

# Environmental Accounting

The Cosmo Oil Group began environmental accounting in Fiscal 2000, and the practice is now in its 5th year.

In order to create an environmental account, we reference the Ministry of Environment's "Environmental Accounting Guidelines (Fiscal 2005 Edition)" and "Environmental Conservation Cost Categories Guideline 2003 Edition", and tabulated the environmental conservation costs and environmental conservation benefits. In addition, in tabulating the environmental conservation costs, all accounting items in the financial accounts were covered as has been in the past.

The following characteristics must be taken into considering when thinking about the environment in relation to the petroleum industry:

(1) In order to control the substances with environmental impact generated when products are used (at the time of combustion) by the customer, an enormous cost must be incurred (refer to upstream/downstream costs).

(2) Since petroleum products from Middle Easter crude oil are high in sulfur content, a tremendous amount of investment has been made for many years in terms of environmental conservation (refer to year end acquisition costs).

In order to make it possible to ascertain these characteristics in value terms, we created "upstream/downstream costs" accounting items under environmental conservation costs. Furthermore, in order to make it easier to understand the aggregate cost from the past, we also tabulated "year-end acquisition costs".

At the Cosmo Oil Group, we have disclosed the tabulation results of our environmental accounting book in this Sustainability Report, as well as on our website and in our brochure to shareholders. In addition, the tabulate cost data has been used as the calculation basis for our company's contracts during the decision making process.

## Period and Scope

### Calculation Period:

Fiscal 2004 (April 1, 2004 to March 31, 2005)

### Scope of Calculation:

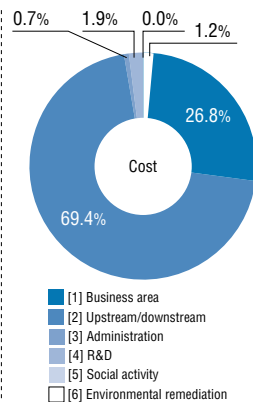
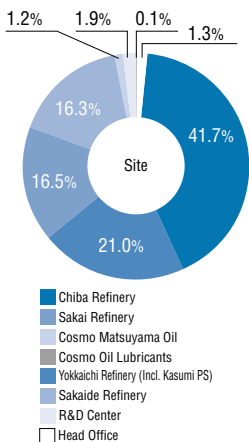
4 refineries owned by Cosmo Oil, Yokkaichi Kasumi Power Station, Head Office, branches, R&D Center, affiliate Cosmo Matsuyama Oil Co., Ltd. and Cosmo Oil Lubricants Co., Ltd. For affiliates, only those costs and benefits which are closely related to our refineries are extracted and collected.

### Counting by Respective Sites:

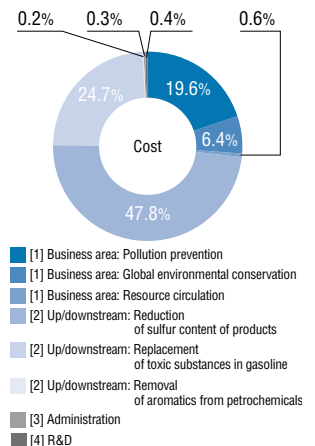
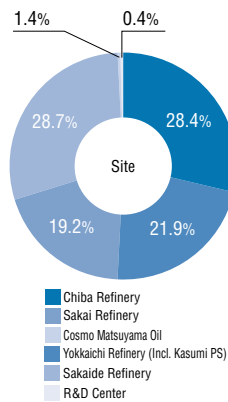
Site-by-site data are shown on pages 81 through 92 for 4 refineries of Cosmo Oil, R&D Center, Head Office, branches, Cosmo Matsuyama Oil Co., Ltd. and Cosmo Oil Lubricants Co., Ltd. (Yokkaichi Refinery's data includes some data of Yokkaichi Kasumi Power Station.)

Subject Companies and Sites	Site	Remarks
Cosmo Oil Co., Ltd.	Chiba Refinery	Calculated all data at the site
	Yokkaichi Refinery	Calculated all data at the site
	Sakai Refinery	Calculated all data at the site
	Sakaide Refinery	Calculated all data at the site
	Yokkaichi Kasumi PS	Calculated all data at the site
	Head Office Branches	*Environment related donations, environmental report production costs and electricity consumed
	R&D Center	*Purchase conservation cost of recycled paper, environmental remediation cost.
Cosmo Matsuyama Oil Co., Ltd.		*Only environmental conservation costs and benefits of the research and development
		*Reducing environmental impact of product, etc
Cosmo Oil Lubricants Co., Ltd.	Chiba Plant	*Green purchase cost of lubricant raw material (other than this are included in the figures of Cosmo Oil Chiba and Yokkaichi Refineries)
	Yokkaichi Plant	

Environmental Conservation Costs



Year-end Acquisition Costs



### Changes from the Previous Year

The main change compared to the previous year is that costs associated with soil contamination measures have been added as “environmental remediation cost”.

### Calculation Results

#### Environmental Conservation Cost

The calculation results for Fiscal 2004 indicated an investment of 14.9 billion yen, an increase of 3.5 billion yen as compared to the previous year. The main reason for this increase was the introduction of FCC gasoline desulfurization units for producing sulfur free gasoline. Expenses were 56.4 billion yen, an increase of 8.9 billion yen as compared to the previous year. The main reason for this increase was the maintenance and repair work that was done on the FCC units and desulfurization units in the course of the regular maintenance schedule. The year end acquisition cost was 165.6 billion yen, an increase of 16.1 billion yen as compared to the previous year. The main reason for this increase was the same as for the increase in the investment cost, which was the introduction of FCC gasoline desulfurization units.

#### Environmental Conservation Benefit

The “benefits corresponding to worksite costs” has increased overall since the last year in terms of the environmental impact per crude oil equivalent throughput. The “benefits related to upstream and downstream costs” in terms of the concentration and unit per output have also increased since the last Fiscal year for almost all items. The reason why the amount of impact has decreased greatly for both the “benefits corresponding to worksite costs” and the “benefits related to upstream and downstream costs” is because the above-described improvements in concentration and unit per output led to a decrease in the production volume.

### Integration of Environmental Impact and Environmental Productivity

We started assessments using JEPIX (Japan Environmental Policy Index) in addition to EPS as a method for integrating environmental impact. EPS is a method that was developed by a research organization in Sweden, whereas JEPIX was developed in Japan based on Japanese data, and is therefore suitable for assessing the environmental influences within Japan.

The CO<sub>2</sub> conversion value for Fiscal 2004 using EPS for the environmental impact within the business areas decreased by 88,000 t-CO<sub>2</sub> due primarily to the decrease in the treated crude oil. Since the shipment of product also decreased, there was an overall decrease of 2,287,000 t-CO<sub>2</sub>.

The Eco index point (index value using JEPIX) for within the business areas was 9,746 million points, a decrease of 247 million points as compared to the previous year.

Regardless of whether EPS is used or JEPIX is used, an improvement is indicated.

Environmental productivity calculates the production volume per integrated environmental impact per unit, and the larger this value, the more was produced with less environmental impact.

**Environmental productivity = Production volume / integrated environmental impact**

The environmental productivity for Fiscal 2004 improved from the previous year, and this is believed to be because the environmental impact of products decreased.

#### Integration of Environmental Impact

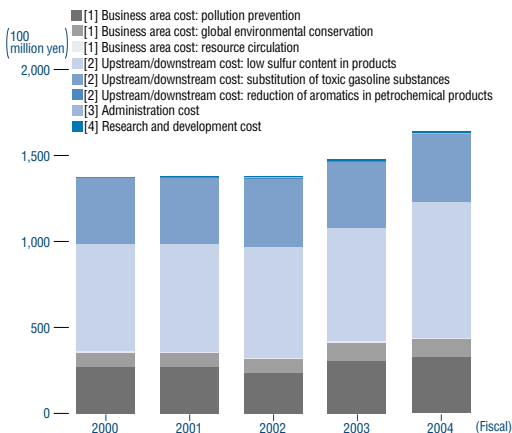
(Unit: million Eco index points)

JEPIX	Weighted Environmental Impact	
	Fiscal 2004	Reduction (compared to the previous year)
<b>Business area</b>		
Greenhouse gas	4,685	79
Ozone depleting substances	2	2
Toxic air pollutants	477	- 4
Optical oxidants	760	25
NOx	1,968	129
SPM10	468	158
COD to rivers	0	0
COD to sea areas	489	- 19
Nitrogen	728	- 130
Phosphorous	134	- 19
Landfill waste	35	26
<b>Total for within the business areas</b>	<b>9,746</b>	<b>247</b>

#### Environmental Productivity

JEPIX	Production Volume Per Integrated Environmental Impact	
	Fiscal 2004	Reduction (compared to the previous year)
<b>Total for the business areas</b>	<b>0.00298</b>	<b>0.00003</b>

#### Year-end Acquisition Costs



#### Integration of Environmental Impact (unit: 1,000 t-CO<sub>2</sub> conversion)

EPS	CO <sub>2</sub> conversion		
	Fiscal 2004	Reduction (compared to the previous year)	
<b>Business areas</b>	SOx (index 30.3)	188	5
	NOx (index 19.7)	61	4
	Benzene (index 33.8)	0	0
	COD (index 0.0095)	0	0
	CO <sub>2</sub> (index 1)	4,918	79
	<b>Total within business areas</b>	<b>5,167</b>	<b>88</b>
<b>Product</b>	Potential SOx (index 30.3)	5,043	481
	CO <sub>2</sub> at the time of product use (index 1)	73,452	1,708
	<b>Total product</b>	<b>78,495</b>	<b>2,200</b>
<b>Total business areas + products</b>	<b>83,662</b>	<b>2,287</b>	

#### Environmental Productivity (unit: kl/t-CO<sub>2</sub> conversion)

EPS	Integrated Environmental Impact Amount of Production per Unit	
	Fiscal 2004	Improvement (compared to the previous year)
<b>Total within business areas</b>	<b>5.614</b>	<b>0.003</b>
<b>Product total</b>	<b>0.370</b>	<b>0.004</b>
<b>Total business areas + product</b>	<b>0.347</b>	<b>0.004</b>

## Definitions of Terms Used in Accounting

### Methods of compiling environmental costs

- **Investments:** Capital investment for depreciable assets acquired for the purpose of environmental conservation
- **Expenditures:** Expenditures during the period associated with environmental activities (includes depreciation)

#### ① Business Area Costs

##### Pollution Prevention

- Air pollution prevention costs (Sulfur recovery units, nitrogen oxide control units, etc.)
- Water pollution prevention costs (Wastewater treatment equipment, sour water treatment equipment, etc.)
- Soil contamination prevention costs (Soil contamination investigation costs etc.)
- Levies under the Law concerning pollution-related health damage compensation and other measures

##### Global Environmental Conservation

- Costs associated with establishment of energy conservation equipment such as cogeneration facilities

##### Resource Circulation

- Costs associated with waste treatment and recycling

Note: Following the integration of data compilation method among refineries, management activity cost for Fiscal 2003 has been modified from 13.313 million yen to 13.260 million yen.

#### ④ Administration Costs

Costs associated with environmental education for company staffs, management and maintenance of the environment management system, plant maintenance and afforestation of offices and monitoring and assessment of environmental impact.

#### ② Upstream/Downstream Costs

##### Green Purchasing

Costs associated with the provision of products with low environmental impact to customers.

##### Reducing Sulfur Content of Products

- Costs associated with reducing sulfur content in products to reduce sulfur oxide emitted when products are in use.

##### Replacement of Toxic Substances in Gasoline

- Costs associated with reduction and refinery of toxic substances in gasoline such as benzene and lead.

##### Reduction of Aromatic Substances of Petrochemical Products

- Costs associated with removal of aromatics and olefins from raw materials used in petrochemical products

Note: Following the integration of data compilation method among refineries, and review of proportional distribution coefficient of environmental cost of per-device, upstream/downstream costs for Fiscal 2003 has been modified from 32,134 million yen to 32,730 million yen. In addition, investment amount is modified from 1,520 million yen to 1,519 million yen, and accumulation acquisition amount is modified from 104,797 million yen to 106,312 million yen.

#### ③ Research and Development Cost

Costs Associated with Environment R&D Activities.

#### ⑤ Social Activity Cost

Costs Associated with Non-business Activities, such as Afforestation.

#### ⑥ Environmental Remediation Cost

Soil Contamination Measures at Service Stations

### Environmental Conservation Costs (reference)

Item	Fiscal 2004	Change*
Purchase cost of recycled paper (whole amount booked)	12	- 1
Environment related donations	31	- 3
Environmental report production cost	35	- 10

Unit: (million yen)

\* Difference between Fiscal 2003 and 2004.

### Environmental Accounting

Item	Environmental Conservation Cost (million yen)			
	Investment		Cost	
	Fiscal 2004	Change	Fiscal 2004	Change
[1] Business area costs				
Pollution prevention	344	-6,775	5,825	862
Global environmental conservation	137	-2,417	8,614	1,016
Resource circulation	20	1	668	-31
[2] Upstream/downstream costs				
Green purchasing	0	0	71	-6
Reducing environmental impact of products	14,250	12,731	39,081	6,428
Reducing sulfur content of products	(12,776)	(11,506)	(28,395)	(4,741)
Replacement of toxic substances in gasoline	(1,474)	(1,225)	(10,569)	(1,682)
Reduction of aromatics in petrochemical product	( 0)	( 0)	( 117)	( 5)
[3] Administration cost	2	-133	382	-115
[4] Research and development cost	133	79	1,088	28
[5] Social activity cost	0	0	1	0
[6] Environmental remediation cost	0	0	714	714
Total	14,886	3,486	56,444	8,896

## Methods of compiling environmental benefits

### • Amounts and benefits of reduction: Fiscal 2003 - 2004

#### ① Benefits Corresponding to Worksite Costs

##### Concentration/Unit Values

- Environmental impact per crude oil equivalent throughput.

##### Environmental Impact

- Environmental impact originated from business area.

Note: Yokkaichi Kasumi Power Station and Cosmo Matsuyama Oil Co., Ltd. are excluded from concentration/unit values calculation, as crude-based processing volume estimation is impossible with these facilities where crude process is not carried out.

#### ② Benefits Related to Upstream and Downstream Costs

##### Benefits through technological upgrading of refining process.

##### Concentration/Unit

- Low-sulfur products: sulfur contents in products
- Replacement of toxic substances in gasoline (low-benzene): benzene concentration in gasoline
- CO<sub>2</sub> emissions from product use: value obtained by dividing the environmental impact (see below) by petrochemical product volume

##### Environmental Impact

- Potential environmental impact expected to occur from product use at refineries
- Low-sulfur products: environmental impact value obtained by multiplying average sulfur content of products with production volume
- Replacement of hazardous substances in gasoline (low-benzene): value obtained by multiplying average benzene concentration of gasoline with production volume
- Reduction of aromatics in petrochemical products: volume of aromatics in petrochemical products eliminated in business area
- CO<sub>2</sub> emissions from product use: value obtained by multiplying per unit CO<sub>2</sub> emissions of each product with production volume

##### Notes:

- We do not take into account SO<sub>x</sub> reduction obtained by desulfurization equipment during customers' use; therefore actual SO<sub>x</sub> emissions of heavy fuel oils, etc. is lower than potential SO<sub>x</sub>.
- As we select the optimum production method based on the relationship between cost and environmental conservation, the sulfur content value in each product is lower than JIS specification.
- Naphtha is used as petrochemical raw material and fertilizer raw material and does not emit SO<sub>x</sub> or CO<sub>2</sub> directly; however it is included in the value.
- In relation to CO<sub>2</sub> emissions, we calculate the data by the method recommended by the Ministry of Environment's "Guidelines Concerning Methods of Calculation of Emissions of Greenhouse Gases by Businesses (draft)". Costs associated with non-business activities, such as afforestation.

## Economic Benefits

(million yen)

	Category and Key Activity	Environmental Conservation Benefits			
		Investment		Cost	
		Change	Fiscal 2004	Change	Fiscal 2004
[1]	Benefits corresponding to worksite costs				
	Resources input into business activities				
	Energy input	0.02 (kl*crude/1,000kl)	9.23 (kl*crude/1,000kl)	384 (TJ)	72,908 (TJ)
	Water input	1 (kg/kl)	187 (kg/kl)	-793 (1,000t)	42,941 (1,000t)
	Benefits related to environmental impacts and wastes generated by business activities				
	Emission to air: CO <sub>2</sub>	0.33 (kg CO <sub>2</sub> /kl)	24.14 (kg CO <sub>2</sub> /kl)	79 (1,000t - CO <sub>2</sub> )	4,918 (1,000t - CO <sub>2</sub> )
	SO <sub>x</sub>	0.5 (g/kl)	26.1 (g/kl)	152 (t)	6,192 (t)
	NO <sub>x</sub>	1.0 (g/kl)	14.5 (g/kl)	189 (t)	3,103 (t)
	Benzene	0.00 (g/kl)	0.03 (g/kl)	-0.34 (t)	10.36 (t)
	Emission to water: COD	-0.03 (g/kl)	0.76 (g/kl)	-5.9 (t)	152.2 (t)
	Industrial waste: Generated	-30 (g/kl)	234 (g/kl)	-7,348 (t)	50,584 (t)
	Recycled	-16 (g/kl)	71 (g/kl)	-4,868 (t)	18,767 (t)
	Landfill	2 (g/kl)	3 (g/kl)	462 (t)	607 (t)
[2]	Benefits related to upstream and downstream costs				
Benefits related to goods and services produced by business activities	Reducing sulfur content of products	(sulfur: mass %)	(sulfur: mass %)	(potential SO <sub>x</sub> emissions: t)	(potential SO <sub>x</sub> emissions: t)
	High octane gasoline	0.0001	0.0004	0	8
	Regular gasoline	0.0010	0.0021	68	177
	Naphtha	0.0069	0.0275	-49	929
	Jet fuel oil	-0.0083	0.0190	-181	489
	Kerosene	0.0008	0.0013	50	69
	Diesel fuel	0.0011	0.0019	100	156
	Heavy fuel oil A	0.0146	0.4172	1,072	27,106
	Heavy fuel oil C	-0.0574	1.6017	14,826	137,495
	LPG	-0.0001	0.0005	-2	6
	Total	0.0279	0.3603	15,884	166,435
	Low-benzene gasoline	-0.0162 (vol %)	0.5131 (vol %)	-2,136	31,612 (t)
	Reduction of aromatics in petrochemical products			-1,983	6,873 (kl)
Reduction of CO <sub>2</sub> emission from products in use	0.0172 (t-CO <sub>2</sub> /kl)	2.5323 (t-CO <sub>2</sub> /kl)	1,718 (1,000t - CO <sub>2</sub> )	73,452 (1,000t - CO <sub>2</sub> )	

Detail of Benefit	Amount
Energy conservation	2,623
Catalyst recycling	186
Gypsum sales	128
Ammonia recycling	138
R&D	12
Electricity conservation	4
Total	3,091

##### Methods of compiling economic benefits

- Conservations by cogeneration = Conservations by steam generation + conservations in electricity  
- fuel costs (LPG, heavy fuel oil, etc.)
- Purchase cost of new catalysts saved by recycled catalysts in oil refining, plus disposal costs of waste catalysts.
- Sales proceeds of gypsum, a by-product of fuel-gas desulfurization at Yokkaichi Kasumi Power Station.
- Purchase price of ammonia saved by recycled ammonia at Yokkaichi Kasumi Power Station plus disposal costs of waste alkali.
- Income received for royalty, and cost conservations realized through R&D activities.
- Conservations, in year-on-year change, at the head office and other facilities.