

Improving quality for the sake of reducing the environmental impact

The biggest impact on the environment during the lifecycle of petroleum products is generated at the time of use of the products. In order to prevent air pollution due to SO_x in urban areas during the 1960s, the oil industry invested heavily in desulfurization units and so forth in an effort to reduce such environmental impact.

Furthermore in response to community demand, the industry has also been grappling with the problem of reducing the im-

impact of gasoline and diesel air pollution arising on account of the rapid growth of motorization since the 1970s.

As we move into the future, the industry is also committed to raising the quality of petroleum products for the sake of conserving the air that surrounds us.

➤ Reducing the environmental impact of gasoline

In order to reduce the environmental impact of gasoline, the Japanese oil industry has promoted measures for no lead, low benzene and low sulfur, as follows:

Reduction of lead and benzene, which could harm the body

- Regular gasoline become unleaded in 1975, and premium in 1986.
- In January 2000, the maximum permitted volume of benzene in gasoline was reduced from 5% to 1%.

Reduction of evaporation gas, cause of photochemical smog

In 2001 the maximum permitted summer vapor pressure of gasoline was reduced from 78Pa to 72Pa, and is planned to be further reduced to 65Pa in 2005.

Reduction of sulfur content of gasoline

- At the same time as reducing atmospheric pollution, lowering sulfur content maximizes the effectiveness of an automobile's exhaust gas cleaning system.
- Until the end of 2004, by law the sulfur content of gasoline was limited to 50ppm, but the results for Cosmo Oil for FY 2003 were 31ppm (average) for regular and 5ppm (average) for premium.

■ History of Improvement of Gasoline Quality by the Japanese Oil Industry

1950	Commencement of production of gasoline
1970	The Shinjuku (Ushigome Yanagicho) lead pollution case
1975	Regular gasoline becomes lead-free
1986	Premium gasoline becomes lead-free
1987	Sales of 100-octane premium gasoline
1996	Amendment of JIS Maximum benzene reduced to 5 vol%, and sulfur to 100ppm
2000	Benzene limited to 1vol%

➤ Reduction of environmental impact of diesel fuel (reduction of sulfur content)

The Japanese oil industry has been striving as described below to lower sulfur content in order to reduce the environmental impact of diesel fuel.

Sulfur content: from 5,000ppm to 500ppm

- In line with the strengthening of exhaust gas restrictions in the 1990s, the maximum limit on sulfur content, which had been 5,000ppm, was lowered to 2,000ppm in 1992, and then to 500ppm in 1997.
- This reduction of sulfur content in diesel fuel was necessary in order to enable the smooth functioning of EGR (exhaust gas recycling) and exhaust gas cleaning systems using oxidizing catalysts, which were required in order to reduce the volume of NO_x and PM (particulate matter) emitted by diesel vehicles.

Sulfur content: from 500ppm to 50ppm

- Having regard to the 2005 automobile exhaust limits, the installation of aftertreatment equipment such as DPF (diesel particulate filters) is becoming necessary, and it has been determined by central government regulation that by the end of 2004 the limit on sulfur content will be reduced from 500ppm to 50ppm.
- In response we have taken the voluntary action of commencing sales of 50ppm diesel from October 2002 in a number of areas, and from April 2003 nationwide (excepting Okinawa and outlying islands).

when petroleum products are used.

➤ Making gasoline and diesel fuel sulfur-free

Cosmo Oil is pushing forward its preparations aimed at commencing supply of sulfur-free (sulfur content not exceeding 10ppm) gasoline and diesel fuel in 2005. Sulfur-free gasoline and diesel fuel not only decrease air pollution but also, because they can be used in the latest environmentally friendly cars, increase fuel economy and reduce CO₂.

Cutting CO₂ by using sulfur-free gasoline

- An occlusion-type NO_x reducing catalyst fitted in a lean-fuel burning engine such as a direct fuel injection engine or lean-burn engine, which is one type of technology for improving fuel economy, is liable to be poisoned by sulfur.
- If the sulfur content of the gasoline is lowered, the sulfur poisoning of the NO_x reducing catalyst is suppressed, it becomes possible to expand the scope of the operation of the lean fuel combustion, and an improvement in the fuel economy of vehicles fitted with lean-burn engines can be anticipated.

Reducing NO_x by using sulfur-free diesel fuel

- Since there are limits on what can be done in order to substantially reduce the NO_x emissions by a diesel vehicle solely by improving the combustion control, it is essential to introduce an aftertreatment unit to process the reduction of NO_x.
- Currently the car industry is pushing forward with development of such an aftertreatment unit, with the occlusion type NO_x reducing catalyst being seen as hopeful.
- When the sulfur content of the diesel fuel is of the order of 50ppm, these technologies cannot demonstrate their full functions on account of poisoning of the catalyst, etc., and accordingly it is necessary to lower the sulfur content of diesel fuel further.

■ Environmental policy and capital investment (whole of Japanese oil industry)

Source: Petroleum Association of Japan

