

# Environmental Report

## Fourth Consolidated Medium-Term Environmental Plan

The Cosmo Oil Group launched its first initiatives under its Consolidated Medium-Term Environmental Plan in fiscal 2002. In fiscal 2010, the Group introduced its Fourth Consolidated Medium-Term Environmental Plan based on the following policies: respond strategically to prevent global warming while ensuring continuation of business, reduce environmental impact, and promote environmental contribution activities.

### Fiscal 2010 Initiatives and Results under the Fourth Consolidated Medium-Term Environmental Plan

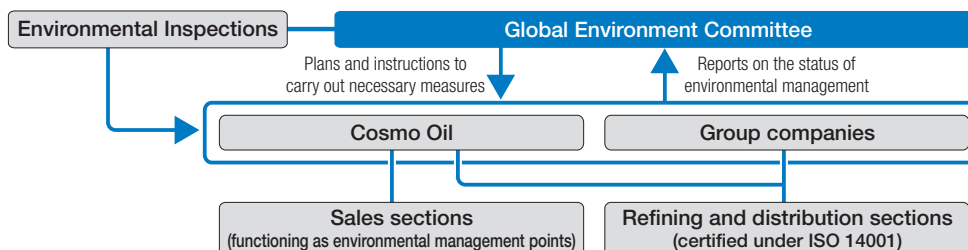
Degree of achievement: ○ Achieved △ Partially achieved × Not achieved

Themes		Fiscal 2010 Goals	Fiscal 2010 Results	Achievement of Goal
Respond strategically to prevent global warming while ensuring continuation of business	Reduce CO <sub>2</sub> emissions	Make progress toward fiscal 2012 goal (reduce CO <sub>2</sub> by 220 kilotonnes per year compared to level before implementation of measures) (1) Reduce CO <sub>2</sub> in business areas (energy savings in refineries, bio-gasoline, etc.) (Anticipated reduction of 88 kilotonnes) (2) Develop wind power generation business (equivalent to reduction of 146 kilotonnes of CO <sub>2</sub> ) (3) Conduct environmental technology development and commercialization study aimed at future CO <sub>2</sub> reductions	Reduced CO <sub>2</sub> by about 240 kilotonnes (1) Reduced CO <sub>2</sub> by about 96 kilotonnes (2) Reduced CO <sub>2</sub> by 140 kilotonnes from wind power generation business (3) Conducted environmental technology development and commercialization study aimed at future CO <sub>2</sub> reductions	○
	Manage greenhouse gas emissions	Control the volume of greenhouse gas emissions in manufacturing, product transport and storage processing as well as in offices and the R&D Center	<ul style="list-style-type: none"> <li>Continued to control the volume of greenhouse gas emissions in the specified areas</li> <li>Compiled a report on greenhouse gas emissions pursuant to Japan's Energy Conservation Act and Global Warming Prevention Act</li> </ul>	○
Reduce environmental impact	Identify environmental risks that may arise at times of normal operations and times of irregular operations; implement response measures for each	<ul style="list-style-type: none"> <li>Consider precautions for times of normal operations and times of irregular operations in which there is no leeway in regulation and agreement values at refineries</li> </ul>	<ul style="list-style-type: none"> <li>Identified 10 risks and considered precautions (Precautions completed for one risk and under ongoing consideration for 9 risks)</li> </ul>	○
	Reduce industrial waste	<ul style="list-style-type: none"> <li>Final disposal rate: less than 0.5% for Cosmo Oil, less than 5.0% for entire Group</li> <li>Introduce electronic manifests</li> </ul>	<ul style="list-style-type: none"> <li>Final disposal rate: 0.5% for Cosmo Oil, 2.9% for entire Group</li> <li>Conducted survey aimed at introduction of electronic manifests at refineries without them during current medium-term plan</li> </ul>	○
	Enhance internal/external audits for thorough environmental management	<ul style="list-style-type: none"> <li>Continue ISO internal/external audits and environmental inspections in each workplace</li> </ul>	<ul style="list-style-type: none"> <li>Conducted internal/external audits and environmental inspections; environmental management was generally good</li> <li>One legal/regulatory violation (related to air); reported to local authorities; corrective action taken</li> </ul>	△
	Adopt rigorous measures to ensure soil preservation	<ul style="list-style-type: none"> <li>Continue environmental monitoring and facilities management at refineries, oil depots, and Cosmo Oil service stations</li> <li>Take actions according to equipment renovations and complete soil environment surveys at Cosmo Oil service stations with outdated equipment</li> </ul>	<ul style="list-style-type: none"> <li>Cosmo Oil service stations: Took actions as planned (surveys at 64 service stations, cleanup at 28 service stations, of which measures completed at 19 service stations)</li> <li>Refineries: Actions being taken in sequence</li> </ul>	○
	Promote Eco Office activities	<ul style="list-style-type: none"> <li>Conduct energy- and resource-saving actions throughout the Cosmo Oil Group</li> </ul>	<ul style="list-style-type: none"> <li>Achieved goals to a large extent for copy paper and fuel consumption of company vehicles</li> <li>Did not achieve goal for electricity use in offices, as air conditioner use increased with heat waves (goal achieved for Cosmo Oil alone)</li> </ul>	△
	Promote green purchasing	<ul style="list-style-type: none"> <li>Reconsider specified items (office supplies) and purchase 100% from selected specified items at each Group company</li> </ul>	<ul style="list-style-type: none"> <li>Practiced 100% green purchasing of specified items at each Group company</li> </ul>	○
Promote environmental contribution activities	Promote environmental communication	<ul style="list-style-type: none"> <li>Promote environmental contribution activities through Cosmo Oil Eco Card Fund</li> </ul>	<ul style="list-style-type: none"> <li>Continued supporting 11 projects and decided to support four new projects</li> </ul>	○
	Protect biodiversity	<ul style="list-style-type: none"> <li>Survey impact on biodiversity in business area and establish initiative policy</li> <li>Conduct initiatives to protect public woodlands near workplaces</li> <li>Conduct projects through the Cosmo Oil Eco Card Fund with the aim of protecting biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>Measured impact on biodiversity in business areas</li> <li>Conducted a total of six initiatives to protect public woodlands near workplaces</li> <li>Conducted projects through the Eco Card Fund with the aim of protecting biodiversity (Qin Ling Mountains Forest and Ecosystem Recovery Project, Seed Planting School, and support for South Pacific nations)</li> </ul>	○

## Cross-Sectional Environmental Management Structure

The Cosmo Oil Group has established a unique environmental management system centered on the Global Environment Committee, a body that cuts across the Group and departments. The Global Environment Committee drafts the Consolidated Medium-Term Environmental Plan, reports on and evaluates plan results, and provides feedback to specified departments. Through this structure the Group encourages all employees to voluntarily engage in environmental action and shares actions taken throughout the Group, from the front lines to the management level.

### Environmental Management System



## Environmental Management Systems Based on ISO 14001 in Each Workplace

The Cosmo Oil Group has obtained ISO 14001 certification at 10 workplaces, including four refineries, focusing on workplaces with a large environmental impact. Each workplace has incorporated the Consolidated Medium-Term Environmental Plan into its business objectives and is taking initiatives aimed at accomplishing goals systematically. Additionally, the Group periodically checks to see if the system is functioning reliably by performing internal audits and external audits by certification bodies to verify that actions are taken in accordance with the PDCA cycle.

### Workplaces with ISO Certification

Workplace	Date certified	Workplace	Date certified
Sakaide Refinery	June 1997	Cosmo Oil Lubricants Co., Ltd. Shimotsu Plant	June 2003
Chiba Refinery	March 1998	Cosmo Kaiun Co., Ltd.	August 2003
Yokkaichi Refinery	March 1998	Cosmo Oil Lubricants Co., Ltd. Osaka Plant	October 2003
Sakai Refinery	March 1998	Yokkaichi LPG Terminal	September 2006
Cosmo Matsuyama Oil Co., Ltd.	December 1998	Research & Development Center	December 2006

## Saving Energy in Distribution Divisions

In fiscal 2010, unit energy consumption in the transport<sup>1</sup> sector at Cosmo Oil alone was 8.76 kiloliters/million tonne-kilometers (kl/Mt-km), a 0.09 kl/Mt-km improvement over the previous fiscal year. The Company engaged in the transport of 6,139 Mt-km of freight, which is a reduction to 98.4% of the volume transported in the previous fiscal year. Energy usage was 53,757 kiloliters of crude oil equivalent, which is a bigger reduction to 97.4% of the amount used in the previous. This resulted in a reduction of unit energy consumption.

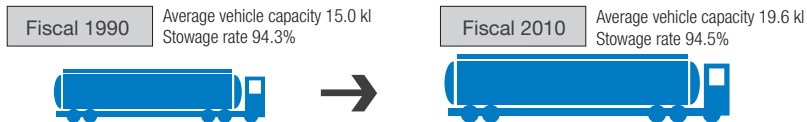
The Cosmo Oil Group continues to implement energy conservation initiatives in ground transport by utilizing large tanker trucks and maintaining high stowage rates by consolidated loading. The transport volume per vehicle stood at 17.85 kiloliters per delivery, an improvement of 0.3 kiloliters per delivery, year on year. Unit energy consumption was 36.42 kl/Mt-km, an improvement of 0.52 kl/Mt-km over the previous year. Real energy usage (diesel) also declined, to 96.3% of the previous year. To further conserve energy, the Group will focus on systematic delivery, one-stop unloading and other means of raising efficiency.

The Group also continues to focus on the use of large coastal tankers and maintaining high stowage rates for marine transport activities. Unit energy consumption in marine transport was 6.14 kl/Mt-km, an improvement of 0.05 kl/Mt-km year on year. In fiscal 2011, Cosmo Oil will continue its efforts in using large coastal tankers and improving stowage rates.

1. Unit energy consumption in transport (kiloliters/million tonne-kilometer) is calculated by energy consumption (kiloliters of crude oil equivalent) divided by cargo tonne-kilometers (weight in tonnes of material transported multiplied by the number of kilometers transported).

### Average Capacity and Stowage Rate

#### Tanker trucks for white oil



#### Coastal tankers



## Eco Office Activities

The Cosmo Oil Group conducts “Eco Office” activities to reduce the amount of copy paper used, the amount of fuel consumed by company vehicles and the amount of electricity consumed at its offices. To attain these overall goals, each and every employee will engage in initiatives to achieve reduction targets set by each workplace. In fiscal 2010, Group companies succeeded in keeping usage under the target levels in each category except the amount of electricity consumed at its offices. The goals for fiscal 2010 were set by multiplying the average performance for fiscal years 2007 to 2009 by the reduction rate.

### Eco Office Activities<sup>1</sup>

Targeted Area	FY2010 Goal		FY2010 Results (Compared to Goal)			
	Cosmo Oil	Group companies	Cosmo Oil		Group companies	
Copy paper (thousand sheets)	13,031	19,122	10,734	-17.6%	18,057	-5.6%
Company car fuel consumption (kl)	281	812	228	-18.9%	713	-12.2%
Office electricity consumption (MWh)	1,016	2,216	1,004	-1.2%	2,348	+6.0%

1. The Team Minus 6% Activities at Offices campaign was renamed Eco Office Activities in fiscal 2010.

## Environmental Impact of Business Activities

**Crude Oil Extraction**

▶ INPUT		◀ OUTPUT	
Energy		Emissions into atmosphere	
Fuel	24,830 TJ	CO <sub>2</sub>	1,384 kt
		SO <sub>x</sub>	19,086 t
		NO <sub>x</sub>	3,062 t

**R&D Center**

▶ INPUT		◀ OUTPUT	
Energy		Emissions into atmosphere	
Fuel	105 TJ	CO <sub>2</sub>	6 kt

**Crude Oil Transport**

▶ INPUT		◀ OUTPUT	
Energy		Emissions into atmosphere	
Fuel	12,183 TJ	CO <sub>2</sub>	832 kt
		SO <sub>x</sub>	18,135 t
		NO <sub>x</sub>	22,465 t

**Offices**

▶ INPUT		◀ OUTPUT	
Energy		Emissions into atmosphere	
Fuel	30 TJ	CO <sub>2</sub>	1 kt

**Refining**

▶ INPUT		◀ OUTPUT	
Raw materials		Water	
Crude oil	25,562 MI	Industrial water	44,132 kt
Others	1,510 MI	Sea water	370,319 kt
Energy		Total energy consumption (TJ)	
Purchased power	4,601 TJ (475,366 MWh)	Fiscal 2008	71,499
Private use fuel	68,757 TJ (1,774 MI of crude oil equivalent)	Fiscal 2009	69,136
		Fiscal 2010	73,358

Emissions into atmosphere		Industrial waste	
CO <sub>2</sub>	5,093 kt	Generated	50,426 t
Private-use fuel	4,452 kt	Recycled	19,013 t
Purchased power	166 kt	Final disposal	272 t
Hydrogen production process	476 kt	PRTR Law designated chemical substances	
SO <sub>x</sub>	5,560 t	Released	227 t
NO <sub>x</sub>	3,005 t	Transferred	51 t
Wastewater		CO <sub>2</sub> emissions (kt)	
Wastewater	381,258 kt (including 370,819 kt of sea water)	Fiscal 2008	4,912
Chemical oxygen demand (COD)	116 t	Fiscal 2009	4,813
Nitrogen	61 t	Fiscal 2010	5,093
Phosphorus	1 t		

**Products**

- Production: 26,101 MI
- Sulfur recovered: 143 kt (by-product)
- Electricity sold: 1,314,994 MWh
- Steam sold: 1,774 TJ
- CO<sub>2</sub> sold: 116 kt

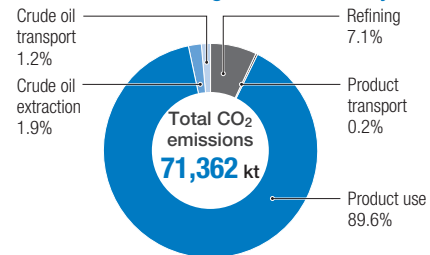
**Product Transport and Storage at Oil Depots**

▶ INPUT		◀ OUTPUT	
Energy		Emissions into atmosphere	
Fuel	2,084 TJ	CO <sub>2</sub>	144 kt
		SO <sub>x</sub>	1,644 t
		NO <sub>x</sub>	3,184 t

**Product Use**

◀ OUTPUT	
Emissions into atmosphere	
CO <sub>2</sub>	63,909 kt
(The figure above does not include CO <sub>2</sub> emissions of 892 kilotonnes attributable to generating electricity sold, and CO <sub>2</sub> emissions of 88 kilotonnes attributable to generating steam sold.)	
SO <sub>x</sub>	114,618 t
CO <sub>2</sub> emissions (kt)	
Fiscal 2008	70,736
Fiscal 2009	65,695
Fiscal 2010	63,909

### CO<sub>2</sub> Emissions Throughout the Oil Lifecycle



- SO<sub>x</sub> and NO<sub>x</sub> figures for "Crude Oil Extraction," "Crude Oil Transport," and "Product Transport and Storage at Oil Depots" are estimated based on LCI for Petroleum Products by Fuel and Environmental Impact Assessment for Petroleum Products, published in March 2000 by the Japan Petroleum Energy Center.
- CO<sub>2</sub> emissions for "Refining" and "Product Transport and Storage at Oil Depots" are calculated in accordance with the Guidelines for Accounting Greenhouse Gas Emissions from the Industry, published by the Japanese Ministry of the Environment and the Ministry of Economy, Trade and Industry.
- See the Environmental Accounting web page in the Cosmo Oil Group website for the methodology and basis of "Product Use" calculations. Energy consumption is calculated in accordance with the stipulations regarding the rational use of energy in the Act on the Rational Use of Energy.
- "Refining" includes data from the Yokkaichi Kasumi Power Station and Cosmo Matsuyama Oil Co., Ltd.
- "Electricity sold" refers to power sold by Chiba Refinery, Yokkaichi Kasumi Power Station, and Cosmo Matsuyama Oil Co., Ltd. CO<sub>2</sub> emissions for "Refining" were calculated after deducting the portion of CO<sub>2</sub> emissions that results from generating electricity sold. Conversely, the purchased power portion of CO<sub>2</sub> emissions is included in "Refining" data.
- "Steam sold" refers to steam sold by the Chiba Refinery and Cosmo Matsuyama Oil Co., Ltd. CO<sub>2</sub> emissions for "Refining" were calculated after deducting the portion of CO<sub>2</sub> emissions that results from generating steam sold.
- CO<sub>2</sub> emissions attributable to the construction of facilities are not included in calculations.
- SO<sub>x</sub> emissions for "Product Use" are included for reference, and were estimated from the sulfur content of products without accounting for sulfur reduction during use. Accordingly, actual SO<sub>x</sub> emissions are lower than the estimate.
- With regard to CO<sub>2</sub> emissions for "Product Use," CO<sub>2</sub> emissions attributable to generating electricity and steam sold are estimated separately.
- CO<sub>2</sub> emissions of 15.7 kilotonnes arising from the fire on the LPG tanks at the Chiba Refinery are included in CO<sub>2</sub> for "Product Use."
- Naphtha used mainly as a petrochemical material does not directly emit CO<sub>2</sub> or SO<sub>x</sub>. However, naphtha is included with other petroleum products when calculating CO<sub>2</sub> and SO<sub>x</sub> emissions for "Product Use."
- "Industrial waste" refers to waste generated during business activities, which includes waste that could be sold.
- Figures given for "Offices" include data from the Cosmo Oil Head Office and branch offices.

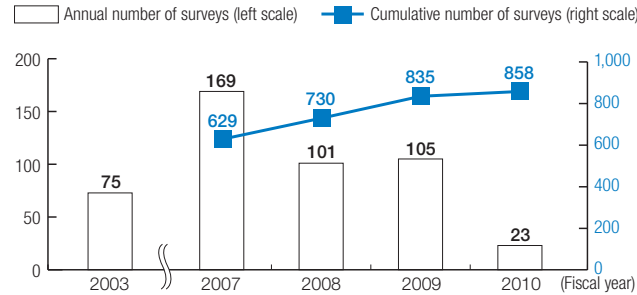
Detailed information Environmental accounting

[www.cosmo-oil.co.jp/eng/csr/accounting/ev\\_accounting.html](http://www.cosmo-oil.co.jp/eng/csr/accounting/ev_accounting.html)

## Reducing Environmental Risk in Soil

To reduce the risk of soil contamination occurring, particularly from a petroleum leak at service stations, the Cosmo Oil Group takes preventative measures and works to minimize impact on the surrounding environment in the case of spills and leaks. In fiscal 2010, surveys were conducted at 64 service stations in conjunction with equipment renovations carried out at service stations owned by Cosmo Oil (of these, surveys at 23 stations were new). Work was conducted on risk countermeasures at 28 service stations, including those that were still on-going from the previous fiscal year, and completed at 19 stations. These surveys and countermeasures, recorded as environmental accounting, totaled some ¥560 million. The Company will continue to conduct soil environment surveys at other service stations as they undergo renovations and will keep striving to minimize the risk of soil contamination.

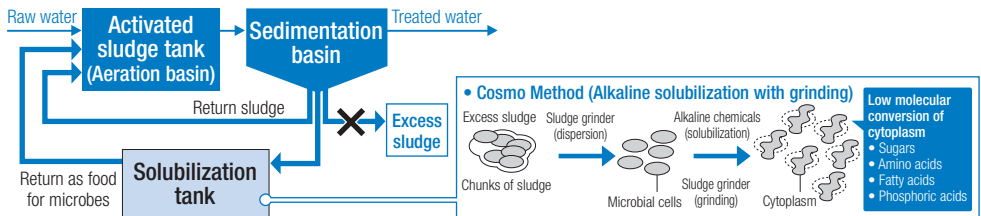
### Number of Soil Surveys at Service Stations Owned by Cosmo Oil



## Reducing Excess Sludge

Excess sludge discharged from wastewater treatment facilities accounts for the largest portion of all industrial waste in Japan.<sup>1</sup> Sludge also makes up approximately 50% of industrial waste generated at Cosmo Oil's refineries, which means that initiatives against excess sludge could translate into the most effective means of waste reduction for the Cosmo Oil Group. The Company has conducted research<sup>2</sup> into technologies for reducing excess sludge generated at refineries and has achieved large reductions in excess sludge at the Chiba Refinery and the Sakaide Refinery.

### Methods for Reducing Sludge

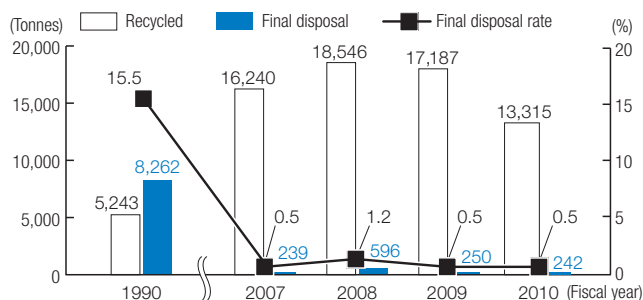


1. According to *State of Discharge and Treatment of Industrial Waste in FY2008* issued by Japan's Ministry of the Environment
2. Research is being carried out as a project supported by the Japan Petroleum Energy Center.

## Striving to Achieve Zero Industrial Waste

In fiscal 2010, the final disposal rate of waste from target companies<sup>1</sup> was 2.9%, achieving one of the Fourth Consolidated Medium-Term Environmental Plan goals. The amount of waste sent for final disposal at Cosmo Oil's four refineries (including Yokkaichi Kasumi Power Station) was 242 tonnes, a 97% reduction from fiscal 1990 and a 0.5% final disposal rate. This fiscal 2010 reduction surpassed the target—94% reduction over fiscal 1990 and a 1.0% or less final disposal rate—set in the voluntary action plan of the Petroleum Association of Japan.

### Volume of Industrial Waste at Four Refineries



1. Target companies include Cosmo Oil Co., Ltd., Cosmo Engineering Co., Ltd., Cosmo Matsuyama Oil Co., Ltd., Cosmo Oil Lubricants Co., Ltd., Cosmo Petroleum Gas Co., Ltd., and Hokuto Kougyo Co., Ltd.