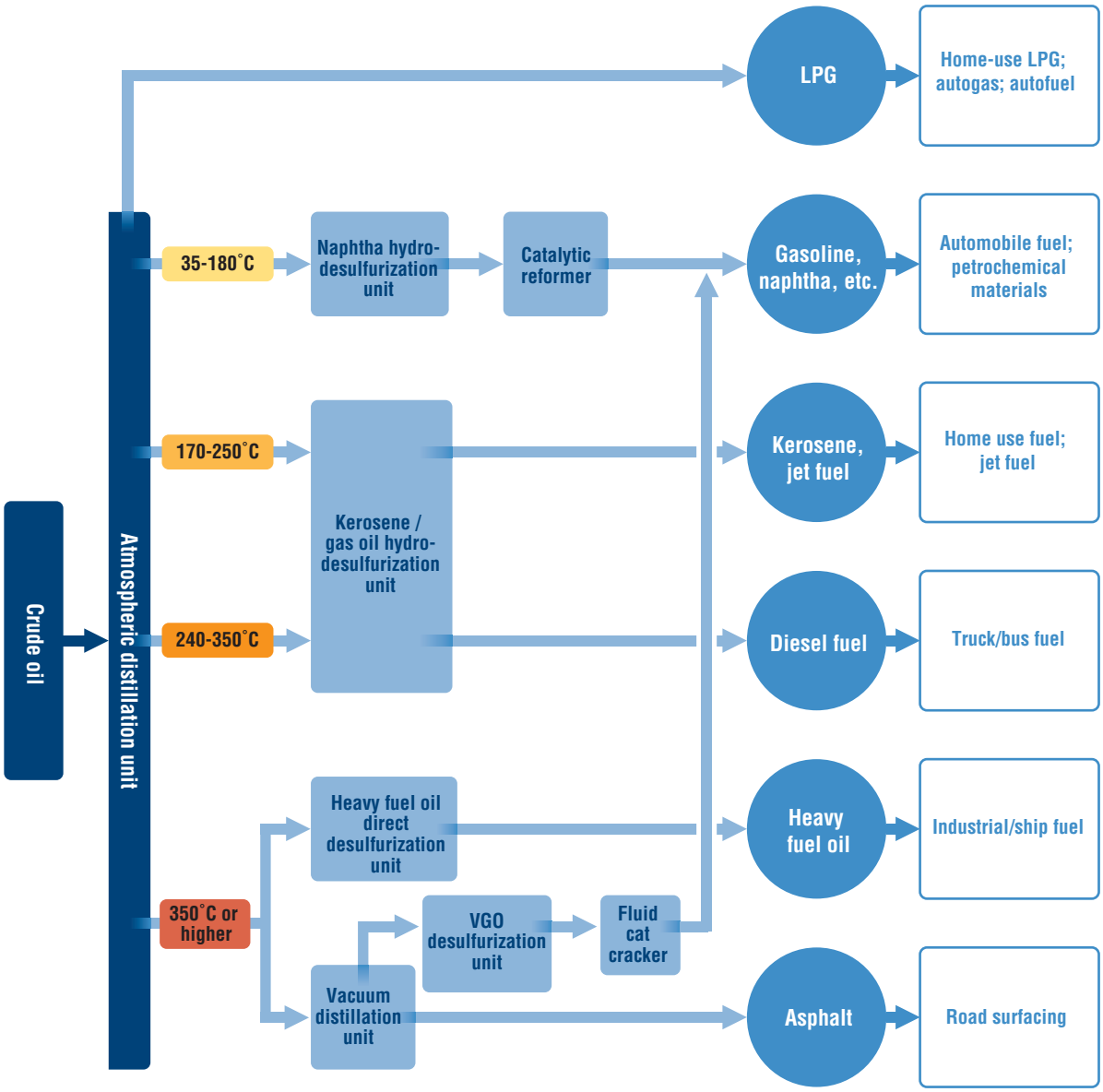
Production flow of petroleum products

Various petroleum products are produced when crude oil is refined in a refinery. Crude oil is a blend of hydrocarbons having a wide range of boiling points. Middle East oil, on which Japan is greatly dependent, has a high sulfur content.
In the refinery, crude is distilled in a atmospheric pressure distillation unit and separated into gas, naphtha, kerosene, diesel fuel and heavy fuel oil fractions. LP gas is produced from the gas fraction. After hydro-desulfurization, the naphtha fraction is processed by a catalytic reformer and converted into gasoline, etc., and the kerosene and diesel fuel fractions are processed into kerosene and diesel fuel. After hydro-desulfurization in a heavy fuel oil direct desulfurization unit, the heavy fuel oil fraction is extracted as heavy fuel oil, or is separated using a vacuum pressure distillation unit, with the light fraction being converted to gasoline by hydro-desulfurization in a VGO desulfurization unit and processing in a fluid cat cracker, and the heavy fraction being converted to asphalt. These processes in a refinery impact the environment in the form of atmospheric pollution, water contamination and waste materials, etc., but we take various actions to reduce these impacts.

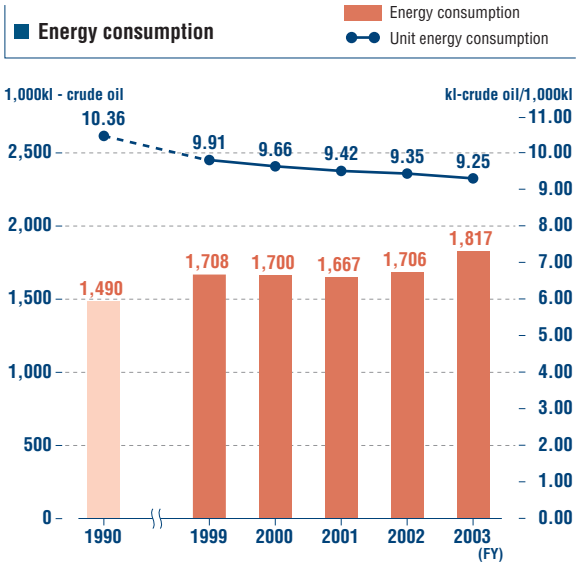


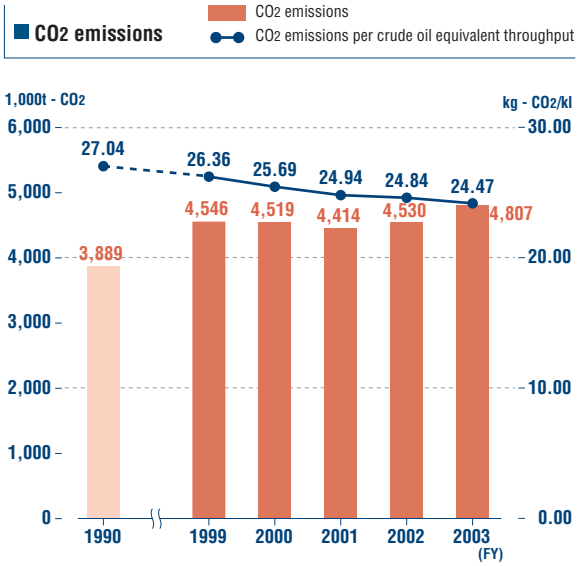
Notes:
• VGO stands for Vacuum Gas Oil.
• Environmental performance data (p 9-12) relates mainly to Cosmo Oil's 4 refineries and some of its offices.

Prevention of climate change

Refineries

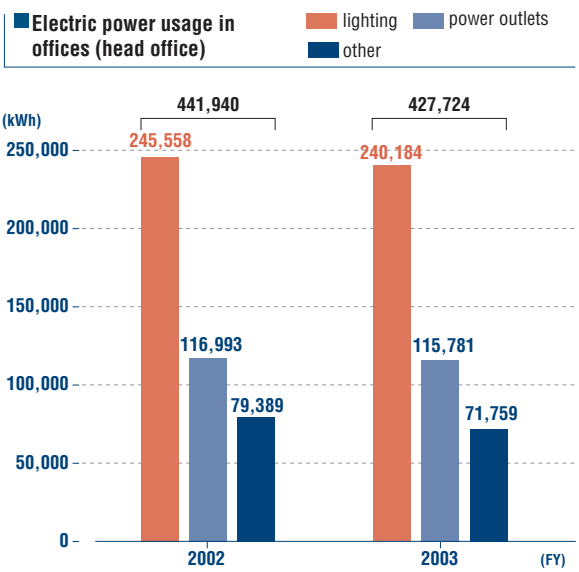
In our refineries, we strive to conserve energy by introducing high-efficiency equipment, reinforcing operating controls, etc.
As a result of these efforts, the unit energy consumption load for FY 2003 (9.25kl of crude oil/thousand kl) was 10.7% down from the 1990 figure, above the target reduction (8.3%).





Offices

At our head office we have implemented energy conservation activities such as having separate air conditioning on each floor, the no-necktie movement and dimming lights at lunchtime. Consequently electric power usage by our head office in FY 2003 was 428,000kWh, down 3.2% from 2002.
In FY 2004, with the goal “5% less than 2003” we are surveying each of our workplaces and striving for further energy conservation.

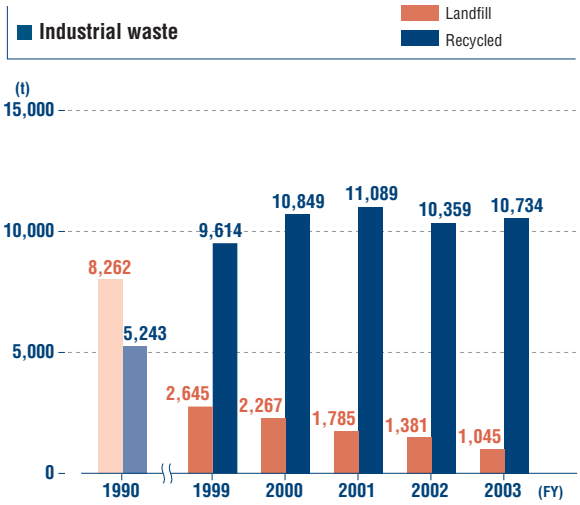


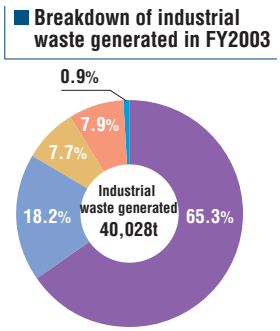
Reduction of industrial waste

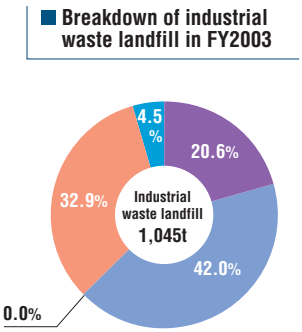
Refineries

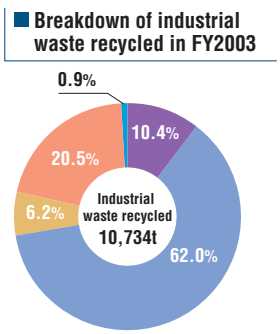
Our refineries are endeavoring to reduce the final disposal (landfill) amount of industrial waste arising from the oil refinery process. Our efforts include reduction of the volume of waste generated, and separation of the waste that does arise. We also choose waste disposal methods that are conducive to recycling.

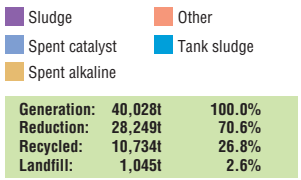
As a result of these efforts, the total amount of final disposal from all of our four oil refineries for FY 2003 was 1,045 tons, an 87.4% reduction from the 1990 level, over the target of an 81% reduction for the second year in a row.











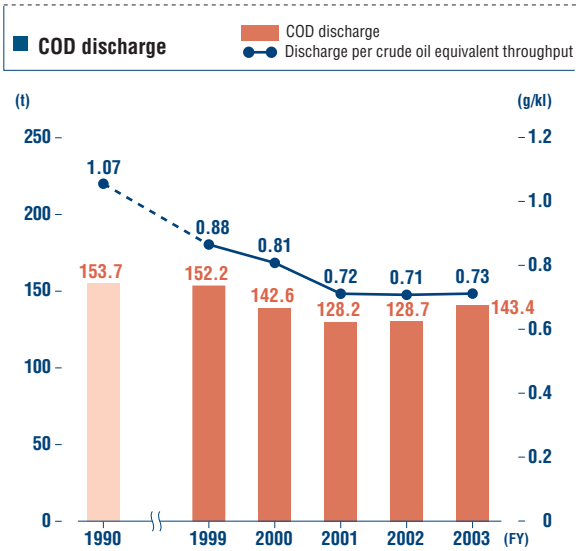
Generation:	40,028t	100.0%
Reduction:	28,249t	70.6%
Recycled:	10,734t	26.8%
Landfill:	1,045t	2.6%

Prevention of water pollution

A large volume of seawater or industrial water is used in the oil refining process at our oil refineries, mainly for cooling, and also for cleaning and boilers.

As oil content, etc may mix into wastewater that was used in the cleaning process in oil refining, we endeavor to prevent water pollution by removing oil content using an oil-water separation unit and other appropriate treatment such as activated sludge process treatment, before the water is released.

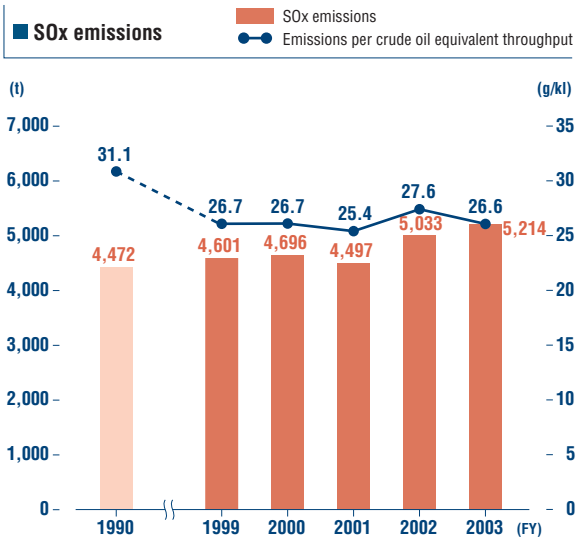
As a result of these efforts, all of our refineries' wastewater levels are under the limits set by their respective regions.

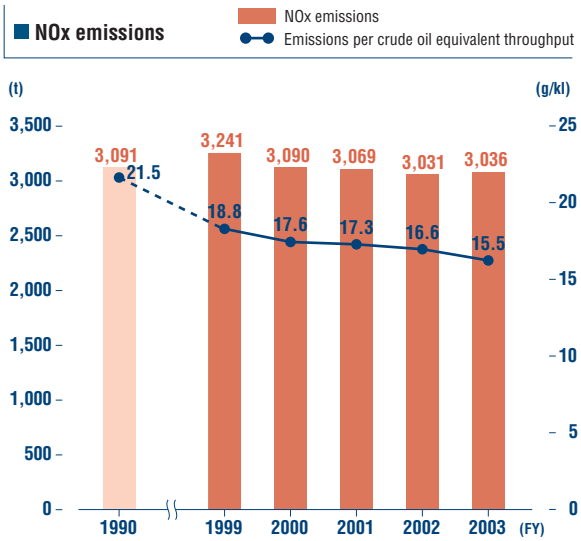


Prevention of air pollution

SOx (Sulfar Oxdes) and NOx (Nitrogen Oxdes)

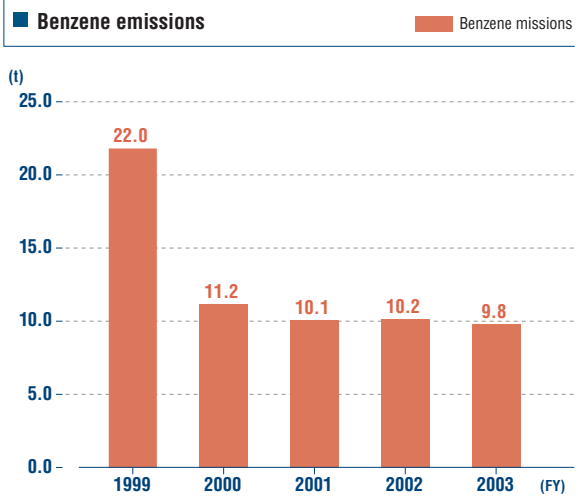
The refining process involves emissions, such as SOx and NOx from heating furnaces and boilers.
Our refineries are endeavoring to choose fuels with lower sulfur and nitrogen levels for heating furnaces and boilers. We introduce low NOx burners to reduce the generation of thermal NOx, a substance generated when nitrogen reacts with oxygen at combustion. We also introduce flue gas desulfurization and denitrification equipment to remove generated SOx or NOx from exhaust gas. In addition, we remove small particles in exhaust fumes using electrostatic precipitaters. As a result of these efforts, all of our four oil refineries' emission levels are under the local legal limits.





Hydrocarbons and benzene

Some petroleum products such as gasoline contain volatile components. To handle such products, we traditionally store them in a floating roof tank in order to control evaporation, and have also installed equipment that collects the hydrocarbons that evaporate when we ship the products.
Benzene, specified as a hazardous air pollution substance, is a hydrocarbon. Through the measures described above, we are endeavoring to reduce the benzene content in gasoline as well as to control its emission.



Note: includes emissions from oil storage depots