

## 7.3 Better fuel countermeasure

### 7.3.1 Introduction

By the use of better fuel controls, the creation of air pollutants is reduced. Ways to convert types of fuel (changing from burning coal to burning heavy oil or gas) and the method of using the better quality fuels within the same fuel type (switching from those with high sulfur content to low sulfur content) are being adopted.

### 7.3.2 The necessity of better fuel countermeasure.

Even if emission standards are kept in urban regions with concentrations of offices and commercial buildings, because the sources of the emissions are concentrated by each building's boiler, there is high concentrate pollution.

It is difficult to install flue-gas desulfurization equipment because areas which have become crowded do not have much space and are small in scale. Therefore, in areas such as these seasonal fuel usage standards are effective.

### 7.3.3 Fuel usage standards as a Air Pollution Control Law

There are the following two types of these standards

- (1) Seasonal standards: Regulate the amount of sulfur in fuel in 14 urban areas including Sapporo and Tokyo.
- (2) Standard for area-wide total pollution load control: Regulate the facilities smaller than objective facilities for areawide total pollutant load control, in 24 areas including Tokyo and Osaka, setting standards to match areas with less than 0.3% sulfur.

### 7.3.4 The effects of using better fuel

(1) Gaseous fuels (natural gas, LPG etc.)

- a) Burns with little excess air, burns efficiently.
- b) Because they do not contain sulfur or ash, they do not create sulfur oxides or soot.
- c) Because they do not contain nitrogen they do not create Fuel NO<sub>x</sub> (however we must pay attention to Thermal NO<sub>x</sub>).

(2) Liquid fuels (heavy oil, light oil, kerosene etc.)

- a) Heavy oils create soot, but not as much as coal.
- b) Because heavy oils contain sulfur and nitrogen, they create sulfur oxides and nitrogen oxides. In this case, flue-gas desulfurization and denitrification are performed.
- c) Low-sulfur heavy oils, made by removing sulfur by desulfurization, produce few sulfur oxides and nitrogen oxides. Desulfurization can be thought of as performing denitrification at the same time. Refer to Fig.7.3.1 for the relationship between sulfur and nitrogen in heavy oils.

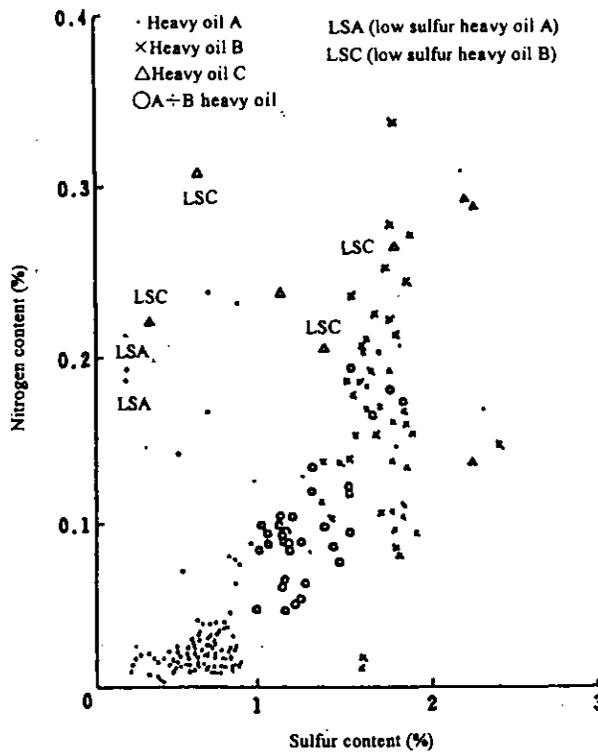


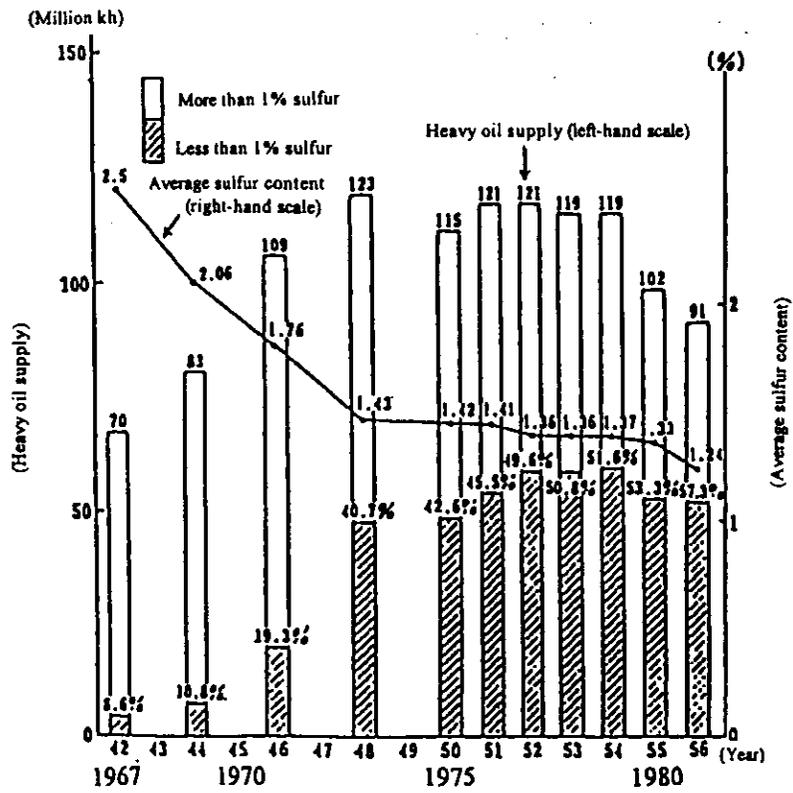
Fig.7.3.1 Relationship of sulfur and nitrogen in heavy oils.

(3) Solid fuels (bituminous coal, anthracite coal, lignite, coke)

- a) Because they contain a lot of ash and sulfur, large quantities of soot and sulfur oxides are produced.
- b) Because they also contain nitrogen, they also produce nitrogen oxides.
- c) It is difficult to control burning, skill is required.
- d) Large furnaces use pulverized coal firing and fluidized combustion, and by the exhaust treatment gas, soot and dust sulfur oxides and nitrogen oxides are removed.

7.3.5 Supply of high-quality fuels.

According to statistics going back to 1967, the amount of sulfur in fuels has decreased from 2.5% in 1967 to 1.33% in 1980. Fig.7.3.2 shows the supply of heavy oils and average sulfur content by type of sulfur. Also, the current level is approximately 1.1%. This is how all regions in Japan achieved the environmental standards for sulfur dioxide in 1985.



Note: according to fuel oil federation information

Fig.7.3.2 Supply of heavy oils and average sulfur content by type of sulfur.