

## B-2 Clarification of the sources and emissions of CH<sub>4</sub> and N<sub>2</sub>O

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**Total Budget for 1990-1994** 242,042,000 Yen (FY1994: 53,799,000 Yen)

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Nearly more than fifteen years have passed since the first evidence for an increase in the concentration of atmospheric methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) was reported. Up to present time, several time-series measurements of the trend of atmospheric CH<sub>4</sub> and N<sub>2</sub>O had been carried out in various locations of the world. The results obtained showed that the average temporal increase of atmospheric CH<sub>4</sub> and N<sub>2</sub>O during last decade were about 1% and 0.3% per year, respectively. Analysis of ancient air trapped in polar ice cores revealed that the concentration of atmospheric CH<sub>4</sub> had remained almost constant at less than half of the present concentration until 300 years ago, and that the accelerated increase in the concentration started in the 19th century for CH<sub>4</sub> and from 1940's for N<sub>2</sub>O.

Methane and N<sub>2</sub>O play an important role in the photochemical reactions of the troposphere and the stratosphere. In addition, they are the so-called greenhouse gases as well as CO<sub>2</sub> and CFCs, which have strong absorption bands and trap part of the thermal radiation from the earth's surface, accounting for almost 27% of the "radiative forcing" added to the atmosphere in the 1980s.

Atmospheric CH<sub>4</sub> and N<sub>2</sub>O are produced by a wide variety of natural and anthropogenic processes. Many researchers listed major sources and estimated emission values of CH<sub>4</sub> and N<sub>2</sub>O. However, there are large uncertainties in the estimated value of the individual sources and in the leading causes of the increasing concentration of atmospheric CH<sub>4</sub> and N<sub>2</sub>O.

In this study, we presented the results of analytical methods, field measurements, estimated emission values and the effects of many factors on CH<sub>4</sub> and N<sub>2</sub>O emission from solid waste disposal, volcanoes, rice paddy fields, upland fields, enteric fermentation by ruminants, animal husbandry, waste water treatment plants, biomass burning, natural wetlands, coal mining operations, and boiler of power station.

From these results, we estimated CH<sub>4</sub> emissions from various sources in Japan as follows: Solid waste disposal; 390-770 Gg, Coal mining; 150 Gg, Automobile; 12 Gg, Rice paddy; 160-320 Gg, Animal ruminant; 350 Gg, Wastewater treatment; 3-9 Gg, Biomass burning; 30 Gg, Animal waste; 8 Gg. Another annual CH<sub>4</sub> and N<sub>2</sub>O emission estimates from individual sources in Japan and global scale were also partially attempted.