Environmental Impacts from Business Activities

http://www.cosmo-oil.co.jp/eng/sustainable/07/env/lca.html

To offer products with less environmental impacts, we work to reduce the environmental load throughout oil's life cycle, including when used by customers. We not only ascertain the environmental impacts at each stage but also strive to reduce impacts through continuous improvements.

TJ: Terajoule (10^{12} joules)

Crude Oil Extraction

INPUT

●Energy
Fuel…**26,298**TJ

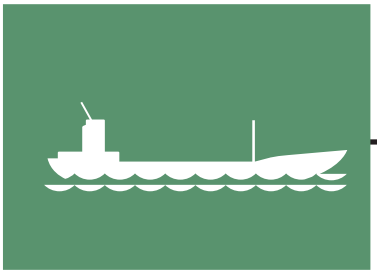
OUTPUT

●Emissions to air
CO_2…**1,466**thousand tons-CO_2
SOx…**20,214**tons
NOx…**3,243**tons

Environmental measures

Energy conservation
Air pollution control (Zero Flare Project)

Crude Oil Transportation



INPUT

●Energy
Fuel…**12,903**TJ

OUTPUT

●Emissions to air
CO_2…**882**thousand tons-CO_2
SOx…**19,208**tons
NOx…**23,793**tons

Environmental measures

Oil spill prevention
Energy conservation (increasing efficiency by joint distribution, increasing size of tankers)

Refining (Refineries)

INPUT

●Raw materials
Crude oil…**27,284**thousand kl
Others…**1,575**thousand kl
●Energy
Purchased power…**3,267**TJ (**338,944**thousand kWh)
Private-use fuel…**67,645**TJ (**1,744**thousand kl-crude oil)
●Water
Industrial water…**42,214**thousand tons
Sea water…**350,998**thousand tons

Total energy consumption unit: TJ

FY2004	72,908
FY2005	75,418
FY2006	70,913

OUTPUT

●Emissions to air
CO_2…**4,847**thousand tons-CO_2
Private-use fuel : **4,405**thousand tons-CO_2
Purchased power : **126**thousand tons-CO_2
Hydrogen production process : **317**thousand tons-CO_2
SOx…**5,105**tons NOx…**2,901**tons
●Wastewater
Wastewater…**360,500**thousand tons
(including **350,998** thousand tons of sea water)
COD…**120**tons Nitrogen…**74**tons
Phosphorus…**1**ton
●Industrial waste
Generated…**55,304**tons
Recycled…**24,742**tons
Landfill…**422**tons
●PRTR Law designated chemical substances
Released…**88**tons Transferred…**37**tons

CO_2 emissions unit: thousand tons-CO_2

FY2004	4,990
FY2005	5,086
FY2006	4,847

Environmental measures

Energy conservation
Resource conservation/recycling
Industrial waste management
Chemical substance control
Air pollution control Wastewater management
Soil preservation On-site tree planting

Office

Environmental measures

Energy conservation
Resource conservation/recycling
Green procurement

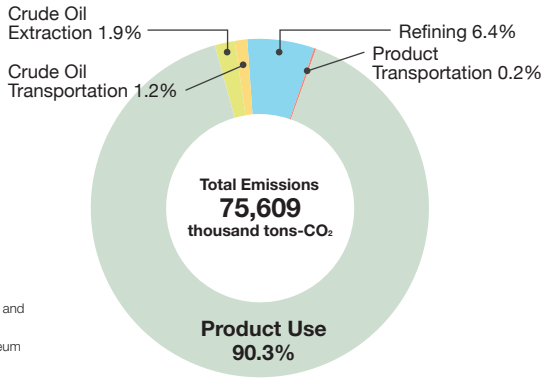
Laboratory

Environmental measures

Energy conservation
Resource conservation/recycling
Industrial waste management
Chemical substance control
Wastewater management

○Figures include estimates based on the actual production volumes of petroleum products in fiscal 2006.
○Figures for "Crude Oil Extraction," "Crude Oil Transportation," and "Product Transportation and Stockpiling (Oil Depots) *SOx and NOx only," 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 (JPEC).
○CO_2 emissions for Refining (Refineries) and Product Transportation were calculated in accordance with the *Guidelines for Accounting Greenhouse Gas Emissions from the Industry (Draft)* published by the Ministry of the Environment and the Ministry of Economy, Trade and Industry.
○See website for methods and basis of "Product Use" calculations.
WEB Detailed data Environmental Accounting http://www.cosmo-oil.co.jp/eng/sustainable/07/info/ev_accounting.html
Energy consumption is calculated in accordance with the stipulations of the Energy Conservation Law regarding the rational use of energy.
○"Refining (Refineries)" includes data from the Yokkaichi Kasumi Power Station and Cosmo Matsuyama Oil Co., Ltd.
○Electricity sold refers to power sold by Chiba Oil Refinery, Yokkaichi Kasumi Power Station, and Cosmo Matsuyama Oil Co., Ltd. CO_2 emissions from refining (refineries) is the amount after deducting the portion of CO_2 emissions that results from generating electricity sold. Conversely, the purchased power portion of CO_2 emissions is included in "Refining (Refineries)" data.
○Steam sold refers to steam sold by the Chiba Refinery and Cosmo Matsuyama Oil Co., Ltd. CO_2 emissions from refining (refineries) is the amount after deducting the portion of CO_2 emissions that results from generating steam sold.
○CO_2 emissions attributable to the construction of facilities are not included.
○"Product Use" SOx emission data is for reference. It is estimated from the sulfur content of products without taking sulfur reduction during use into consideration. Accordingly, actual SOx emissions are lower than the estimate.
○With regard to "Product Use" CO_2, in addition to CO_2 emissions resulting from the use of products, CO_2 emissions attributable to generating electricity and steam sold are estimated separately.
○Naphtha used mainly as a petrochemical material does not directly emit CO_2 or SOx. However, naphtha is treated in the same way as the other petroleum products when the "Product Use" CO_2 and SOx emissions are calulated

CO_2 Emissions throughout Oil's Life Cycle



Product

●Production
27,622 thousand kl

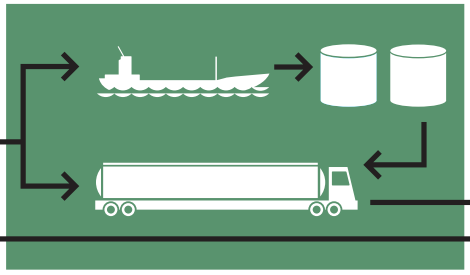
●Sulfur recovered
226 thousand kl
(by-product)

●Electricity sold
1,526,907 thousand kWh (14,903 TJ)

●Steam sold
1,788 TJ

●CO_2 sold
137 thousand tons-CO_2

Product Transportation and Stockpiling (Oil Depots)



INPUT

●Energy
Fuel…**2,326**TJ

OUTPUT

●Emissions to air
CO_2…**161** thousand tons-CO_2
SOx…**1,740** tons
NOx…**3,370** tons

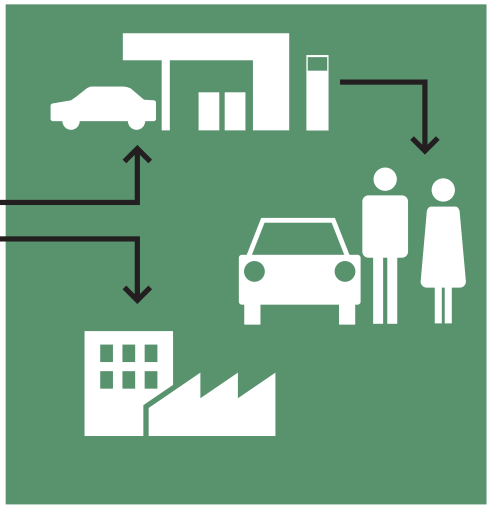
Environmental measures

■Maritime transportation (ships)
Oil spill prevention
Energy conservation (increased efficiency through mutual accommodations, larger tankers for coastal routes)

■Land transportation
Energy conservation (larger vehicles and high stowage rate)

■Stockpiling (oil depots)
Energy conservation/Resource conservation
Chemical substance control/Soil preservation
Oil spill prevention

Product Use



OUTPUT

●Emissions to air
CO_2…**68,253** thousand tons-CO_2
(Does not include CO_2 emissions of 1,039 thousand tons-CO_2 attributable to generating electricity sold or CO_2 emissions of 85 thousand tons-CO_2 attributable to generating steam sold.)
SOx…**152,393** tons

CO_2 emissions	unit: thousand tons-CO_2
FY2004	73,452
FY2005	77,015
FY2006	68,253

Environmental measures

■Service stations
Energy conservation
Resource conservation/recycling
Industrial waste management
Chemical substance control
Air pollution control
Wastewater management
Soil preservation

WEB Detailed data Oil Life Cycle Inventory (LCI)
http://www.cosmo-oil.co.jp/eng/sustainable/07/env/lca.html