While Cosmo Oil moves along with the action goals of the entire petroleum industry, its in-house Action Group* has established an action plan outlining specific, concrete actions related to environmental problems, establishing goals and realizing the conditions for execution. Up to

2000, action plans were established according to industry goals; from 2001, the company will also take on an individual policy in which environmental activities are tightly interwoven, with the goal of contributing to a vibrant, sustainable society.

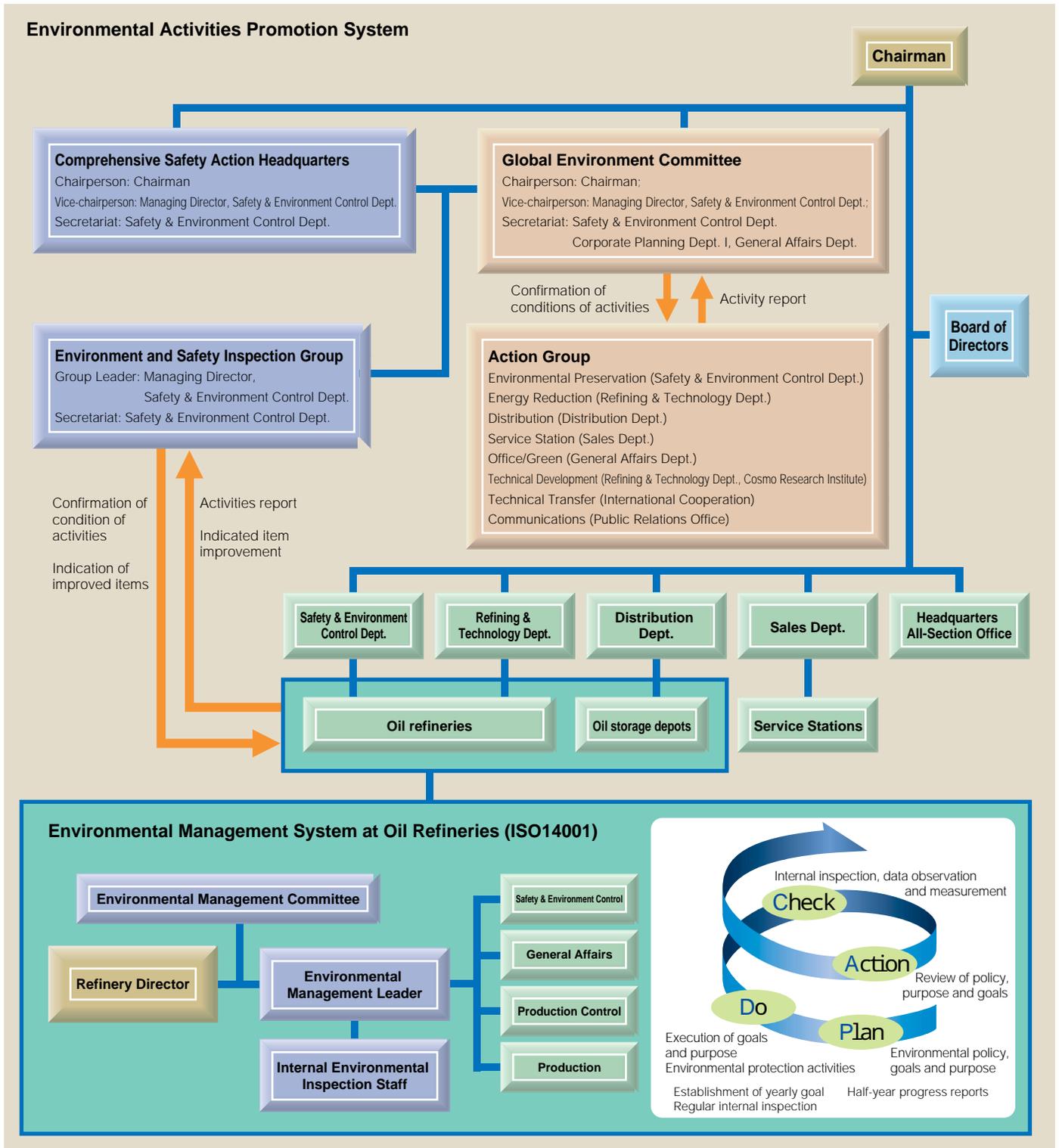
*Please refer to page 13 for more on the formation of the Action Group.

Action Plan		Results	Related page
Theme	Goal	Year 2000 Results	
Thorough environmental protection	Reduce the final disposal of industrial wastes discharged by oil refineries to 67 percent of 1990 levels by 2010.	Successful reduction in 2000 to 72.6% of 1990 figures.	Page 16
	To not simply meet regional discharge standards for the discharge of environmental impact materials such as SOx, NOx and CO ₂ , but to strive for a higher level of reduction.	Discharge of materials with environmental impact reduced dramatically, to well below regulation figures.	Pages 15, 16, and 41 to 45
Promotion of energy savings	To control the discharge of CO ₂ , a cause of global warming, energy conservation will be promoted, with a goal of reducing crude oil energy consumption units used by 2010 to 10 percent below 1990 levels.	Reduction in 2000 to levels 6.7% below those of 1990. Energy reductions in a number of areas are moving steadily towards meeting targets.	Page 15
	To reduce the amount of fuel used for the land and domestic ocean transport of petroleum by 2010 to nine percent below 1990 levels.	By reduction of the number of vehicles used, and the continued move toward larger, more efficient vessels, 2000 figures for land vehicles were 13% below 1990 levels, while ocean transport fuel use was 11% below 1990.	Page 28
Promotion of reduction of materials used and increased recycling Increased awareness at affiliated Service Stations of proper waste treatment	Full understanding and management of the manifest system for the control of usage.	A brochure reflecting changes in the law was created and distributed in April, 1999, and special informational activities were conducted at special agencies and Service Stations.	Page 29
	To realize complete understanding of the need to reuse resources through the recycling of containers.	Efforts are being made for the best possible handling of waste materials, based on the Container and Packaging Recycling Law implemented in April of 2000.	Page 29
	Creation of a database of environmental problems regarding Service Stations, aimed at being shared throughout the company.	Environmental information has been incorporated into the intra-office database, with inquiries and responses made public throughout the company.	Page 37
Promotion of green activities in offices	Promote energy reduction and recycling through the implementation of a paperless office.	Paperless operations are being promoted through the increased use of office automation, and where suitable, the purchase and use of green office supplies.	Page 30
Research and development Technical development in primary petroleum business	Promote research and development into high-performance desulfurization catalyst.	A high-performance catalyst with the potential for the production of diesel fuel with sulfur levels of 50ppm has been created and is undergoing performance evaluation at the Sakai refinery.	Page 18
	Promote new-energy technical development.	A pilot-test unit of a high-performance, high-efficiency catalyst for the production of liquid fuel from natural gas has been developed.	Pages 8 and 9
Technical development for reduction of industrial environmental impact.	Promote wastewater-related technical development.	A new concept has been developed to reduce excess sludge occurring during the process wastewater treatment at oil refineries. The process will undergo performance evaluation at our refineries.	Page 9
	Promote soil remediation technology.	A new method for the evaluation of oil content in the soil has been developed.	Page 9
	Promote hydrocarbon vapor recovery technology	An adsorbent for the recovery of hydrocarbons and organic solvents has been developed.	Page 27
Society and public relations activities	Transmit information about Cosmo Oil's environmental activities, both internally and to the public.	The Cosmo Environmental Report was published and placed on the company website; environmental events such as Cosmo Earth Conscious Act have been held.	Pages 35 and 36
Emergency countermeasures	Take countermeasures to ensure minimal environmental impact in emergencies.	Maintenance of emergency facilities has been carried out; accident prevention training and education is being made on a regular basis; preparations have been made for the rapid deployment of appropriate measures in emergencies.	Page 33

Environmental Activities Promotion System

To achieve the environmental action plan, the company-wide Global Environment Committee, and the Comprehensive Safety Action Headquarters, both chaired by the Chairman, were established. These groups are to decide on basic policies and an action plan, to collect reporting from the various business areas, to

carry out inspections and other activities, to sum up actual conditions and provide support. At each oil refinery, the ongoing improvement of activities is being made by establishing an environmental management system based on ISO14001 and the implementation of the PDCA (Plan-Do-Check-Action) cycle.



Oil Refinery Environmental Management System

ISO14001 certification*, the international standard for environmental management systems, has been obtained at all four of our refineries. According to ISO14001, the head of each oil refinery establishes an environmental policy, sets goals, works to save energy and reduce waste materials, establishes education and training courses and conducts other activities focused on the continuous improvement of environmental protection.

Apart from regularly-scheduled inspections by the examination and registration authorities, internal inspections are carried out regularly according to the inspection standards set by each oil refinery to confirm progress toward system goals, and to check conditions. In 2000, certification was renewed at all of the oil refineries.

ISO14001 Certification Acquisition at Cosmo Oil Refineries

Refinery name	Location	Certifying organization	Certification Date
Chiba Oil Refinery	Chiba Prefecture	JQA	March 13, 1998
Yokkaichi Oil Refinery	Mie Prefecture	JQA	March 20, 1998
Sakai Oil Refinery	Osaka Prefecture	JQA	March 20, 1998
Sakaide Oil Refinery	Kagawa Prefecture	JQA	June 18, 1997

Oil Refinery Personnel Obtaining Environmental Qualification

Air Pollution Control Manager	81
Water Pollution Control Manager	82
Noise Pollution Control Manager	18
Vibration Pollution Control Manager	6
Hazardous Materials Officer (Class A, Class B)	1,776
High-Pressure Gas Production Safety Manager (Class A, Class B)	953
Qualified Person for Energy Manager (heat)	87
Qualified Person for Energy Manager (electricity)	15
Personnel in charge of industrial waste subject to special control	13
Technical manager for industrial waste treatment facility	8
Environmental Measurement Staff	5

As of March, 2001

Education and Development

To effectively promote environmental activities, top management must of course express its intentions both internally and publicly, and promote a change of awareness for all employees.

The following outlines some of the education and development activities held during 2000:

Environmental study meetings: outside instructors were invited five times during the year
 Environmental education for oil refinery employees and employees of related companies: based on the environmental manual and held annually.

Cosmo Research Institute environmental research announcement: meetings announcing four themes, including "The Greening of the Tax System and Energy Conservation Law" and "About Eco Funds," were held.

The video "Cosmo Environmental Revolution" was produced and distributed to 50 subsidiaries and related companies.

Activities for the Future

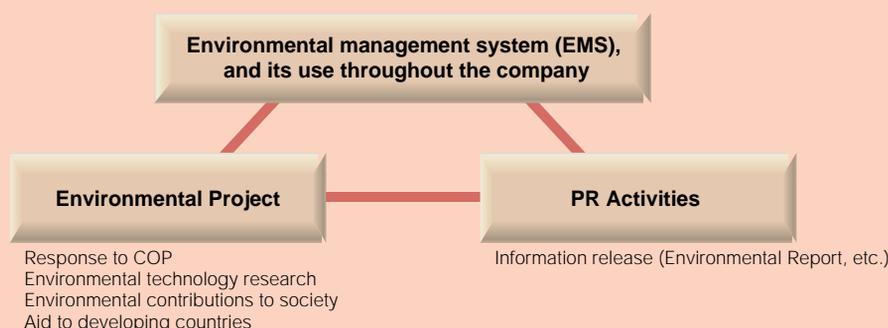
From the year 2001, a review of the organization and environmental activities promotion system is planned to increase integration of environmental protection activities into corporate management.

The beginning of these activities came with creation of the Environment Affairs Office in the Corporate Planning Dept. in July of 2001. In close coordination with the Public Relations Office and Safety & Environment Control Dept, it will actively and effectively promote the release of information, the development of environmental management at all levels of the company, and promote various activities related to the environment.

*ISO 14001

The international standard for environmental management, established by the International Organization for Standardization (ISO). It establishes important points in reducing environmental impact in business activities, products and services.

Activities from Year 2001 (plan design)



Results in Reduction of Environmental Impact

Prevention of Global Warming

Oil refineries use a great deal of energy and discharge large quantities of CO₂ in the process of refining crude oil; preventing global warming by reducing energy use is therefore one of Cosmo Oil's most important environmental protection activities.

Goal: To reduce the crude oil energy consumption units for energy¹ in 2010 by 10 percent compared to 1990 levels.

Results: In the 1990s, increases in crude oil throughput, and actions on behalf of the environment such as the reduction of the sulfur content in kerosene and reduction of benzene in gasoline resulted in an increase of energy consumption at oil refineries. However, through the promotion of energy savings, 2000 levels of crude oil energy consumption units were already 6.7 percent below 1990 levels.

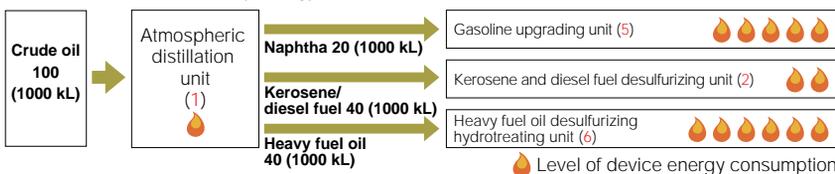
¹ Crude oil energy consumption units

The total amount of energy used at oil refineries is broken down into values for the amount of crude oil conversion equivalent (unit: thousands of kiloliters). The unit is shown in kiloliters of crude oil/thousand kiloliters. The total volume of energy used is the crude oil conversion value (unit: kiloliters of crude oil).

² Crude oil equivalent throughput

The throughput of each device is converted to the crude oil equivalent throughput at the atmospheric distillation column. At the atmospheric distillation column, the crude oil is separated into naphtha, kerosene, diesel fuel, heavy fuel oil, etc., and processed for sulfur reduction. Because the different units and their composition vary according to the oil refinery, the crude oil equivalent throughput, which reflects the operating conditions of each unit, can be used to calculate the crude oil energy consumption unit. With the energy consumption of the atmospheric distillation column as the base, the level of energy consumption for each device is also known and throughput can be converted. The total of the conversion throughput for the separate devices becomes the total crude oil equivalent throughput for the oil refinery.

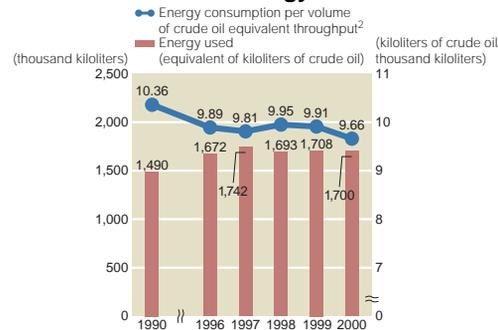
Calculation Total oil refinery energy use (equivalent of 5000 kL crude oil)



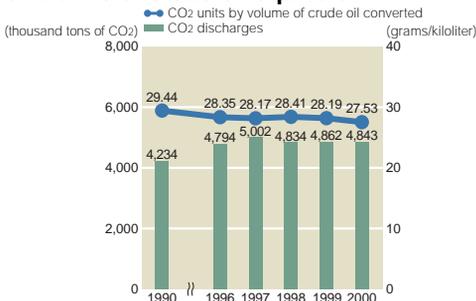
Crude oil equivalent throughput $(100 \times 1) + (20 \times 5) + (40 \times 2) + (40 \times 6) = 520$

Crude oil energy consumption units $5000/520 = 9.6$ (kiloliters of crude oil/thousand kiloliters)

Energy quantities used/change of quantities of crude oil used for energy



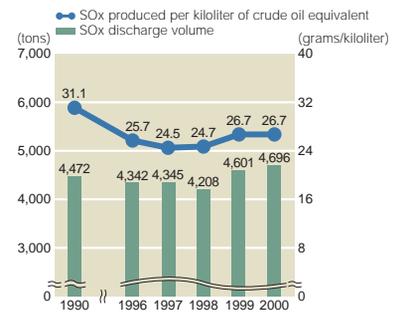
Changes of CO₂ discharges and units of crude oil equivalent



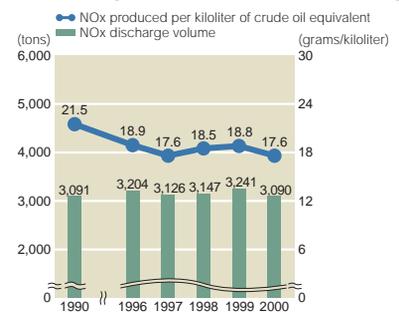
Prevention of Air Pollution

The heaters, boilers and other energy-consuming facilities used in the process of refining at the oil refineries discharge both SO_x and NO_x gases. However, through the use of low-sulfur fuels and countermeasures such as the denitration of flue gases and strict observance of regulations, we are working to further reduce these levels. In the area of hydrocarbon vapors, a cause of photochemical smog, actions have been taken to reduce their discharge from tanks and distribution facilities at oil refineries and oil storage depots. These countermeasures also contribute to the reduction of benzene discharges, also a damaging air pollutant.

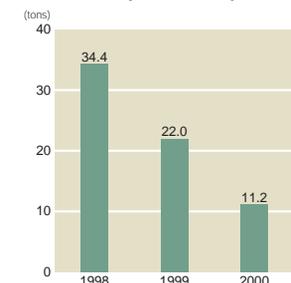
Changes in Sulfur Oxide (SO_x) Discharges



Changes in Nitrogen Oxide (NO_x) Discharges



Changes in Discharges of Harmful Air Pollution Material (Benzene)

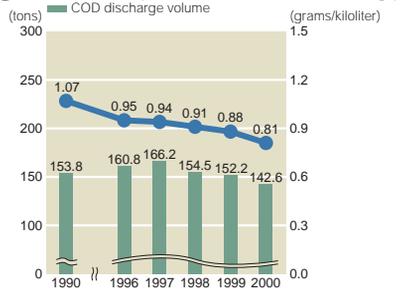


*Including discharge volume from oil storage depots.

Prevention of Water Pollution

Because wastewater becomes intermixed with oil at oil refineries, process wastewater treatment facilities are established to purify the water and make it as environmentally friendly as possible before disposal.

Changes in Water Pollution Materials (COD)¹ Discharges



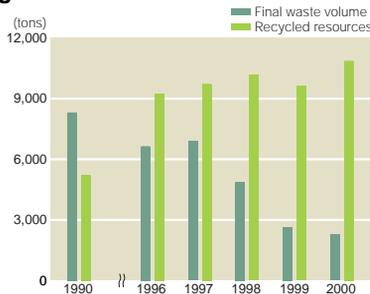
Reduction of Industrial Waste

Cosmo Oil is working aggressively to reduce the amount of industrial waste discharged from its oil refineries—one of its most important environmental protection activities.

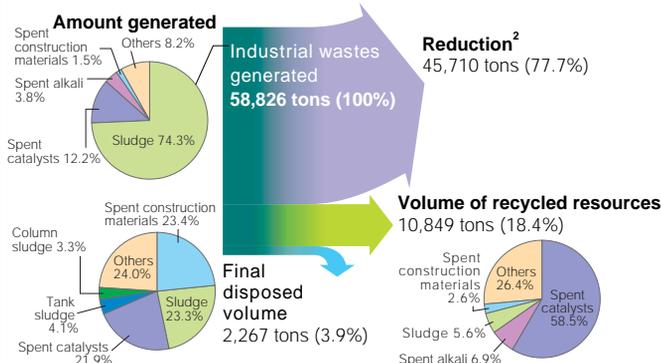
Goal: To make a 67 percent reduction in final amounts disposed in 2010, compared to 1990 figures.

Actual results: Through the separation of industrial wastes, recycling of materials and reduction of amounts, Cosmo Oil's four refineries accomplished a reduction of approximately 72.6 percent.

Changes of Industrial Waste



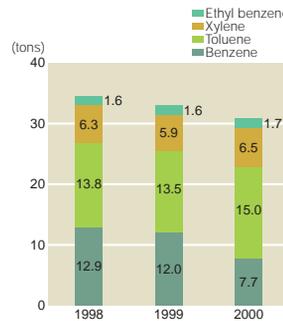
Flow of Industrial Waste Materials



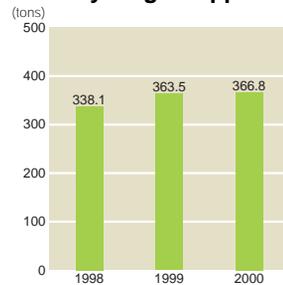
Volume of PRTR Target Materials

Cosmo Oil has been cooperating in putting into force the Pollutant Release and Transfer Registers (PRTR) law³, with a PRTR pilot investigation undertaken by Japan's Federation of Economic Organizations in 1999, in which discharges from oil refineries were calculated. Based on PRTR, which goes into force in 2001, the control of chemical materials will be strengthened.

Changes in Pollution Exhaust Discharges



Changes in Recycling of Applicable Materials*



*Materials such as molybdenum, cobalt, etc. recycled from spent catalysts.

Soil Environmental Protection

In the daily environmental management activities at Cosmo Oil, we investigate the soil at our business areas and make the appropriate responses. Soil analysis is also conducted at oil storage depots, on service station lands and on unused properties being sold as well, and any necessary countermeasures made.

¹ COD

Chemical Oxygen Demand. One of the indexes of water pollution, it indicates the amount of oxygen consumed in the oxidation of materials including organic matter in water.

² Reduction

To reduce the amount of waste materials discharged from oil refineries, wastes are reduced through the dehydration and incineration of sludge.

³ PRTR Law

Pollutant Release and Transfer Registers law. A system of notification to national authorities by company representatives of the discharge amount of listed chemical materials and wastes into the air, water and earth, to understand the amount of change outside the business location.

Fuel Oil Quality Regulations and Responses

Japan is largely dependent on Middle East crude oil, which is relatively heavy and contains a comparatively high quantity of residual fraction and sulfur. Compared to the lower-sulfur African and North Sea crude oil supplied to Europe and North America, producing materials suitable for the protection of the environmental from Middle East crude oil—gasoline, kerosene, diesel fuel oil and heavy fuel oil—requires far more advanced refining facilities. Japan's petroleum industry has been actively investing in desulfurizers and other facilities, and has worked for the reduction of environmental pollution. As a result, we provide world-level products with excellent environmental qualities. For the future, quality regulations for environmental protection will continue to move to even greater strictness.

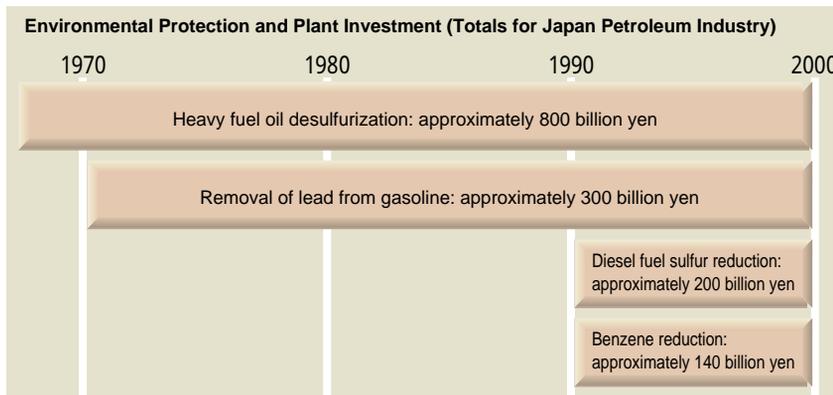
functioning of catalytic converters in cleaning exhaust gases, the idea of moving to lead-free gasoline was considered.

As a result of research conducted by a partnership of Japan's petroleum industry and automotive industry, regular gasoline was entirely lead free by 1975. Lead-free premium gasoline was placed on the market in 1983; with cars prone to valve recession (a phenomenon in which the seats of exhaust valves are worn away when non-leaded gasolines are used) disappearing from the market, the production and sales of all leaded gasoline was terminated in 1987.

Benzene Reduction

Benzene has received attention for its influence on the human body, with Japan's Ministry of the Environment classifying it as a high-priority harmful air pollutant. While the exact influences on living organisms are not completely clear, new Japanese regulations to reduce air pollution which came into effect from April of 1996 limit benzene concentrations in gasoline to less than five percent.

In addition, the Petroleum Council decided in 1966 to move toward reduction of benzene to the one percent level, with the petroleum industry moving to make the necessary changes to oil refinery facilities. Low-benzene gasoline with less than one percent benzene actually began shipping from January of 2000.

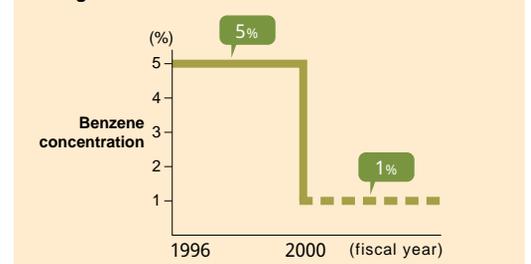


The History of Gasoline Quality Improvement in the Japanese Petroleum Industry

- 1950 Gasoline production begins
- 1970 Shinjuku-ku, Tokyo air pollution incident
- 1975 Sales of non-leaded regular gasoline begin
- 1983 Sales of non-leaded premium gasoline begin
- 1987 Sales of 100-octane premium gasoline begin
- 1991 Sales of MTBE (methyl tertiary butyl ether) blended premium gasoline begin*
- 1996 Revision of JIS standard (benzene less than 5.0 percent, sulfur content of less than 100 ppm, MTBE less than 7.0 percent)
- 2000 Regulation for benzene content of one percent

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

Changes in Benzene Concentration in Gasoline



Gasoline

The Move to Lead-Free

In the 1960s, when the surge of economic growth resulted in rapid adoption of the automobile by wide sections of society, 4-alkyl lead was added to gasoline to increase the octane number. In 1970, however, lead pollution in the Shinjuku area of Tokyo highlighted the toxicity problem of 4-alkyl lead. To respond to exhaust gas regulations and to solve the problem of lead's obstruction of the

Sulfur Content

Sulfur discharged into the atmosphere is a cause of major environmental problems such as acid rain. Although regulated by the JIS standard to less than 0.01 percent (100ppm), Cosmo Oil ships its premium gasoline with a level of only 0.0005 percent (actual result for FY 2000) and regular gasoline at 0.003 percent (figures for FY 2000)—figures dramatically lower than regulation figures for sulfur content.

Diesel Fuel

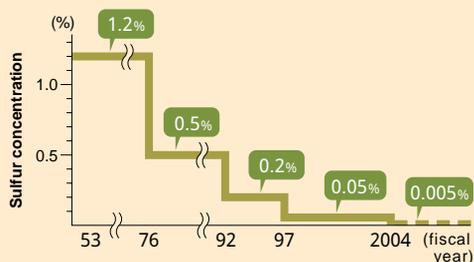
From High to Super-High Levels of Desulfurization

To reduce the amount of sulfur in diesel fuel, the Japanese petroleum industry began the installation of desulfurization units in oil refineries, particularly hydrodesulfurization facilities, from the latter half of the 1950s. Particularly in recent years, air pollutants such as nitrogen oxide and suspended particulate matter in large cities mean that considerable time will be needed to achieve environmental quality standard levels, so the Central Environmental Council of the Environmental Agency (today's Ministry of the Environment) announced that, until diesel trucks and buses can be fitted with exhaust gas recycling (EGR) devices, sulfur levels in diesel fuel would be reduced to 0.2 percent from October of 1992. The Council continued that, in the long run, until aftertreatment devices can be put into practical use, sulfur levels are to be reduced to less than 0.05 percent. From 1997, shipping of diesel fuel with sulfur levels of less than 0.05 percent began.

Cosmo Oil ships diesel fuel with a sulfur level of 0.04 percent (year 2000 figure), below the regulation level of 0.05 percent.

Changing regulations for diesel exhaust gases mean that the allowable sulfur content of diesel fuel is expected to be further toughened to 0.005 percent (50 ppm). At Cosmo Oil, we are also moving to super-low desulfurization with strengthening of our infrastructure, including the implementation of a deep desulfurization unit as well as technological development such as improvements to catalysts to provide high-level desulfurization at existing facilities.

Changes in Diesel Fuel Sulfur Content Regulation



Kerosene

Surpassing JIS Standards

In Japan, where kerosene-fueled heaters are widely used in homes, sulfur content has long been strictly regulated to ensure public health. Current JIS standards are for sulfur levels of 0.008 percent (80 ppm), but Cosmo Oil kerosene shipped at 0.003 percent in 2000—far below the statutory figure.

Heavy Fuel Oil

Dramatically Strengthening Desulfurization Devices in the 1970s and 80s

The sulfur oxide (SOx) released when heavy fuel oil burns was a serious source of pollution in heavily industrialized areas as early as the high economic growth period of the 1960s. With the enactment of the Basic Law for Environmental Pollution Control in 1967, the public and government began the work of preventing air pollution.

The petroleum industry responded with the import of low-sulfur crude oil and the rapid implementation of heavy fuel oil desulfurizing units. By 1980, 44 direct heavy fuel oil desulfurization units and a number of indirect desulfurization units were constructed. Since then, progress has continued in other areas where heavy fuel oil is used, such as flue gas desulfurization facilities, and the concentration of SOx has improved to a degree seen in few other places around the world.

Cosmo Oil is increasingly using the low-sulfur heavy fuel oil produced by direct heavy fuel oil desulfurization units as the raw material for other value-added, low-sulfur fuel oils such as diesel fuel and gasoline.

Environmental Accounting

Introduction of Environmental Accounting

Cosmo Oil has for the first time adopted environmental accounting. The costs of environmental preservation have been calculated, and the effects of these activities gathered in a way which reflects the unique factors of the petroleum industry.

In introducing environmental accounting, our aim is to use it both for the internal statement of our goals and intentions, and to help us meet our responsibilities in communicating with our stakeholders.

The structure of environmental accounting is outlined in the guidelines of the Ministry of the Environment; a number of domestic industries make their official announcements of environmental accounting in accordance with these guidelines. The petroleum industry also applies the guidelines specified in the Investigation Report on the Introduction of Environmental Accounting in the Petroleum Industry by the Petroleum Energy Center (PEC).

Since environmental accounting has just begun, however, these guidelines will continue to change and be updated to better correspond to the differences in various industries, and to the unique needs of every company.

Cosmo Oil undertook this environmental accounting by referring to the guidelines of the Ministry of the Environment and the Petroleum Energy Center and conducted an environmental accounting which is related to environmental protection activities. Total expenditures for environmental costs are calculated to cover the costs stated in financial accounting.

Applicable Report Scope and Period

Report period

Fiscal year 2000 (April 1, 2000 to March 31, 2001)

Report scope

This report covers Cosmo Oil's four oil refineries; the total figures reflected only the directly related activities of the oil refineries, with the costs and effects of closely-related companies included.

Cosmo Oil Co., Ltd.

Chiba Oil Refinery, Yokkaichi Oil Refinery, Sakai Oil Refinery, Sakaide Oil Refinery

Cosmo Oil Lubricants, Co., Ltd.

Chiba Factory, Yokkaichi Factory (the environmental costs and effects of these two factories are included with those of Cosmo Oil's Chiba Oil Refinery and Yokkaichi Oil Refinery), purchase costs for environmentally friendly lubricating oil raw materials

Cosmo Matsuyama Oil Co., Ltd.

Costs concerned with the reduction of benzene in gasoline (product environmental impact decrease cost) and costs for the after-treatment of crude benzene.

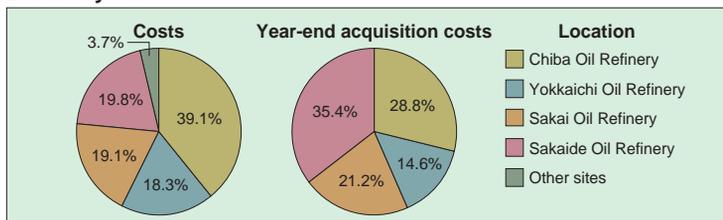
Cosmo Research Institute

Costs and effects of research and development concerned with environmental preservation.

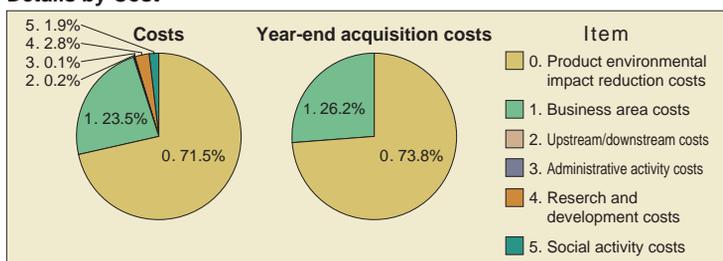
Environmental Accounting by Site

Environmental accounting is totaled after separating the four oil refineries and other sites; separate data on each site is provided from pages 41 to 45.

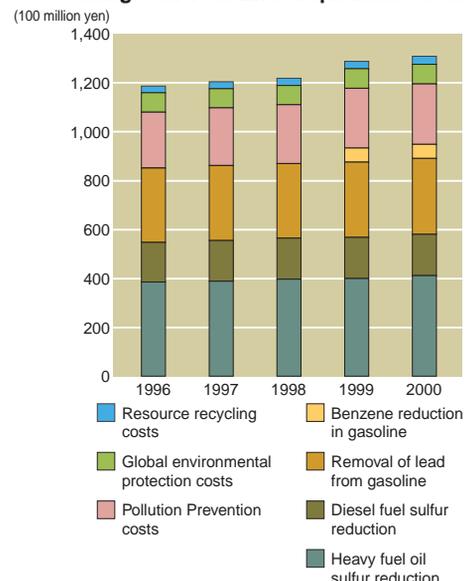
Details by Site



Details by Cost



Changes in Year-End Acquisition Costs



Characteristics of the Petroleum Industry

Because Japan's petroleum products are largely produced from high-sulfur Middle East oil, highly advanced purification infrastructure for environmental protection has been a necessity, with massive investment made over many years. For the future, even stricter quality regulations aimed at environmental protection are expected, so that additional and increased environmental protection investments by industry are anticipated.

Because the main products of the petroleum industry—gasoline, kerosene, diesel fuel and heavy fuel oil—will be burned at the end-user stage, there are three environmental impact factors:

Characteristics of the Environmental Impact of Petroleum Products

1. Because use of these products means combustion, processes such as recycling, recovery or re-merchandising, all feasible with durable goods, are not possible.
2. Recycling, recovery or re-merchandising of containers and packaging material is not possible. For example, gasoline is supplied directly to the vehicle, so the delivery of the product is to the customer's "container."
3. As stated in 1., use of these products takes the form of combustion; this results in the release of materials with environmental impact, including pollutants such as sulfur oxide and nitrogen oxide, as well as CO₂.

Departures from Ministry of the Environment Guidelines

Because of the unique conditions of the petroleum industry already mentioned, in making our environmental accounting some points differ from the Ministry of the Environment guidelines:

1. The Investigation Report on the Introduction of Environmental Accounting in the Petroleum Industry by the Petroleum Energy Center was used as the reference in adding the following cost classifications:

0. Product environmental impact reduction costs

1. Heavy fuel oil sulfur reduction
 2. Diesel fuel sulfur reduction
 3. Removal of lead from gasoline
 4. Benzene reduction in gasoline
2. The year-end acquisition costs are shown to understand the amount of investment on environmental protection equipment and the changes in accumulated investment during the year.
3. The items regarding environmental effects include the environmental load discharged from

business areas, as well as a calculation of the environmental impact occurring when products are used; the reduction in the environmental impact volume during refining process at oil refineries; and the potential environmental impact volume related to products.

Environmental Cost Classification

Costs and investments are classified according to six categories developed by referring to the guidelines of the Ministry of the Environment and the Petroleum Energy Center.

0.*Product environmental impact reduction costs:

The costs associated with quality improvement to reduce environmental impact at the product consumption stage.

Heavy fuel oil sulfur reduction: Costs related to reducing the release of sulfur oxide which occurs in the use of heavy fuel oil by the reduction of sulfur content.

Diesel fuel sulfur reduction: Costs related to the reduction of release of nitrogen oxide and particulate materials in diesel vehicle exhaust gases through the reduction of sulfur content to less than 0.05 percent.

Removal of lead from gasoline: Costs related to discontinuing the use of 4 alkyl lead additive as an octane number booster and producing other base materials for high-octane gasoline.

Benzene reduction in gasoline: Costs related to the reduction of benzene, a material of concern due to possible effects on the human body, to one percent or less.

1. Business area costs

Pollution prevention costs

Air pollution prevention costs (sulfur recovery facilities, nitrogen oxide control facilities, etc.)

Water pollution prevention costs (wastewater processing facilities, sour water processing facilities, etc.)

Global environment protection costs: Costs associated with energy-saving facilities such as cogeneration facilities.

Resource recycling costs: Costs related to waste processing and recycling.

2. Upstream/downstream costs: Cost differential between the purchase of low environmental impact and general raw materials.

3. Administration activity costs: Costs incurred through employee environmental education, employment and maintenance related to the environment management system, and the observation and measurement of environmental impacts.

4. Research and development costs: Costs incurred through research and development related to environmental protection.

5. Social activity costs: Costs incurred through afforestation, beautification, and compensation levied by the Pollution-Related Health Damage Compensation Law.

*Please note that the outline format used here is in keeping with the format of the Japanese guidelines used.

Environmental Accounting

Total Results of Environmental Accounting

Total environmental costs for 2000 were 47,128 million yen; investment totaled 2,417 million yen; fiscal year-end acquisition costs were 128,469 million yen. These all indicate that product environmental impact reduction costs account for a major share of 70 percent or more of total costs.

The cost of environmental protection in all oil refinery activities accounts for 50 percent of expenses, 40 percent of investment, and 25 percent of fiscal year-end acquisition costs.

Method of calculating environmental protection effect

As the guidelines for the calculation of the results of environmental protection activities are still in the development stage, there is still much room for review.

For Cosmo Oil, we believe that while proper calculation of total effect and value has been made in our environmental accounting, and that we will continue to consider examination methods in the future, the following should be considered as a trial calculation.

0. Effectiveness of Reduction of Product Environmental Impact

1. Reduction of Environmental Impact: The level of reduction of environmental impact through advanced refinery technology at our oil refineries.

Decrease of Environmental Impact: Calculated by taking the difference between the standard value and average concentration for Cosmo Oil in 2000, multiplied by production quantity, converted to give environmental impact materials.

Concentration/Basic Unit: The difference between the base value and the average concentration for the company during 2000.

Item	Standard	Content
Gasoline sulfur content	0.01%	JIS automotive gasoline quality standard
Kerosene sulfur content	0.008%	JIS No. 1 kerosene quality standard
Diesel fuel sulfur content	0.2%	Prior to 1997 revision to JIS diesel fuel quality standard. Following the revision, the current standard is for sulfur content of less than 0.05%.
Gasoline benzene content	5%	Prior to 2000 revision to JIS automotive gasoline quality standard. Following the revision, the current standard is for less than 1%.

2. Environmental Impact Level: The potential environmental impact expected when the product is used, after the reduction of product environmental impact at the oil refinery level.

*Considering the relationship between cost and environmental protection, the most suitable method of production is established, with product sulfur levels well below the numerical values set by standards.

*Because SOx reduction accomplished by sulfur reduction

Environmental Accounting

Item	Environmental Protection Cost (unit: million yen)		
	Cost	Investment	Fiscal year-end acquisition costs
0 Product environmental impact reduction costs			
Heavy fuel oil sulfur reduction	18,701	1,416	41,116
Diesel fuel sulfur reduction	4,938	85	16,876
Removal of lead from gasoline	7,979	328	31,044
Benzene reduction in gasoline	2,056		5,753
1 Business area costs	11,097	588	33,680
Pollution prevention costs	3,899	403	24,693
Global environmental protection costs	6,487	27	8,018
Resource recycling costs	711	158	969
2 Upstream/downstream costs	82		
3 Administration activity costs	64		
4 Research and development costs	1,331		
5 Social activity costs	880		
Total	47,128	2,417	128,469

equipment at the time of customer use is not taken into consideration, the actual SOx emission volume is smaller than the latent SOx quantity.

*Although figures for naphtha are contained, it is used as a raw material in petrochemical applications and fertilizers, so SOx and CO2 are not directly discharged.

Impact Level: Product sulfur reduction = average sulfur content in company products multiplied by production volume, converted to the environmental impact for the given material.

Gasoline benzene reduction = average benzene concentration in gasoline multiplied by production quantity.

CO2 emission volume during product use = the figure derived from multiplying the basic unit for CO2 discharge for various products used by the Petroleum Association of Japan by the production figure for Cosmo Oil, added to all petroleum products.

Concentration/Basic Unit: Product sulfur reduction = quantity of sulfur in products.

Gasoline benzene reduction = benzene concentration in gasoline.

CO2 volume discharge in product use = environmental impact mentioned above divided by petroleum product production figure.

Item	Environmental Protection Effect			
	Reduction of Environmental Impact		Environmental Impact Level	
	Decrease of Environmental Impact	Concentration/Basic Unit	Impact Level	Concentration/Basic Unit
0 Effectiveness of Reduction of Product Environmental Impact				
Product sulfur reduction	(Latent SOx quantity: tons)	(Sulfur content: %)	(Latent SOx quantity: tons)	(Sulfur content: %)
• Gasoline	662	0.0072	257	0.0028
• Kerosene	282	0.0047	194	0.0033
• Diesel fuel	13,560	0.1588	3,520	0.0412
• Heavy fuel oil			203,655	1.0431
Total			207,626	
Benzene reduction in gasoline	(kiloliter)	(%)	(kiloliter)	(%)
	275,466	4.3816	38,879	0.6184
CO2 released during product use			(CO2, thousand tons)	(CO2 kilograms/kiloliter)
			69,136	2,560.02
1 Effect within business areas	(tons)	(grams/kiloliter)	(tons)	(grams/kiloliter)
SOx emissions	95	0.02	4,696	26.69
NOx emissions	151	1.23	3,090	17.56
Benzene emissions	4.3	0.03	7.7	0.04
COD displacement	9.6	0.07	142.6	0.81
CO2 emissions	(CO2, thousand tons)	(CO2 kilograms/kiloliter)	(CO2, thousand tons)	(CO2 kilograms/kiloliter)
	18.98	0.66	4,843	27.53
Basic unit of energy consumption		0.25		9.66
Industrial waste generated	(tons)		(tons)	
	5,837		58,826	
Reused industrial waste			10,849	
Industrial waste disposed			2,267	

Economic Effect

Item	Amount (unit: million yen)
Savings through energy reduction (savings through cogeneration)	3,614
Cost reduction through reduced handling of industrial waste (savings through catalyst recycling)	131
Effects of research and development (income through royalties, etc.)	50
Total	3,795

1. Effect within business areas

1. Reduction of Environmental Impact: The decrease in environmental impact in 2000 compared to the previous year (where environmental impact has increased, a minus mark is indicated).

Impact Level: The absolute level of environmental impact.

Concentration/basic unit: The reduction in environmental impact per the quantity of crude oil converted.

*For crude oil conversion treatment quantity and basic units of energy consumption, please see page 15.

2. Environmental impact level: The environmental impact quantity discharged from within business areas in 2000.

Impact Level: The absolute level of environmental impact.

Concentration/basic unit: The environmental impact level per the quantity of crude oil converted.

Method for calculating economic effect: Although Cosmo Oil has not yet established a definitive method for totaling the economic effects, the following numerical values are provided for reference.

Savings through energy reduction:

Estimation of the amount of savings made by the introduction of cogeneration equipment.

Cost reduction through reduced handling of industrial waste (savings through catalyst recycling): Savings achieved through the recycling of catalysts used in oil refining, compared to the costs for the purchase of new and disposal of used catalysts.

Effects of research and development (income through royalties, etc.): Royalty income, actual receipts and cost-savings achieved through research and development.

Subjects for the Future

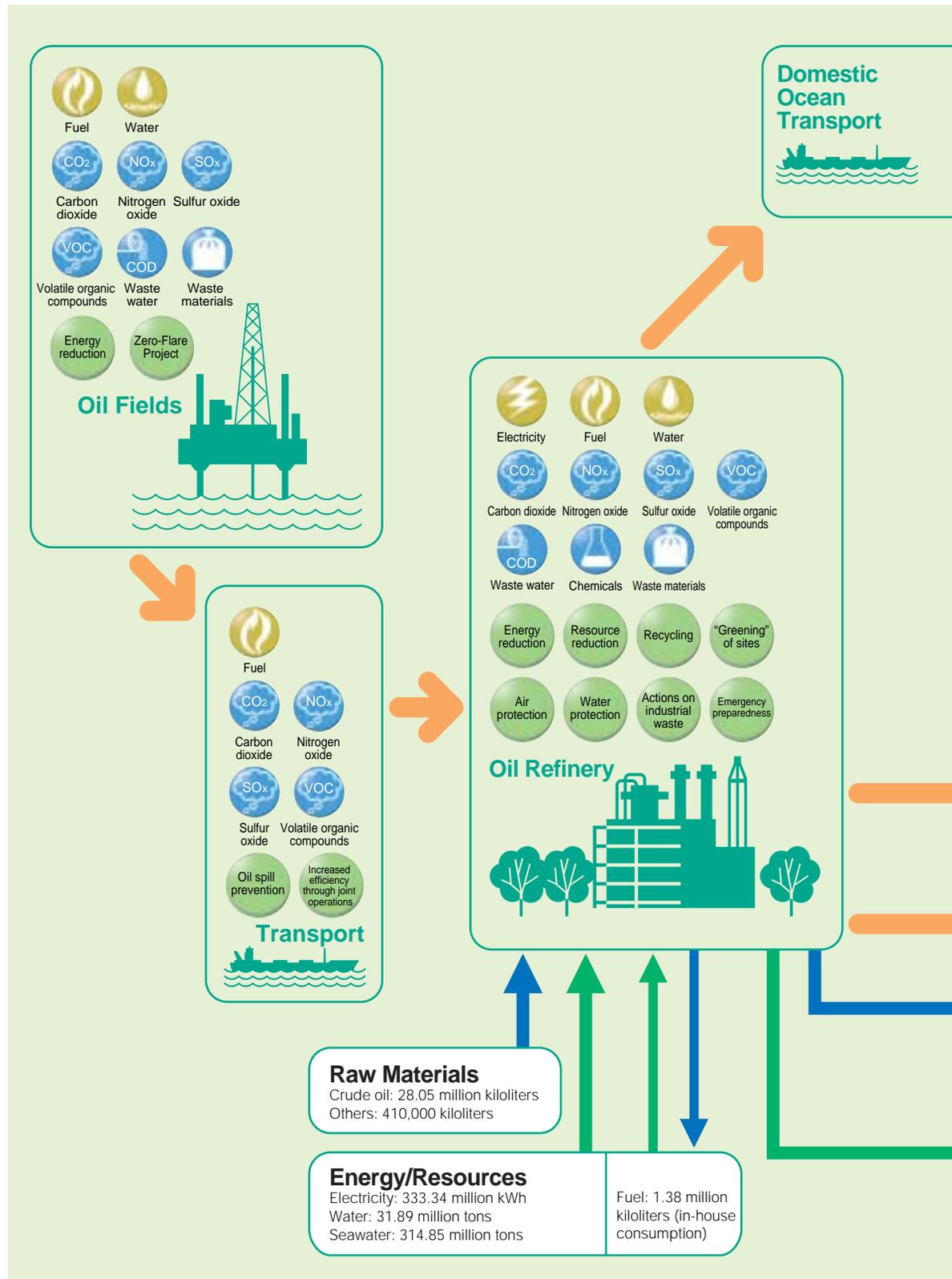
Cosmo Oil's environmental accounting process is only at the starting point. Our goal for the future is environmental accounting which is useful for internal management decisions, and which provides accountability to society as well.

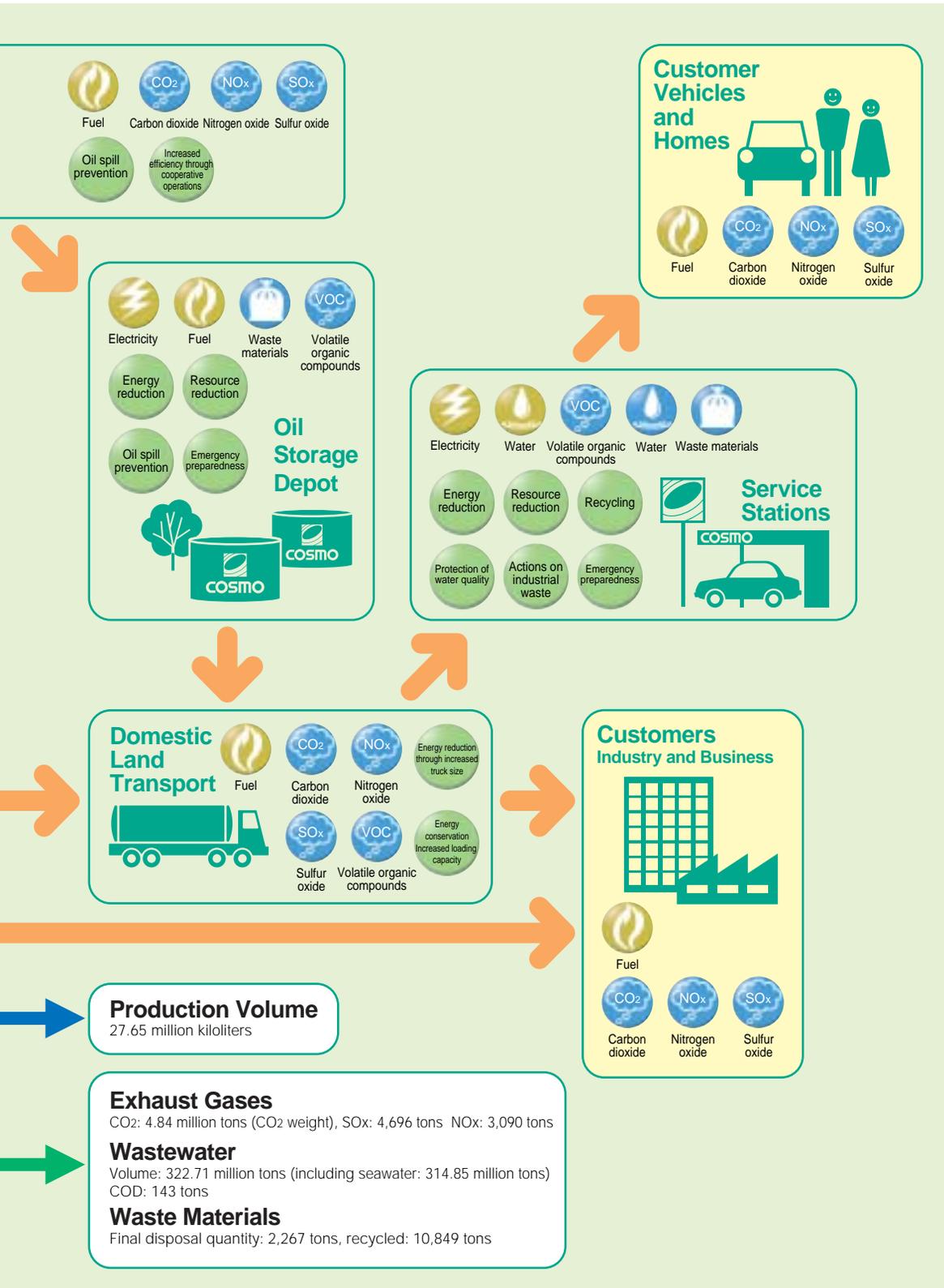
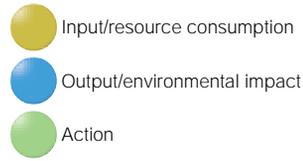
We hope to continue by taking in opinions and requests from outside the company, more thoroughly examining our internal operations, continuing research, and expanding the area of coverage, the items covered and the evaluation indexes.

Environmental Impact of Business Activities

The environmental impact of our business activities can be observed at each stage, from oil field development to consumer use of products. Oil refineries use a variety of raw materials, energy and resources such as

electricity, industrial-use water, seawater and self-produced fuels in the production of a variety of petroleum products.





Oil Field Development, Crude Oil Transport

Japan depends on imports of crude oil from abroad, largely from the Middle East. Cosmo Oil has a long history of independent crude oil development in the Middle East; today in the oil fields which are the site of crude oil production, in local production facilities and during the ocean transportation of crude oil by tanker, a borderless system of environmental measures have been put into place.



Production at the Abu Dhabi Mubarraz Oil Field

*Associated Gas

This gas, which emerges from the oil field during crude oil production, contains a high degree of hydrogen sulfide, CO₂ and other acid gases.

Repressurization and Subterranean Injection of Associated Gas and Water: More Environmentally-Friendly Oil Fields

A familiar sight at the oil fields of the world is the orange flame—the flare—of associated gas*, which emerges during crude oil production, being burned in the atmosphere. This is not only a waste of resources but a process with the environmental problems of the discharge of hazardous materials and the generation of CO₂.

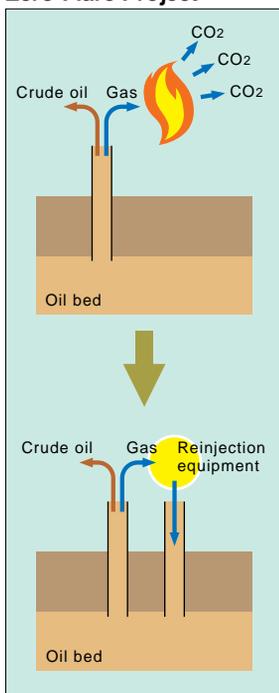
Cosmo Oil is the majority stockholder of Abu Dhabi Oil Co., Ltd., with 51.1 percent of outstanding shares. In November of 2000 at two oil fields which are managed by the company in Abu Dhabi including the Mubarraz oil field, we first began the Sour Gas Reinjection Project, in which associated gas is reinjected into the earth. Through the project, the associated gas which previously was burned in the atmosphere is repressurized with a large compressor and reinjected into the subterranean oil layer, realizing a major cutback in hydrogen sulfide emissions, a major cause of acid rain, and of CO₂ resulting from combustion.

This not only helps to prevent air pollution in Abu Dhabi, but contributes greatly to the prevention of global warming, and has the added benefit of increasing the recovery rate from the oil field due to the increased pressure within the oil bed.

The project won high praise from the Abu Dhabi government, and was selected as Supreme Winner of the 2000 ADNOC HSE Award presented by the Abu Dhabi National Oil Company.

The Sour Gas Reinjection Project is the first step in the Zero-Flare Project, through which all Abu Dhabi Oil fields will handle associated gas in the same way.

Zero-Flare Project



Promoting Larger Sizes and Double Hulls Safe, Energy-Saving Ocean Transport of Crude Oil

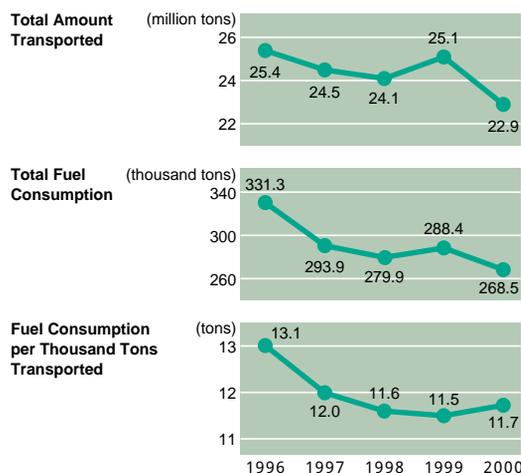
In marine transportation, environmental protection is a major issue for ship owners; as a ship charterer, we also fully understand the need for safe navigation. In fixed-term chartering, good ship owners enter the contract with few past problems and a plan firmly in place to prevent any recurrence of problems that do happen. In spot charters, we work for the prevention of ocean pollution by a confirmation of the actual operating data of the ship, based on our own examination standards.

To prevent accidents resulting in oil spills, we have proceeded since 1998 with the term chartering of double-hulled tankers. As of March 31, 2001, three term-charter double-hulled vessels were introduced into the fleet of 13 ships. Another ship is to be added in 2002.

The use of Very Large Crude Carriers (VLCCs—ships of 200,000 tons or more) has also resulted in a 10 percent reduction in the fuel used per volume of transported crude oil compared to 1996 levels.

In November of 2000, a business partnership with Nippon Mitsubishi Oil Corporation aimed at joint tanker operations resulted in the founding of Nippon Global Tanker Co., Ltd. By drawing on advantages of scale, the new company will provide an increase of efficiency in ships and operations, as well as reduce fuel consumption.

Term-Charter VLCC Fuel Consumption



Oil Refineries

Oil refineries refine crude oil to produce petroleum products such as gasoline, kerosene and diesel fuel.

Large amounts of heat energy are required during the refining process, so the refineries are equipped with heaters, boilers and other facilities. These facilities burn petroleum gas, a byproduct of fuel oil refining, releasing CO₂, SO_x, NO_x and other gases. Cosmo Oil is working to use energy efficiently to reduce CO₂ emissions, while also working in many ways to reduce SO_x and NO_x emissions.

We are also working to reduce the amount of water used in the refining process, and to make the appropriate treatment of wastewater to prevent water pollution outside the refineries.

Petroleum Refining Process

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

Promotion of Efficient Energy Use to Prevent Global Warming

The introduction of cogeneration facilities is one measure being taken to use energy efficiently at oil refineries. Cogeneration equipment makes possible the supply of both heat and electrical power at the same time. By using waste heat occurring from electrical generation to generate steam, oil refineries can efficiently use this energy—the process is more efficient than using electrical generation equipment alone.

Operations at Cosmo Oil provided 39,500kW at the Chiba Oil Refinery, 17,500kW at the Yokkaichi Oil Refinery, and 17,000kW at the Sakai Oil Refinery.

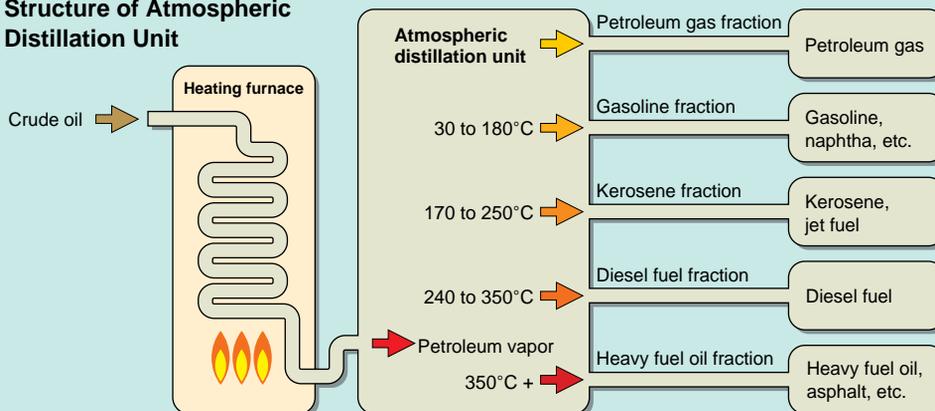
By improving existing infrastructure and by precisely controlling operations, a major reduction in CO₂ emissions is possible. For example, through the introduction of inverters, the recovery of heat from heater exhaust gas, and the careful checking and balancing of heat input and waste heat energy, conservation can be promoted.

At the Sakaide Oil Refinery, existing energy conservation programs were strengthened, resulting in major results in a very short time. As a result, the refinery was awarded the 2000 Agency of Natural Resources and Energy General-Director's Award.



Cogeneration facility at the Chiba Oil Refinery

Structure of Atmospheric Distillation Unit



Preventing Air Pollution with Flue Gas Desulfurization and Vapor Recovery

We work to reduce emissions of SOx and NOx gases by using fuels which are low in sulfur and nitrogen in our oil refineries' heaters and boilers. In addition, low-NOx burners are used to reduce the thermal NOx formed when atmospheric nitrogen and oxygen react during combustion, and flue gas desulfurization and denitration units¹ have been introduced to remove SOx and NOx from flue gases. Electric precipitators are also used to eliminate fine particulates from exhaust gases. Through these actions, Cosmo Oil's four oil refineries have all cleared regulations in the emission of SOx and NOx, and are helping in the prevention of air pollution.*



Fuel Gas Denitration unit which removes NOx from exhaust gases

For gasoline tanker trucks, the release of hydrocarbon vapors² into the atmosphere during loading is prevented through the fitting of vapor recovery units.

* Please refer to data by site on page 41.

¹ Flue gas denitration unit

A unit which removes NOx from exhaust gases. Ammonia and a catalyst are used to reduce the gas, or adsorption using an adsorption solution can be used.

² Hydrocarbon vapor

The gasified form of light hydrocarbons

³ Process wastewater

Wastewater containing oil discharged from refining facilities. At the oil refinery, water contained in the process wastewater is eliminated with an oil-water separation unit, treated by secondary processes such as active sludge treatment, and discharged.

⁴ Biotope

"Biotope" is a German term combining *bio*, the Greek word for "life" and *tope*, from the Greek *topos* or place. It is a place where plants, insects, fish and birds can exist in symbiosis. They are created by organizations, schools and companies in their local area for the purpose of environmental protection.

For the Effective Use of Water Resources and the Prevention of Water Pollution

Seawater and industrial-use water are used in oil refinery processes. Cosmo Oil strives to use as little water as possible by applying the recirculation of industrial water for cooling.

After being used for washing and other refining processes, the resulting process wastewater³ is processed in the oil-water separation unit to remove oil, then undergoes active sludge treatment and other processes to assist in water pollution prevention.

Promotion of Waste Reduction Through Volume Reduction and Recycling

The major industrial waste products generated by oil refineries are the sludge which occurs during wastewater processing, and the spent catalysts from the refining process.

Sludge is first dehydrated, then incinerated to reduce the quantity in incinerators which have been carefully checked for accordance with dioxin emission regulations.

Spent catalysts are reused through reactivation treatments, the metals in spent catalysts are recovered, or recycled as a raw material in cement. Through this the amount of waste and the cost of new catalyst purchases are both reduced.

Cosmo Oil Yokkaichi Kasumi Electric Power Plant Biotope⁴

To find a suitable application for the surplus heavy oil from the Yokkaichi Oil Refinery, the Yokkaichi Kasumi Power Plant is being constructed, with the aim of selling the electricity generated at the facility. During the environmental impact evaluation conducted prior to construction, however, it was discovered that two rare plant species—*kawatsurumo* or Wigeongrass (*Ruppia maritima* Linnaeus) and *tsutsuitomo* or Small Pondweed (*Potamogeton pusillus*)—were on the construction site. Both are aquatic plants which grow in marshes and ponds. The Yokkaichi Kasumi Power Plant is a biotope where the safeguarding of endangered species is promoted.



Protection of rare plants in the biotope

Distribution (Domestic Product Transport)

Petroleum products are transported by tanker trucks and domestic tanker ships from refineries to nationwide service stations, oil storage depots and factories. Cosmo Oil has from an early stage engaged in a variety of activities to increase efficiency and save energy, including increasing the size of tanker trucks and ships, standardizing waste collection at oil storage depots, and joining in partnership with other companies.

A goal of a nine percent reduction over 1990 levels of fuel consumption for both land and sea transport by 2010 had been planned; however, current results are already ahead of this target figure.

Land Transport: Major Fuel Consumption Decreases Through Larger Vehicles and More Efficient Delivery

Energy conservation is being achieved in land transportation through a move to larger vehicles, longer operating hours and a reduction in the number of vehicles. The process of vehicle enlargement has been accomplished, bringing us to the top class in



Tanker Truck Average Size and Loading Capacity

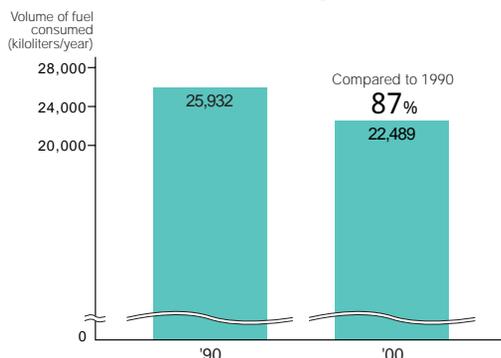
1990
Average size: 15.0 kiloliters
Loading capacity: 94.3%



2000
Average size: 18.6 kiloliters
Loading capacity: 94.0%



Tanker Truck Fuel Consumption Volume



the industry. Improvements have also been made in the operating hours for each truck, with nighttime, Sunday and holiday deliveries now being made.

This policy has resulted in year-2000 fuel consumption 13 percent below the figure for 1990.

Coming improvements such as the increased use of an automatic delivery system, expanded night deliveries and further improvement of delivery efficiency will all add to reduced fuel consumption.

Ocean Transport: Rapid Move to Larger Vehicles for Increased Loading Capacity and Efficiency

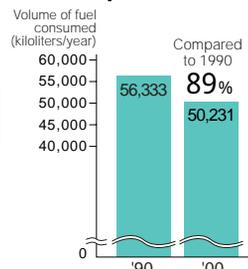
Tankers of the several thousand ton class are used for transport from oil refineries to distribution bases, oil storage depots, and other destinations. In recent years the increased operating rate made possible by the move to larger vessels and improved loading capacity has resulted in an 11 percent reduction in fuel consumption compared to 1990.

Cosmo Oil will continue in the future to carefully plan to reduce the mismatch of ships and cargo, make use of the cooperative relationship with Nippon Mitsubishi Oil Corp. in areas such as joint receiving, and continue to expand the size of ships used. By decreasing the number of vessels and increasing cargo handling at night and on holidays, we will continue to increase operating ratios and aim at further reduction of fuel consumption.



Increasing the size of domestic tankers

Domestic Tanker Fuel Consumption Volume



Domestic Tanker Average Capacity and Loading Capacity

1990
Average capacity: 1,536 kiloliters
Loading capacity: 90.0%



2000
Average capacity: 2,927 kiloliters
Loading capacity: 94.8%



Service Stations (SS)



Pamphlet for raising the consciousness of special agent and service station staff

Cosmo Oil's approximately 5,800 service stations around the country are visited by a great number of customers every day, making them truly the face of the company. A variety of activities are being developed for the active promotion of environmental activities and to inform our customers of our environmental position, and for the creation of service stations which are in harmony with the local community and the global environment. To increase our customers' environmental consciousness, our Cosmo the Card provides additional value in activities related to environmental protection.

Creating Service Stations in Harmony with the Environment Through a Variety of Environmental Preservation Activities

At our service stations, a variety of measures have been taken for many years to prevent environmental impact in the surrounding neighborhoods, taking into consideration our customers' convenience and our urban locations.



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

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

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

In recycling, the need to separate trash has been well established, with cloth, bottles and cans separated according to local rules. Used tires and other materials are recycled. Suitable treatment methods have been found for plastic chemical containers to meet the Containers and Packaging Recycling Law. The manifest system¹ is being applied to very strictly confirm the condition of waste materials up to the final treatment stage.



Cogeneration system introduced at a service station

Cogeneration systems and kerosene heat pump air conditioning systems have also been introduced, part of the active promotion to save energy at service stations.

Implementation of the Manifest System and Heightening of Staff Consciousness

Industrial wastes are not simply separated, but, through the implementation of the manifest system, confirmation can be made that the proper treatment has been made. This is one important part of the process of raising the consciousness of special agency and service station staff. These active enlightenment activities include a Cosmo Oil-produced and distributed pamphlet outlining the proper handling of industrial wastes. From 2002, uniforms made from recycled materials and featuring the eco-mark symbol will be introduced.

Development of Customer Involvement in Environmental Preservation Through Cosmo the Card

Cosmo the Card is Cosmo Oil's independently issued and managed credit card, with some 2.4 million cards now issued. The average purchase amount per card per month is approximately 100 liters, and the rate of use is always at a high rate of 60 to 75 percent.

Recently, the number of consumers with a high level of environmental consciousness—"green consumers"—continues to grow, so our customers' awareness of environmental preservation is also increasing. To meet these changes, Cosmo Oil is using Cosmo the Card as a structure on which ways for customers to participate in environmental protection activities can be created.

First is to support the adoption of Electronic Toll Collection (ETC)², an automatic highway toll payment system. ETC allows drivers to pass through tollgates without stopping, reducing traffic jams while reducing CO₂ and other exhaust gases. To make it easier for customers with high environmental consciousness to use ETC, we led the way into the marketplace with the release of the ETC Cosmo the Card. A system is also being created so that the Cosmo the Card Joyup point credits or remaining mileage can be donated to the WWF (World Wildlife Fund). We will continue to strengthen our framework to connect our customers to environmental protection.



ETC Cosmo the Card

¹ Manifest system Industrial waste control management table system

Introduced for all industrial waste products in December, 1998. The manifest targets service station waste materials such as lubricating oil, metal trash, discarded plastics, tires and rubber waste, glass, acids, spent alkali and other materials.

² Electronic Toll Collection System (ETC)

An automatic, radio based system for the automatic payment of highway tolls. A special ETC card and in-car equipment are required.

Offices

The headquarters, branch and oil refinery offices of Cosmo Oil have been working for many years for the promotion of electricity and energy conservation, reducing the quantities of paper products used and increasing recycling. Ongoing environmental activities include the production of an office environmental management manual and the enlightenment of employees on an individual basis.

Cosmo Oil believes that office environmental protection activities will also result in an increase in business efficiency. While working for this synergy, we are also striving to reduce the environmental impact of all office activities.

Advancing the Paperless Office Through Intranet Activities

Intranets are widely used for making business contacts and sharing proposals, suggestions and materials—and increasingly to promote the paperless concept. This can also drastically reduce both the number of meetings and the amount of materials needed for them.

Where paper is used, awareness of the need to conserve has been firmly established, with two-sided copying and other programs in place.



Cosmo Oil's Executive Committee in April, 1999, at the introduction of an Intranet system boosting the move to paperless

Promoting Recycled Paper, Eco Mark Products and Other Green Products

From 1998, all copy paper and other papers are made from 100 percent recycled material. The copy paper is also entirely 70 percent white paper. For employee business cards, kenaf, an annual plant of the hibiscus family which has gained much attention as a paper



Recycled paper forms and kenaf business cards

source material which does not require forest resources, is being used.

The introduction of papers with the Eco Mark has also begun, with almost all tubes, tags and file folders 100-percent Eco Mark products as of 2000.

Future stationery, office equipment and other purchases will also be made on a "green" basis.

Establishment of the Clean Box: Increasing Recycling Awareness

Cosmo Oil is working in a variety of ways to reduce the amount of trash discharged, by recycling useable ballpoint pens, files and stationery and copy machine toner cartridges. "Clean Boxes" have been set on all office floors to encourage the separation of wastes and the recycling of paper resources.



Clean Box

Development and Sales of Environmental Products and Technologies

Working closely together as one unit, the group companies of Cosmo Oil are applying their wealth of petroleum-related technology in the research, development and sale of environmentally-related products. These technologies and products are not limited to the petroleum industry, however, and have been introduced into many other industries as well.

Cosmo Research Institute

(from July, 2001, Research and Development Center)

From Desulfurization to Soil Remediation Technology, Applying Petroleum Technology Experience to Environmental Support

Cosmo Research Institute is involved in a wide range of research and development in petroleum technology. One part of that development is active work on technology related to the environment, with the results being applied not only by Cosmo Oil but by other companies and industries as well.

The Institute successfully applied biotechnology to the excess sludge resulting from the wastewater treatment process at oil refineries, with the resulting technology, currently under patent application, able to drastically reduce the amount of excess sludge. This technology will be put into field test in our refineries from 2001.

In research and development on soil remediation, methods for precisely measuring the amount of oil in the soil and for evaluating the possible application of bioremediation—a remediation technology using microorganisms—were successfully developed. Practical evaluation test will be made in 2001.

Much of the Institute's technology has focused for many years on research and development on the production of products with low environmental impact. With regulations on the content of sulfur in diesel fuel scheduled to reduce allowable levels from 500ppm to 50ppm, special effort is currently being placed on the development of catalysts able to meet this need. Even with this difficult demand for desulfurization materials, a highly activated catalyst has been developed, with performance evaluation in oil refineries scheduled for 2001. If the desired effects are confirmed, it is also expected that this catalyst will contribute to the reduction of infrastructure expansion and operation costs.

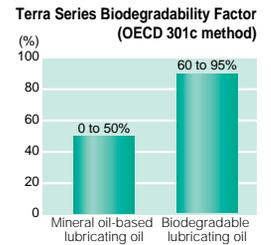
Hydrogen production technology is being applied in the development of fixed fuel cells. Fuel cells are seen as the next-generation energy source, because the exhaust they produce contains very few pollutants. A trial production unit was completed in the spring of 2001. A new

technology called ATR (Auto Thermal Reforming)*, used to promote the development of hydrogen production technology, is also being applied for the further miniaturization of fuel cells.

Cosmo Oil Lubricants Co., Ltd.

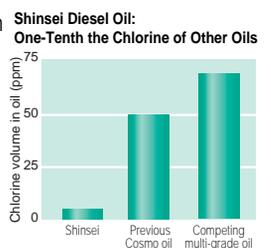
A Unique Approach to Low-Chlorine and Biodegradable Products

Cosmo Oil Lubricants bases the development and sale of its many low-environmental impact lubricating oils on its individualistic philosophy. Cosmo Terra is a series of synthetic lubri-



cating oils with a highly biodegradable structure. Because the oils are decomposed by microorganisms into carbon dioxide and water, they help to protect river, marsh, ocean, soil and other environments. It is a series with wide applications, from oils for outboard motors and chainsaws to grease for construction and agriculture, with the environmental friendliness that has resulted in their being certified as Green Mark products.

Chlorine is an effective additive for increased lubricant performance, but its potential role in dioxin production has been noted in recent years. To respond to this, Cosmo Oil Lubricants in 1999 was the first in Japan to release a chlorine-free lubricating oil. Cosmo Shinsei Synthetic Diesels. Oil for diesel cars has a level of chlorine just one-tenth that of normal oils. By combining a high viscosity-index oil base with chemically synthesized oil, it not only provides the benefits of low-chlorine oils for the environment, but also contributes to extended engine life and a greater distance between oil changes. And the Cosmo Clean series of metal processing oils provide low-chlorine benefits in metal cutting, punching, pressing and processing, solving the problems associated with chlorine in disposal and washing.



For gasoline engine cars, the newly-developed Cosmo Lio SL series of engine oils provides reduced fuel consumption, and increased heat resistance, stable oxidization, durability, cleansing and anti-wear actions. The Lio SL series has been designated as an environmental brand by the American Petroleum Institute (API).



Cosmo Lio Supreme



Experimental plant for slurry method biotechnological soil remediation

*ATR (Auto Thermal Reforming)

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

Cosmo Engineering Co., Ltd.

Applying Hydrocarbon Vapor Recovery and other Oil Refinery Technology to Other Industries

Cosmo Engineering, which shoulders the responsibility for the construction and maintenance of our oil refinery equipment, has also made a major contribution to environmental activities at the refineries.

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



Hydrocarbon vapor recovery unit

Cosmo Engineering also introduced the fixed-bed adsorption unit technology for the removal and disposal of dioxin. This very successful development, installed in existing incinerators after the ash collection stage, can greatly reduce the concentration of dioxin, with removal rates of 99 percent or more. This is a great contribution to the decrease of the dioxin generated by municipal trash or industrial waste incineration facilities.



Dioxin removal unit

The process wastewater treatment technology developed for oil refineries is also finding application in the livestock industry for the control of animal waste materials. The high-efficiency active sludge unit, film-separation active sludge unit, denitrification and phosphorus removal unit can be combined for an advanced level of treatment. This has been introduced into hog farms in response to laws restricting the dumping or burial of wastes.

Cosmo Ventures, Inc.

Petroleum-Related Technology for the Development of Environmentally-Related Products

Cosmo Ventures, Inc. is involved in the development and sale of technologies based on petroleum-related technology for the reduction of

environmental impact, but which can be applied to other industries.

The Bioflora kitchen wastewater treatment system for restaurants and other locations is one such product based on Cosmo's-exclusive technology. The Bioflora 01 developed from this unit can, for example, handle the treatment of water-soluble cutting oil wastewater. By using special microorganisms, oil or organic materials in the wastewater are biodegraded into water and carbon dioxide. Unlike existing treatment facilities, no chemicals or filtration films are necessary, and almost no sludge is generated. The aim now is for market expansion, targeted at factories striving to improve their environmental conditions.

Efforts are also being made to replace flon gas with the development and creation of new cleaning agent products. Petrosafesol is an environmentally safe and gentle cleaning agent replacing specific flon or 1.1.1 trichloroethane as a detergent. It has excellent washing and drying properties, and does not require equipment for washing with water. It has gained attention as a true next-generation cleaning agent.



Bioflora 01

Cosmo Trade & Service Co., Ltd.

Surface-Strengthening and Heat Insulation Materials: Sales of Outstanding Domestic and Foreign Environmental Products

Cosmo Trade & Service is an integrated trading company; in 2001 a new Environment Development Division was established to reinforce the handling of products related to environmental protection. It is the Japanese dealer for Ashford Formula, a US-based concrete protector and strengthener. The Ashford Formula is used to strengthen floors and other areas of warehouses and other concrete buildings, helping to protect employee health and ensure product quality by suppressing concrete dust.

The company is also the importer and distributor for Super Therm, a heat insulation coating material first developed by NASA of the US. It has been shown that the product can reduce solar light by 92 percent, achieving major air conditioning savings. Sales are being developed in a variety of industries.



Example of Ashford Formula application

Business Safety and Emergency Countermeasures

For the petroleum industry, a basic element of environmental response is the knowledge that safety preparations are ready. From the development of crude oil to product sales, ensuring safety in all our business activities is one of the most important subjects for Cosmo Oil, as we implement safety countermeasures ready to respond to the unlikely occurrence of an emergency.

Tanker Safety Measures: Ready to Respond to Emergencies

Massive oil spills from tankers can cause widespread ocean pollution. Cosmo Oil is very careful in the selection of shipping companies used for the chartering of vessels, and continues to introduce ships with double-hull construction, which reduces the danger of spills. To ensure the safety and quality of charters, we request that ship owners hold an independent safety check every year from January to March; under our direction, a careful inspection is made of everything from hull condition to all documentation.

From 1997, we have also held drills in cooperation with ship owners involving a simulated tanker accident, covering all necessary communications both internally and outside the company, including the establishment of a disaster control headquarters and announcements to the media.

Cosmo Oil is also a major contributor to the International Oil Pollution Fund, providing 2.2 percent of all funding. This fund provides compensation to the victims of major oil spills beyond the limit of responsibility of ship owners, to a top figure of approximately 10 billion yen.

Oil Refinery Safety Measures and Emergency Preparedness

Oil refineries handle large quantities of combustible materials. Acting independently with a strong sense of responsibility for the preservation of order and public safety, the head of the refinery acts as chairman in organizing a safety and health committee which plans preventative safety measures for transportation, operations, facilities and other business activities. Through this systematic annual safety goal management, ongoing safety management is ensured.

As a new initiative from January, 2001, The Safety Administration Strengthening Committee has been organized to strengthen administra-

tion covering facilities, construction and operations, to more firmly deal with safety issues.

To prepare for the highly unlikely occurrence of an emergency at the oil refineries, our emergency systems have been reinforced. Along with the preparation of comprehensive, heavy-duty firefighting facilities and emergency materials, an internal fire brigade has been established, with ongoing oil refinery-specific emergency and reporting training being carried out. Joint emergency systems have also been established with neighboring industrial complexes, while joint training with public organizations further strengthens local protection against disasters.

The early detection of abnormalities is also an important of disaster protection for Cosmo Oil. This is reflected in fire alarm systems, gas detection units, a monitoring system and very careful daily patrolling, all serving to identify problems early on.

Oil fences* have also been installed on piers and preparations for their use completed in anticipation of oil spills during transport operations. Other preparations against large-scale oil spills include participation in the Petroleum Association of Japan's Oil Spill Cooperative Organization (POSCO), a mutual support system. Preparations against major oil spills at the Yokkaichi Oil Refinery include setting part of the facilities aside to be managed and made available to others as a base for oil spill prevention materials and facilities.



Oil fence (in stored position)

*Oil Fence

A fence which rides on the surface of the ocean, preventing the spread of spilled oil. It is towed into place by a tugboat or other vessel.



Double-hull VLCC tanker

System for the Strengthening of Oil Refinery Safety Administration



The Service Station Crisis and Safety Management Manual



Company fire brigade at oil refinery



Comprehensive disaster drill

Safety Measures at Service Stations

Each service station has a great many tasks to perform; the *Service Station Crisis and Safety Management Manual* was produced to help deal with regulations, equipment safety and maintenance, emergency and crime prevention, emergency response, response to environmental problems, and communications with the community.

Consulting service station management (SVs) provide instruction to the service stations based on the *Manual*.

International Cooperation

Cosmo Oil has long been involved in technological cooperation and technical transfers with developing nations. In business development, we have made long-term dispatches of our specialists through the Japan International Cooperation Agency (JICA), joined in investigation projects through the New Energy Development Organization (NEDO) and received trainees and dispatched instructors through the Japan Cooperation Center, Petroleum (JCCP).

In recent years, international business cooperation has increasingly focused on pollution prevention, energy conservation and other themes related to global environmental preservation.

Cosmo Oil will continue to actively support environmental preservation and energy conservation in the developing nations, and build our relations with and provide aid funds to governmental organizations, providing training and the continued dispatch of specialists.

Recent International Activities

Automotive Fuel Research for Environmental Improvement—Thailand

Thailand's severe traffic congestion has led to the problems of air pollution and environmental degradation. In the Thailand automotive fuel research for environmental improvement project, Cosmo Oil was asked by JICA to provide specialists and the project leader. In order to find the gasoline types that would be best suited to the traffic conditions in Thailand, the five year project, held from 1996 to 2000, was conducted in the laboratories of the Petroleum Authority of Thailand (PTT).



Environmental Improvement Automobile Fuel research, Thailand

Safety Management Technology—Mexico

Because a comparatively high number of accidents had occurred in the business operations of Petroleos Mexicanos (PEMEX), this program concerned the creation of a safety system. At the request of JICA, Japanese safety control technology, including equipment preservation technology, is being transferred to the Safety Training Center of the Salamanca Oil Refinery.



Safety Training Center, Mexico

2000 Training Results (persons)

	Hosted trainees	Site observation and training	Dispatched trainers	Outside of JCCP
All training	139	186	83	40
Environment, energy conservation, safety related	21		20	

Major Ongoing International Cooperative Projects

(Environmental Protection and Energy Conservation Technology, Safety Management Training)

Special Long-Term Dispatch

Thailand (ESCAP): Energy conservation technology
 Thailand (PTT): Automotive fuel research for environmental improvement
 Mexico (PEMEX): Safety management technology
 Mexico (CENICA): Air pollution analysis technology
 Egypt (CCC): Water pollution analysis technology
 Chile (CNMA): Industrial wastewater quality analysis technology
 Malaysia (JBEG): Gas management technology

NEDO Basic Study for Joint Implementation

Thailand (MOSTE): Siam White Cement energy conservation
 Myanmar (MPE): Tanlin Oil Refinery energy conservation
 Indonesia (PERTAMINA): Gasoline vapor recovery

Public Relations Activities

Cosmo Oil actively communicates its environmental activities to its stakeholders—the company’s shareholders, its customers, the local community and government organizations—building good relations and striving to be a trusted corporate member of society. Concretely, this means providing environmental information within the company and to society, and collecting, analyzing and transmitting this information through the media as swiftly as possible. Through the Internet and customer centers, we are working to build two-way communications with society, information which will then be reflected in our environmental management.

External Public Relations

The annual Environmental Report describes Cosmo Oil’s environmental thinking and actions. The same information will be open to the world community via the Internet. We also are creating environmental videos and television commercials which are aimed at deepening understanding of our activities among the general public.



Television commercial with an environmental protection theme

DAGIAN—Cosmo Oil’s Environmental Public Relations Magazine

To encourage broader thinking about the global environment, we produce the environment information journal *Dagian*, published three times a year. Each issue focuses on one environmental theme, with leading experts in the field commenting on that theme. The information is also available on the Internet.



Cosmo Oil’s Environmental Public Relations Magazine—DAGIAN

Advertising and Publicity

Cosmo Earth Conscious Act is an activity that makes a wide appeal for the protection and preservation of the global environment. Every Earth Day, April 22, a concert and variety of events are held to increase environmental awareness. These are also broadcast through the media.



Fundraising at the Earth Day concert

Investor Relations

To help make our business more transparent and open, top management briefings, including an explanation of accounts, are given two times each year. To communicate with our shareholders, management directions, policy and settlements are reported in the *C’s Mail* Investor’s newsletter, issued quarterly. For international investors, we produce our English language annual report, fact book, and *Close-Up* newsletter. This material is also available on the Internet.



Investor newsletter *C’s Mail* and English-language *Close-Up*



Annual report and fact book

Social Contribution

From the start of our business, community activities centered around our oil refineries have been an important endeavor; from 1992, directed by the Public Relations Office, this has expanded to a broad range of social contribution activities. In general, these are long-term, ongoing activities which are not influenced by business results and which draw on our employees' participation. Our goal is to reflect the originality of our company in three major areas: the automotive society, environmental protection and international contribution. A special feature of our social activities is that most are centered on the environment.

Corporate Activities

KIDS Disneyland Project (May)

Support for project for disabled children

Ashinaga P Walk (May and October)

Support of program for children orphaned by illness, disaster or suicide

The Eighth Cosmo Waku Waku Camp (August)

Cosmo Oil-administered group for children who have lost parents in traffic accidents

Support for Wheelchair Soccer Tournament (August)

Promotion and support of disabled sporting event

Minato Net Event (October)

Event for visually impaired at Tokyo Tower, promoting local interchange and understanding of the physically challenged

UNICEF Foreign Coin Classifying Event (October)

International contribution

2001 Calendar for Miyakejima Evacuees, others (November)

Support for evacuees from volcanic activity

Fourth Cosmo Christmas Concert (December)

Cultural event supporting disabled children

Miyakejima Christmas Charity Concert (December)

Support for Miyakejima volcano evacuees

Japan Virtuoso Symphony Orchestra Concert (March)

Cultural event supporting the environment

Invitation of Welfare Facility Residents (ongoing)

Support for the physically handicapped

Distribution of SS Order Card to Hearing Impaired (ongoing)

Support for the hearing impaired



Christmas Charity Concert, supporting evacuees from Miyakejima volcanic eruptions



Support for the Japan Virtuoso Symphony Orchestra

Social Contribution Activities by Oil Refinery

Chiba Oil Refinery

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

Yokkaichi Oil Refinery

Cleaning outside refinery, junior soccer school, women's softball tournament, etc.

Sakai Oil Refinery

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

Sakaide Oil refinery

Sport promotions, softball tournament, etc.



Cleaning project outside of Chiba Oil Refinery



Junior soccer school, Yokkaichi Oil Refinery

Employee Activities

KIDS Disneyland Project (May)

Employee participation in disabled children's project

Ashinaga P Walk (May and October)

Employee participation in program for children who have lost parents in traffic accidents

UNICEF Foreign Coin Classifying Event (October)

Employee participation in international contribution event

Employee Volunteer Group Participation in Miyakejima Refugee Event (November)

Disaster relief

Collection of used stamps, telephone cards and postcards (ongoing)

International contribution

Contribution of clothing and goods to bazaars (ongoing)

Welfare activity



Ashinaga P Walk 10, educational and support group for children orphaned by illness, disaster or suicide



Cosmo Waku Waku Camp, a two-day, three-night nature experience program for elementary schoolchildren who have lost parents in traffic accidents, with Cosmo Oil employees as staff



UNICEF Foreign Coin Classifying Event

Customers, the Community and Our Employees

Activities for Our Customers

Cosmo Oil works to respond as quickly as possible to the inquiries and opinions of its customers. Along with establishing a toll-free service phone line, this also includes card member services accessible through our Internet site (www.cosmo-oil.co.jp), email, facsimile and postal correspondence services. We try to respond immediately to all inquiries and comments received by telephone, email, mail and fax, then collect, consolidate and manage the data at the Customer Center. This allows for the immediate use of customer feedback in the sharing of information, intra-office service and environmental maintenance.

New Telephone Center for Rapid Handling of Customer Comments

In October, 2000, Cosmo Oil established the new Cosmo Customer Center for the handling of customer inquiries and comments.

The Center provides a toll-free number for customers, and makes every effort to satisfactorily respond to customers during the call.

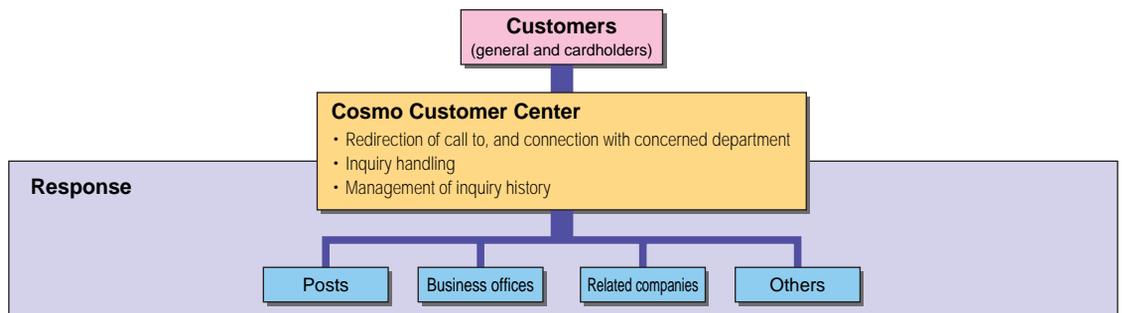
Previously, only card members could contact the Card Center or the toll-free Cosmo Answer Center with questions or comments; other customers were referred to company headquarters and branches. With the opening of the Cosmo Customer Center, we can handle customer contact and provide rapid feedback.

From the opening of the Customer Center to March of 2001, an average of 120 questions and comments have been received monthly.

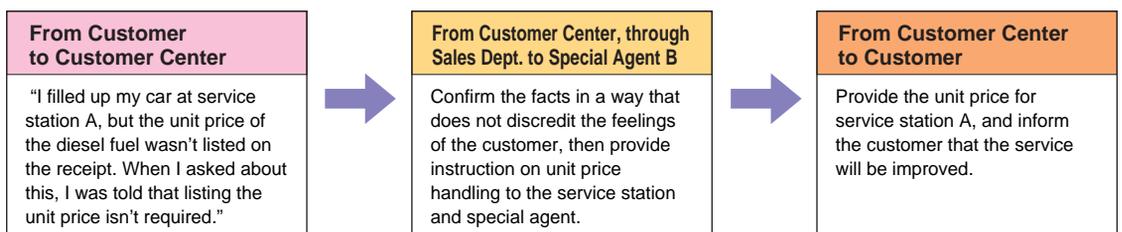
This has allowed for customer comments on service stations to be directed through the Center to the responsible section, then directly to the management of the special agency, greatly improving response to the customer's inquiry.

Email response through the company website

A contact email address was established at the Cosmo Oil's website, www.cosmo-oil.co.jp, which, from October, 2000 to March, 2001, received an average of 50 customer questions and comments a month. As with telephone contact, customer email is handled as quickly as possible by the relevant department in the company. For both the company and the customer, email provides a low-cost form of communication, and one which we put on the same level of importance as the telephone.



Examples



Exchange with the Local Community

Before any major new facility installation at our oil refineries, we not only carry out an environmental assessment as required by Ministry of the Environment regulations, but also work to set up a dialogue with the people of the area so that their opinions can be incorporated as well.

We also work to build an active exchange with the community through area cleaning, sport schools and tournaments, open houses at the facilities, and other activities.

The service stations also work to build good communications with their communities, taking part in meetings of local organizations and neighborhood groups, cleaning roads surrounding the service station, and removing snow.

Personnel System

The goal of personnel management is to build a foundation for the company in a Cosmo Oil network that is truly valued by the customer.

The root of the personnel system is "management by goal"—managers and staff talk until understanding is reached, establish the business goal, and carry out work toward the achievement of the goal with a sense of independence. A flexible promotion system has been established, with a five-step, simple grading system where clear standards for goal achievement are set, where evaluation is based not only on results and achievements but also the process made, and that a fair, interview-based evaluation decision is made.

To develop the talents of the people who create the foundation of the company, our stress is on career building, respecting the individuality of the employee. A suitable job path is established early-on with later clarification processes, programs to enhance abilities, educational programs, and the open, application for new business areas.

Sexual Harassment Training as a Part of Human Rights Training

The progress of internationalization raises the value of the company; in this new era the respect for human rights must be maintained and developed. Our training and educational activities are aimed at developing people who can contribute widely to society in this way. From 1999, as part of our human rights training and reflecting the revision of the Law on the Securing of Equal Opportunity and Treatment Between Men and Woman in Employment, sexual harassment training is now a requirement for all employees.

In labor agreements and office regulations, sexual harassment clauses have been added, and consultation centers set up in major business offices.

Safety and Health

Oil refineries are highly industrial production centers, so we are actively tackling the issues of safety by bringing together Cosmo Oil employees and employees from affiliated companies. To prevent worker accidents, danger forecasting, research into accident causes and examination of the accident recurrence prevention plan are carried out, and a variety of programs to raise the awareness of all employees are being developed.

A reflection of these efforts was seen in March, 2001, as the Chiba Oil refinery became number one in the petroleum industry for worker-accident-free hours—13.57 million worker hours, and still counting.

In health, periodic employee health checks are conducted by physicians who visit the oil refineries, with follow-ups as necessary. The health insurance association system also provides for the medical examination of employee families as well.

Economic Performance

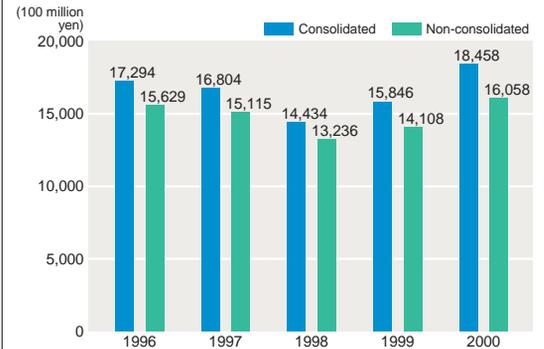
The year 2000 saw the reduction of margins as competition in the domestic petroleum product market increased and crude prices rose. Along with the effect of a depreciated yen, these made for very tough conditions for the petroleum industry. This was reflected at Cosmo Oil in two new themes for management in its ongoing efforts to increase the value of the company: the realization of a Cosmo network with the strongest cost competitiveness in the industry, and the realization of a Cosmo network which is truly embraced by its customers.

In non-consolidated operating results, the influence of rising crude oil prices during the year, while a plus for earnings, came with the rationalization of consumption and improved market conditions which, with a change of inventory valuation, increased profit. In consolidated results, this was reflected in increased profits of the Crude Oil Development Division, combining favorable achievements resulting from the rise in crude oil prices with the increased efficiency resulting by the Division joining with the Sales Division.

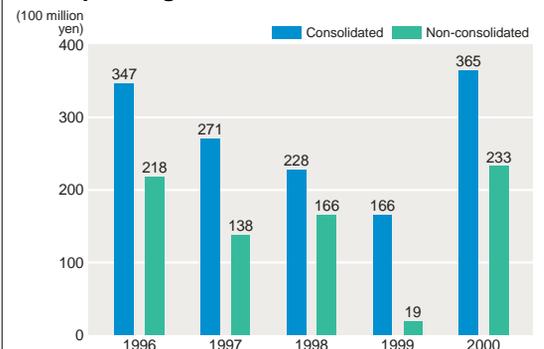
In assets, the securitization of Service Station property and the sale of assets, part of a policy to contain investment, resulted in a slimming of the balance sheet. The improvement of capital efficiency is driving the enhancement of company value.

In plant and equipment investment, within the limits of depreciation expenses, the basic emphasis in investment is on environmental preservation and operation safety.

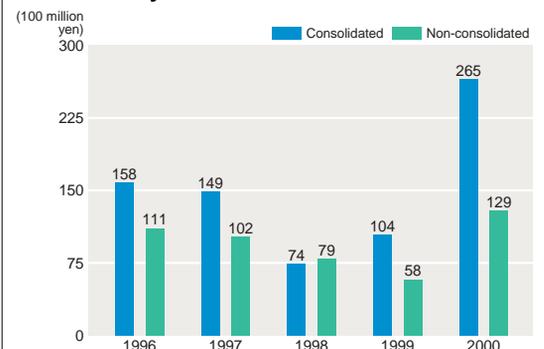
Net Sales



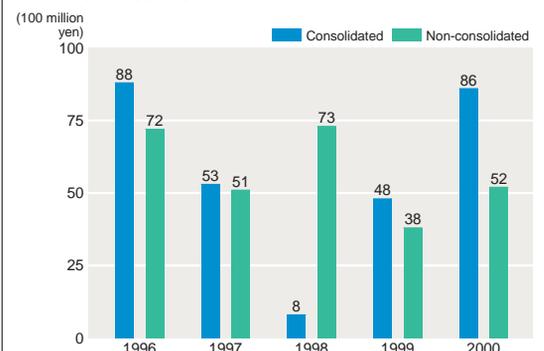
Operating Profit



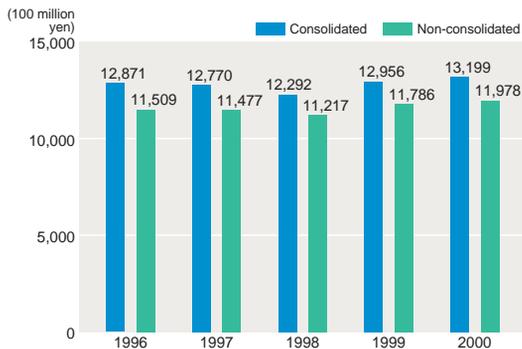
Ordinary Profit



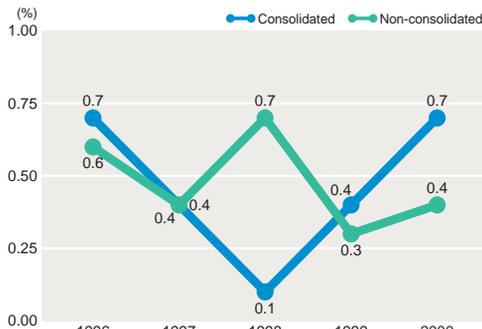
Net Income



Total Assets

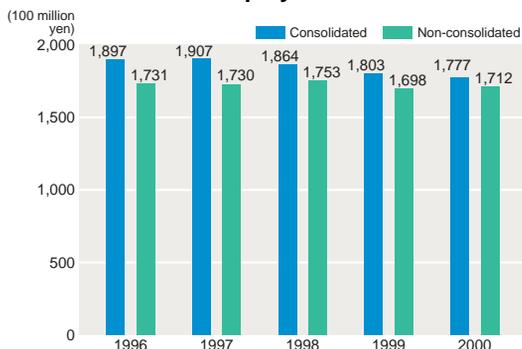


Return on Assets (ROA)

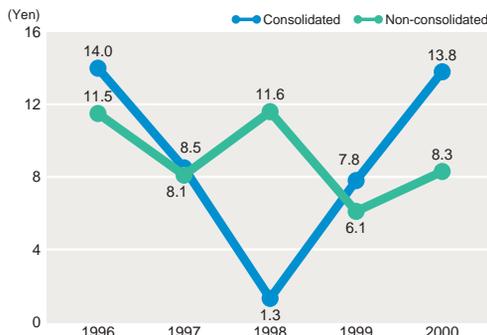


Return on Assets = current net income/total assets

Shareholders' Equity

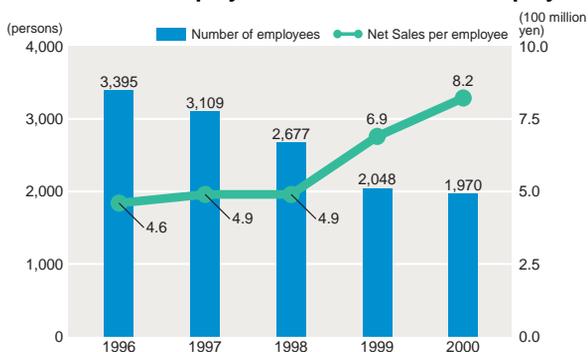


Earnings per Share



Earnings per Share = current net income/number of shares outstanding

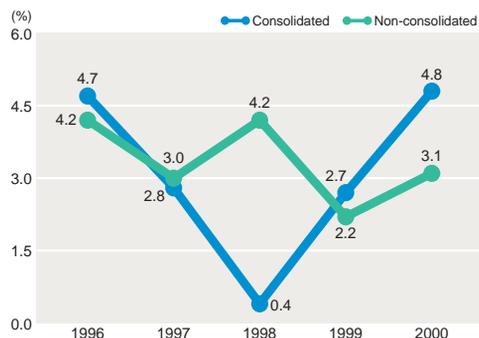
Number of Employees and Net Sales Per Employee



Dividends and Dividend Payout

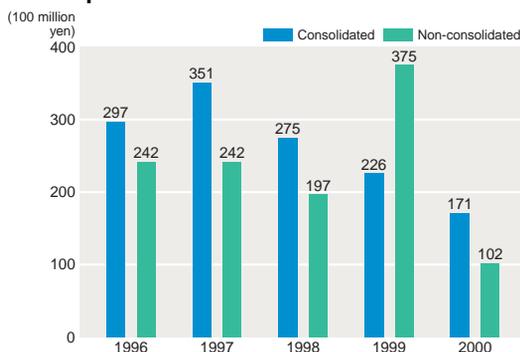


Return on Equity (ROE)



Return on Equity = current net income/shareholders' equity

Capital Investment



Chiba Oil Refinery

Address: 2 Goi-Kaigan, Ichihara-shi,
Chiba-ken
Start of operations: February, 1963
Area: 1,217,835m²
Employees: 412
Crude oil processing capacity: 240,000
barrels/day (as of March, 2001)



Regulated materials

	Material	Regulation	Regulation contents	Regulation value	Actual results	
					Maximum	Average
Air related	NOx (m ³ /hour)	Pollution Prevention Agreement	Total volume regulation	141.1	113.6	82.0
	SOx (m ³ /hour)	Pollution Prevention Agreement	Total volume regulation	189.7	137.1	102.1
	Dust (boiler) (g/m ³)	Pollution Prevention Agreement	Concentration regulation	0.07	0.036	0.027

	Material	Regulation	Regulation contents	Regulation value	Actual results	
					Maximum	Average
Water related	COD (kg/day)	Pollution Prevention Agreement	Total volume regulation	199	154	76.6
	" (mg/L)	Prefectural regulation	Concentration regulation	25	4.4	3.7
	SS (mg/L)	Prefectural regulation	Concentration regulation	50	8.6	5.1
	Oil content (mg/L)	Prefectural regulation	Concentration regulation	3	0.7	0.6
	Nitrogen (mg/L)	Prefectural directive	Concentration regulation	(10)	1.6	1.0
	Phosphorus (mg/L)	Prefectural directive	Concentration regulation	(1)	0.13	0.09
	Phenol (mg/L)	Prefectural regulation	Concentration regulation	0.5	Below lower measurement limit	

Figures in parentheses = daily average

Environmental performance

	Volume used/volume discharged	Basic unit		
Energy	656,655(crude oil kL/year)	9.25(crude oil kL/1,000kL)	Quantity of industrial waste generated	28,771 (tons/year)
CO ₂	1,930,591(CO ₂ tons/year)	27.2(CO ₂ kg/kL)	Quantity of industrial waste recycled	5,174 (tons/year)
SOx	2,551(tons/year)	35.95(g/kL)	Quantity of industrial waste disposed	669 (tons/year)
NOx	1,474(tons/year)	20.77(g/kL)	PRTR (atmospheric release) benzene	1.1(tons/year)
COD	28(tons/year)	0.39(g/kL)	PRTR (atmospheric release) toluene	3.9(tons/year)
			PRTR (atmospheric release) xylene	1.6(tons/year)
			PRTR (atmospheric release) ethyl benzene	0.4(tons/year)
			PRTR (recycling) volume of industrial waste recycled	238.7(tons/year)

Environmental accounting

Item	Environmental protection cost			Item	Environmental protection effect	
	Cost	Investment	Fiscal-year-end acquisition costs		Reduction of environmental impact	Concentration/basic unit
0 Product environmental impact reduction costs	14,538	662	27,456	0 Effectiveness of reduction of product environmental impact		
Heavy fuel oil sulfur reduction	10,024	513	15,347	Product sulfur reduction	(Latent SOx, tons) (Sulfur content, %)	
Diesel fuel sulfur reduction	2,149	68	7,219	Gasoline	249	0.0076
Removal of lead from gasoline	1,602	81	2,872	Kerosene	113	0.0043
				Diesel fuel	5,830	0.1592
					(kL)	(%)
Benzene reduction in gasoline	763		2,018	Benzene reduction in gasoline	97,215	4.3307
1 Business area costs	3,602	241	9,526	1 Effect within business area	(t)	(g/kL)
				SOx emissions	99	1.92
				NOx emissions	166	1.99
				Benzene emissions	0.7	0.01
				COD displacement	3.7	0.05
					(1,000 tons CO ₂)	(kg-CO ₂ /kL)
Pollution prevention costs	1,178	67	5,431	CO ₂ emissions	69.90	0.56
Global environmental protection costs	2,070	16	3,287	(t)		
Resource recycling costs	354	158	808	Industrial waste generated	6,817	
2 Upstream/downstream costs				Reused industrial waste	569	
3 Administration activity costs	29			Industrial waste disposed	116	
4 Research and development costs						
5 Social activity costs	241					
Total	18,410	903	36,982			

(unit: million yen)

Economic Effect (million yen)

Savings through energy reductions (savings through cogeneration) 1,510
Savings through catalyst recycling (reduction of waste management cost) 44

Yokkaichi Oil Refinery

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

Start of operations: July, 1943

Area: 1,330,377 m²

Employees: 346

Crude oil processing capacity: 155,000
barrels/day (as of March, 2001)



Regulated materials

Material	Regulation	Regulation contents	Regulation value	Actual results	
				Maximum	Average
Air related					
NOx (m ³ /hour)	Pollution Prevention Agreement	Total volume regulation	80.8	66.9	36.1
SOx (m ³ /hour)	Pollution Prevention Agreement	Total volume regulation	109.48	62.0	26.0
Dust (boiler) (g/m ³)	Pollution Prevention Agreement	Concentration regulation	0.049	0.044	0.025

Material	Regulation	Regulation contents	Regulation value	Actual results	
				Maximum	Average
Water related					
COD (kg/day)	Pollution Prevention Agreement	Total volume regulation	535	428.7	223.1
" (mg/L)	Water Pollution Control Law	Concentration regulation	160 (120)	7.8	4.7
SS (mg/L)	Water Pollution Control Law	Concentration regulation	200 (150)	8.0	4.1
Oil content (mg/L)	Prefectural regulation	Concentration regulation	1	Below lower measurement limit	
Nitrogen (mg/L)	Municipal guideline	Concentration regulation	15	Below lower measurement limit	
Phosphorus (mg/L)	Municipal guideline	Concentration regulation	1.5	0.11	0.05
Phenol (mg/L)	Prefectural regulation	Concentration regulation	1	Below lower measurement limit	

Figures in parentheses = daily average

Environmental performance

Volume used/volume discharged	Basic unit	Quantity of industrial waste generated	10,350 (tons/year)
Energy 424,961(crude oil kL/year)	10.81(crude oil kL/1,000kL)	Quantity of industrial waste recycled	2,850 (tons/year)
CO ₂ 1,135,404(CO ₂ tons/year)	28.88(CO ₂ kg/kL)	Quantity of industrial waste disposed	899 (tons/year)
SOx 647(tons/year)	16.46(g/kL)	PRTR (atmospheric release) benzene	2.8 (tons/year)
NOx 645(tons/year)	16.41(g/kL)	PRTR (atmospheric release) toluene	3.0 (tons/year)
COD 81(tons/year)	2.06(g/kL)	PRTR (atmospheric release) xylene	1.4 (tons/year)
		PRTR (atmospheric release) ethyl benzene	0.4 (tons/year)
		PRTR (recycling) volume of industrial waste recycled	40.5 (tons/year)

Environmental accounting

Item	Environmental protection cost			Item	Environmental protection effect	
	Cost	Investment	Fiscal-year-end acquisition costs		Reduction of environmental impact	Concentration/basic unit
0 Product environmental impact reduction costs	4,600	853	10,059	0 Effectiveness of reduction of product environmental impact		
Heavy fuel oil sulfur reduction	2,074	791	3,306	Product sulfur reduction	(Latent SOx, tons)	(Sulfur content, %)
Diesel fuel sulfur reduction	733	7	2,045	Gasoline	155	0.0068
Removal of lead from gasoline	1,361	55	2,969	Kerosene	59	0.0049
				Diesel fuel	2,767	0.1560
					(kL)	(%)
Benzene reduction in gasoline	432		1,739	Benzene reduction in gasoline	67,450	4.3550
1 Business area results	3,654	314	8,723	1 Effect within business area	(t)	(g/kL)
				SOx emissions	23	1.17
				NOx emissions	39	0.47
				Benzene emissions	0.7	0.02
				COD displacement	6.8	0.25
					(1,000 tons CO ₂)	(kg-CO ₂ /kL)
Pollution prevention costs	1,285	310	6,553	CO ₂ emissions	34.85	0.07
Global environmental protection costs	2,153	4	2,159	(t)		
Resource recycling costs	216		11	Industrial waste generated	1,316	
2 Upstream/downstream costs				Reused industrial waste	775	
3 Administration activity costs	13			Industrial waste disposed	132	
4 Research and development costs						
5 Social activity costs	364					
Total	8,631	1,167	18,782			

Economic Effect (million yen.)

Savings through energy reductions (savings through cogeneration)	964
Saving through catalyst recycling (reduction of waste management cost)	19

Sakai Oil Refinery

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

Start of operations: October 1968

Area: 1,254,602 m²

Employees: 237

Crude oil processing capacity: 110,000

barrels/day* (as of March, 2001)



*80,000 barrels/day from April, 2001

Regulated materials

	Material	Regulation	Regulation contents	Regulation value	Actual results	
					Maximum	Average
Air related	NOx (m ³ /hour)	Municipal reporting guideline	Total volume regulation	52.9	17.1	9.9
	SOx (m ³ /hour)	Municipal reporting guideline	Total volume regulation	45.6	0.9	0.5
	Dust (boiler) (g/m ³)	Air Pollution Control Law	Concentration regulation	0.05	Below lower measurement limit	

	Material	Regulation	Regulation contents	Regulation value	Actual results	
					Maximum	Average
Water related	COD (kg/day)	Water Pollution Control Law	Total volume regulation	186.8	85.6	51.8
	" (mg/L)	Prefectural regulation	Concentration regulation	15 (10)	9.9	7.1
	SS (mg/L)	Prefectural regulation	Concentration regulation	40 (30)	6.0	Below lower measurement limit
	Oil content (mg/L)	Prefectural regulation	Concentration regulation	2	Below lower measurement limit	
	Nitrogen (mg/L)	Prefectural directive	Concentration regulation	35	6.0	3.0
	Phosphorus (mg/L)	Prefectural directive	Concentration regulation	1.5	0.58	0.19
	Phenol (mg/L)	Prefectural regulation	Concentration regulation	2	Below lower measurement limit	

Figures in parentheses = daily average

Environmental performance

	Volume used/volume discharged	Basic unit		
Energy	243,005(crude oil kL/year)	9.19(crude oil kL/1,000kL)	Quantity of industrial waste generated	4,585 (tons/year)
CO ₂	680,666(CO ₂ tons/year)	25.75(CO ₂ kg/kL)	Quantity of industrial waste recycled	1,003 (tons/year)
SOx	12(tons/year)	0.45(g/kL)	Quantity of industrial waste disposed	509 (tons/year)
NOx	177(tons/year)	6.70(g/kL)	PRTR (atmospheric release) benzene	1.3(tons/year)
COD	19(tons/year)	0.71(g/kL)	PRTR (atmospheric release) toluene	2.0(tons/year)
			PRTR (atmospheric release) xylene	0.8(tons/year)
			PRTR (atmospheric release) ethyl benzene	0.2(tons/year)
			PRTR (recycling) volume of industrial waste recycled	19.3(tons/year)

Environmental accounting

Item	Environmental protection cost			Item	Environmental protection effect	
	Cost	Investment	Fiscal-year-end acquisition costs		Reduction of environmental impact	Concentration/basic unit
0 Product environmental impact reduction costs	5,842	302	20,972	0 Effectiveness of reduction of product environmental impact		
Heavy fuel oil sulfur reduction	1,441	101	1,174	Product sulfur reduction	(Latent SOx, tons) (Sulfur content, %)	
Diesel fuel sulfur reduction	1,066	10	3,137	Gasoline	136	0.0080
Removal of lead from gasoline	3,187	191	15,808	Kerosene	43	0.0059
				Diesel fuel	1,943	0.1585
					(kL)	(%)
Benzene reduction in gasoline	148		853	Benzene reduction in gasoline	52,701	4.5174
1 Business area costs	3,060	33	6,231	1 Effect within business area	(t)	(g/kL)
				SOx emissions	1	0.08
				NOx emissions	26	0.23
				Benzene emissions	0.1	0.00
				COD displacement	0.3	0.06
					(1,000 tons CO ₂)	(kg-CO ₂ /kL)
				CO ₂ emissions	77.38	0.12
					(t)	
				Industrial waste generated	1,024	
				Reused industrial waste	122	
				Industrial waste disposed	123	
2 Upstream/downstream costs						
3 Administration activity costs	9					
4 Research and development costs						
5 Social activity costs	110					
Total	9,021	335	27,203			

Economic Effect (million yen)

Savings through energy reductions (savings through cogeneration)	1,140
Saving through catalyst recycling (reduction of waste management cost)	31

Sakaide Oil Refinery

Address: 1-1 Bannoshu Midori-machi,
Sakaide-shi, Kagawa-ken
Start of operations: October, 1972
Area: 847,943 m²
Employees: 246
Crude oil processing capacity: 140,000
barrels/day* (as of March, 2001)



*120,000 barrels/day
from April 2001

Regulated materials

	Material	Regulation	Regulation contents	Regulation value	Actual results	
					Maximum	Average
Air related	NOx (m ³ /hour)	Pollution prevention memorandum	Total volume regulation	190	62.0	44.0
	SOx (m ³ /hour)	Pollution prevention memorandum	Total volume regulation	164	83.3	59.4
	Dust (boiler) (g/m ³)	Pollution prevention memorandum	Concentration regulation	0.05	0.008	0.006

	Material	Regulation	Regulation contents	Regulation value	Actual results	
					Maximum	Average
Water related	COD (kg/day)	Prefectural regulation	Total volume regulation	120	68.2	40.2
	" (mg/L)	Prefectural regulation	Concentration regulation	15 (10)	6.0	3.6
	SS (mg/L)	Prefectural regulation	Concentration regulation	15 (10)	7.0	3.9
	Oil content (mg/L)	Prefectural regulation	Concentration regulation	2	Below lower measurement limit	
	Nitrogen (mg/L)	Water Pollution Control Law	Concentration regulation	120 (60)	2.0	1.3
	Phosphorus (mg/L)	Water Pollution Control Law	Concentration regulation	16 (8)	0.05	0.03
	Phenol (mg/L)	Prefectural regulation	Concentration regulation	1	Below lower measurement limit	

Figures in parentheses = daily average

Environmental performance

Volume used/volume discharged		Basic unit			
Energy	374,914 (crude oil kL/year)	9.56 (crude oil kL/1,000kL)		Quantity of industrial waste generated	15,120 (tons/year)
CO ₂	1,096,714 (CO ₂ tons/year)	27.97 (CO ₂ kg/kL)		Quantity of industrial waste recycled	1,822 (tons/year)
SOx	1,486 (tons/year)	37.90 (g/kL)		Quantity of industrial waste disposed	190 (tons/year)
NOx	794 (tons/year)	20.25 (g/kL)		PRTR (atmospheric release) benzene	2.5 (tons/year)
COD	15 (tons/year)	0.37 (g/kL)		PRTR (atmospheric release) toluene	6.1 (tons/year)
				PRTR (atmospheric release) xylene	2.7 (tons/year)
				PRTR (atmospheric release) ethyl benzene	0.7 (tons/year)
				PRTR (recycling) volume of industrial waste recycled	68.4 (tons/year)

Environmental accounting

Item	Environmental protection cost			Item	Environmental protection effect	
	Cost	Investment	Fiscal-year-end acquisition costs		Reduction of environmental impact	Decrease of environmental impact
0 Product environmental impact reduction costs	8,375	12	36,302	0 Effectiveness of reduction of product environmental impact		
Heavy fuel oil sulfur reduction	5,162	11	21,289	Product sulfur reduction	(Latent SOx, tons)	(Sulfur content, %)
Diesel fuel sulfur reduction	990		4,475	Gasoline	122	0.0063
Removal of lead from gasoline	1,829	1	9,395	Kerosene	67	0.0048
				Diesel fuel	3,020	0.1608
					(kL)	(%)
Benzene reduction in gasoline	394		1,143	Benzene reduction in gasoline	58,100	4.3793
1 Business area costs	781		9,200	1 Effect within business area	(t)	(g/kL)
				SOx emissions	18	6.46
				NOx emissions	2	3.68
				Benzene emissions	2.8	0.10
				COD displacement	1.2	0.03
					(1,000 tons CO ₂)	(kg-CO ₂ /kL)
				CO ₂ emissions	93.45	2.35
					(t)	
				Industrial waste generated	1,360	
				Reused industrial waste	231	
				Industrial waste disposed	253	
2 Upstream/downstream costs						
3 Administration activity costs	13					
4 Research and development costs						
5 Social activity costs	165					
Total	9,334	12	45,502			

Economic Effect (million yen)

Saving through catalyst recycling (reduction of waste management cost) 37

Others

Cosmo Matsuyama Oil Co., Ltd.

Address: 3-580 Okaga, Matsuyama-shi, Ehime-ken

Start of operations: February, 1944

Area: 532,879 m²

Employees: 121 (as of March, 2001)

Regulated materials

	Material	Regulation	Regulation contents	Regulation value	Actual results	
					Maximum	Average
Air related	NOx (m ³ _N /hour)				20.6	13.1
	SOx (m ³ _N /hour)	Pollution Prevention Agreement	Total volume regulation	208	78.7	48.5
	Dust (boiler) (g/m ³ _N)	Pollution Prevention Agreement	Concentration regulation	0.17	0.06	0.03

	Material	Regulation	Regulation contents	Regulation value	Actual results	
					Maximum	Average
Water related	COD (kg/day)	Law covering special measures to preserve the Seto Inland Sea	Total volume regulation	363.3	32.1	7
	" (mg/L)	Prefectural regulation	Concentration regulation	15 (10)	3.6	3.2
	SS (mg/L)	Prefectural regulation	Concentration regulation	20	4	3
	Oil content (mg/L)	Prefectural regulation	Concentration regulation	2	Below lower measurement limit	
	Nitrogen (mg/L)	Water Pollution Control Law	Concentration regulation	120 (60)	2.2	1
	Phosphorus (mg/L)	Water Pollution Control Law	Concentration regulation	16 (8)	0.33	0.18
	Phenol (mg/L)	Prefectural regulation	Concentration regulation	0.3	Below lower measurement limit	

Figures in parentheses = daily average

Cosmo Research Institute*

Address: 1134-2 Gongendo, Saitama-shi, Saitama-ken

Area: 86,200 m²

Employees: 108 (as of March, 2001)

Regulated materials

	Material	Regulation	Regulation contents	Regulation value	Actual results	
					Maximum	Average
Water related	COD (mg/L)	Water Pollution Control Law	Concentration regulation	160 (120)	19.9	9.1
	SS (mg/L)	Prefectural regulation	Concentration regulation	60 (50)	6	5
	Oil content (mg/L)	Water Pollution Control Law	Concentration regulation	5	2	1
	Nitrogen (mg/L)	Water Pollution Control Law	Concentration regulation	120 (60)	6	5.5
	Phosphorus (mg/L)	Water Pollution Control Law	Concentration regulation	16 (8)	0.9	0.8
	Phenol (mg/L)	Prefectural regulation	Concentration regulation	1	Below lower measurement limit	

Figures in parentheses = daily average

Cosmo Oil Lubricants Co., Ltd.; Cosmo Matsuyama Oil Co., Ltd.; Cosmo Research Institute

Environmental accounting

Item	Environmental protection cost
	Cost
0 Product environmental impact reduction costs Heavy fuel oil sulfur reduction Diesel fuel sulfur reduction Removal of lead from gasoline Benzene reduction in gasoline	319 319 ¹
1 Business area costs Pollution prevention costs Global environmental protection costs Resource recycling costs	
2 Upstream/downstream costs	82 ²
3 Administration activity costs	
4 Research and development costs	1,331 ³
5 Social activity costs	
Total	1,732

Notes on other environmental protection costs:

1: Costs related to raw benzene treatment by Matsuyama Cosmo Oil

2: Costs related to the introduction of environmentally-friendly

lubricating oil raw materials at Cosmo Lubricants

3: Research and development costs at Cosmo Research Institute

Economic Effect (million yen)

Effects of research and development (income from royalties) 50

*From July, 2001
Research &
Development Center

Terminology

Petroleum Refining Facilities

Atmospheric Distillation Unit

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

Vacuum Distillation Unit

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

Hydrodesulfurization Unit

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

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

Diesel Fuel Desulfurization Unit

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

Catalytic Reformer

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

Fluid Cat Cracker

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

Sulfur Recovery Unit

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

Sour Water Treatment Unit

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

Blending Unit

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

Petroleum Product Quality

Octane Number

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

Others

Conversion to Distillates

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

Barrel

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

Steps in Environmental Activities

Cosmo Oil Group		
1986	<p>Cosmo Oil Co., Ltd. established</p> <p>Establishment of the Environment and Safety Control Department at company headquarters, Environmental and Safety Offices at oil refineries</p> <p>Establishment of Environmental Safety Administration Rule and Environmental Safety Countermeasures Headquarters Rule</p> <p>Establishment and execution of yearly safety goals: All-Employee No Accident, No Disaster and Using Originality to Create Environmental Preservation</p> <p>Establishment and execution of yearly environmental safety inspections in oil refineries and oil storage depots, based on environmental safety inspection points</p>	
1987	Completion of the FCC exhaust gas desulfurization unit at Sakai Oil Refinery	
1988	Start of spent grain drying business at Sakai Oil Refinery	
1989		
1990	Completion of cogeneration facilities at Yokkaichi Oil Refinery	
1991	Dispatch of oil spill prevention expert team to the Persian Gulf	
1992	<p>Installation of atmospheric distillation flue gas denitration unit at Sakai Oil Refinery</p> <p>Installation of spent grain drying unit at Chiba Oil Refinery</p>	
1993	<p>Decision on Global Environment Action Program and submission to the Ministry of International Trade and Industry</p> <p>Establishment of the Global Environment Committee, enactment of Global Environmental Committee rules</p>	
1994	<p>The First Global Environment Committee (Action Group) meeting is held, to be held annually thereafter</p> <p>Environment Inspection Point safety inspection system enacted (abolition of former points)</p> <p>Establishment of annual "Challenging Global Environmental Problems" goals</p> <p>Introduction and execution of annual environmental inspection of oil refineries and oil storage depots, based on environmental inspection points</p> <p>Completion of diesel fuel desulfurization unit at Chiba Oil Refinery</p>	
1995	<p>Completion of cogeneration facilities at Sakai Oil Refinery</p> <p>Sakai Oil Refinery receives Director-General's National Resources and Energy Award for excellent industrial energy management</p> <p>Introduction of industry-first 24-kiloliter tank truck</p> <p>Comprehensive Disaster Countermeasures Rule and Detailed Comprehensive Disaster Countermeasures Rule enacted (superceding previous rule and detailed regulations)</p>	
1996	<p>Environmental action plans follow-up result report prepared and submitted to the Ministry of International Trade and Industry</p> <p>Certification to ISO 9002 at Sakaide Oil Refinery and Chiba Oil Refinery</p> <p>Completion of cogeneration facilities installation at Chiba Oil Refinery</p> <p>Completion of diesel fuel desulfurization unit at Sakai Oil Refinery</p>	 <p>Diesel fuel desulfurization unit</p>  <p>SQ product quality mark</p>
1997	<p>In response to a major oil spill on the Japan Sea coast by the Russian tanker <i>Nakhodka</i>, the Nakhodka Oil Spill Support Team was established</p> <p>Certification to ISO9002 at Sakai Oil Refinery, Yokkaichi Oil Refinery, and Cosmo Matsuyama Oil Co., Ltd.</p> <p>Certification to ISO14001 at Sakaide Oil Refinery</p> <p>Start of environmental impact assessment at Cosmo Oil's Yokkaichi Kasumi Electric Power Plant (IPP)</p> <p>Sakaide Oil Refinery receives Energy Conservation Center Chairman's Prize</p>	 <p><i>Nakhodka</i> oil spill, Fukui, Japan</p>
1998	<p>Introduction of double-hull charter tanker</p> <p>Certification to ISO14001 at Chiba Oil Refinery, Yokkaichi Oil Refinery, Sakai Oil Refinery and Cosmo Matsuyama Oil Co., Ltd.</p> <p>Completion of gasoline benzene reduction unit</p> <p>Completion of No. 2 atmospheric distillation unit heating denitrification unit at Chiba Oil Refinery</p>	
1999	<p>Sales begin of Terra series of biodegradable lubricating oil</p> <p>Sales begin of Shinsei non-chlorine diesel engine oil</p>	
2000	<p>Start of full-scale development of oil-based fuel cell</p> <p>Sakaide Oil Refinery receives Director-General's National Resources and Energy Award</p> <p>Opening of Cosmo Customer Center</p> <p>Enactment of industrial waste management rule</p>	

Petroleum Industry

Society

Law of Import Restriction on Specific Petroleum Products enacted

Adoption of the Montreal Protocol, a treaty for the protection of the ozone layer

Exxon Valdez oil spill, Alaska



Gulf War begins
Massive oil spills in the Persian Gulf
Decision on Keidanren Global Environmental Charter

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

Reduction of sulfur content in diesel fuel to less than 0.2 percent

Adoption of United Nations Framework Convention on Climate Change
United Nations Conference on the Environment and Development (Global Summit) held
Request for preparation of Ministry of International Trade and Industry Environmental Voluntary Plan

Basic Environment Law enacted

The United Nations Framework Convention on Climate Change in effect
Cabinet decision on Basic Environment Plan



Large tanker truck, 15 meters long, 24 kiloliter capacity

The First Conference of the Parties to the United Nations Framework Convention on Climate Change (COP1) is held (Berlin)
The Great Hanshin-Awaji Earthquake

Petroleum Association of Japan enacts the Management Plan Concerning Harmful Air Pollutants Independent Management Plan
Law of Import Restriction on Specific Petroleum Products enacted repealed
Reduction of benzene content in gasoline to less than five percent

ISO 14001 environmental management standard enacted
The Second Conference of the Parties to the United Nations Framework Convention on Climate Change (COP2) is held (Geneva)
Enforcement of Law on the Quality Control of Gasoline and Other Fuels
Decision on Keidanren Appeal on Environment – Declaration on Voluntary Action of Japanese Industry Directed at Conservation of Global Environment in the 21st Century



Greenhouse gas reduction consultation at COP3, Kyoto

Reduction of sulfur content in diesel fuel to less than 0.05 percent
The Petroleum Association of Japan enactment of the Petroleum Industry Global Environmental Protection Independent Action Plan

Nakhodka oil spill
Amendment of Law concerning Rational Use of Energy
Amendment of Waste Disposal and Public Cleansing Law
Revision of Electric Utilities Industry Law related Environmental Impact Assessment Law
Partial revision of enforcement of Air Pollution Control Law
Decision on The Self-Active Action Program for Global Environmental Conservation by the Petroleum-Association of Japan-related Keidanren Appeal on Environment
The Third Conference of the Parties to the United Nations Framework Convention on Climate Change (COP3) is held (Kyoto)

Suspension of ban on self-serve service stations



Self-service Cosmo Oil service station

Decision outline for promotion of efforts to prevent global warming
Proclamation of Law Concerning the Promotion of the Measures to Cope with Global Warming
The Fourth Conference of the Parties to the United Nations Framework Convention on Climate Change (COP4) is held (Buenos Aires)

First Follow-up of Keidanren Voluntary Action Plan on the Environment
Proclamation of Law Concerning Reporting of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (The PRTR Law)
Proclamation of Law Concerning Special Measures against Dioxins
Fifth Conference of the Parties to the United Nations Framework Convention on Climate Change (COP5) is held (Bonn)

Based on the Air Pollution Control Law and Quality Control of Gasoline and Other Fuels, benzene levels in gasoline are reduced to less than one percent

Sixth Conference of the Parties to the United Nations Framework Convention on Climate Change (COP6) is held (The Hague)
Proclamation of Basic Law for Establishing the Recycling-Based Society
Proclamation of the Law on Promotions Green Purchasing
Amendment to Waste Disposal and Public Cleansing Law

Independent Review Report of the 2001 Environmental Report



Independent Review Report on the "Cosmo Oil Environmental Report 2001"

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 2001" (the "Environmental Report") of Cosmo Oil Co., Ltd. (the "Company") for the year ended March 31, 2001. 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 first year of our review, any indicators for years prior to the year ended March 31, 2001 were not subject to these procedures.

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

2. Procedures Performed

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

- 1) Obtained the environmental information supporting the environmental performance indicators and the environmental accounting indicators for the purpose of understanding the processes and the procedures of the Company for collecting the data information used to compile the Environmental Report.
- 2) With respect to the environmental performance indicators and the environmental accounting indicators in the Environmental Report, tested quantitative accuracy of the indicators on a sample basis and compared them on a sample basis with the supporting data compiled from the information collected by the Company.
- 3) With respect to the descriptive information in the Environmental Report other than the indicators referred to in the above procedures, interviewed the Company's responsible personnel, made on-site inspections of a refinery and compared such descriptive information with the data collected by the Company or the data found in certain published materials.

3. Results of the Procedures Performed

As a result of the procedures performed;

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

Tokyo, Japan
August 22, 2001

Editorial Postscript

Cosmo Oil released its first Environmental Report in 1999, officially disclosing its environmental actions in that report. This year, as a result of our major actions on environmental issues during 2000, we are issuing this Cosmo Oil Environmental Report 2001.

In our environmental reporting, we have made every effort to concretely and comprehensively disclose our environmental efforts. Since this is the first full-scale version, we understand that there are many areas which can further be developed, and which we will address with improvements in coming editions.

Cosmo Oil's environmental activities are an ongoing, continuously developing process. The release of this Environmental Report is just one step in this process, as we continue to engage in more effective environmental protection activities and enhance our environmental consciousness. The Environmental Report serves both as a communication tool with society and also as a tool for us to systematically consider our own activities.

For questions and comments about the Environmental Report, please contact:

Cosmo Oil Co., Ltd.

Environment Affairs Office

Tel: +81-3-3798-3222

Fax: +81-3-3798-3103

Internet: <http://www.cosmo-oil.co.jp>