

B-16 Development and Assessment of Strategy and Technology for Controlling CH₄ and N₂O to Reduce Global Warming (Final Report)

Contact Person Inamori Yuhei

Head, International Water Environment Renovation Research Team
Regional Environment Division
National Institute For Environmental Studies
Onogawa 16-2, Tsukuba, Ibaraki, 305-0053 Japan
Tel: +81-298-50-2400 Fax: +81-298-50-2560
E-mail: inamori@nies.go.jp

Total Budget for FY1998-FY1999 159,937,000 Yen (FY1999; 104,901,000 Yen)

Key Words : CH₄, N₂O, Controlling Technology, Human Activity, Development

The final goal of this project study is, to develop and establish the effective technology for controlling CH₄ and N₂O emitted from the human activity, and to assess the effectiveness of the developed technology.

In the field of incineration, it has been clarified that it is possible to improve a fluid bed combustion system that exhausts large quantities of N₂O by cutting the quantity of this substance by more than half through the use of a low-cost and practical control method that simultaneously desulfurizes and removes N₂O by adding a fluid medium to low cost coal powder. In the field of automobile, it has been shown that catalyst deterioration caused by the aging of a motor vehicle contributes to a decline in the catalyst's N₂O decomposition capacity on the super hot side and a consequent rise in the quantity of N₂O that it exhausts when driven. In the domestic wastewater treatment field, the relationships between operating conditions and the quantity of N₂O produced has been clarified, providing a framework for a simulation model to be used to popularize the use of control methods and demonstrating the feasibility of controlling the production of CH₄ by wetland management. In the waste management field, the relationship between the moisture content and the methane oxidation capacity of soil used to cover final waste disposal sites plus the types and concentrations of non-methane hydrocarbons in reclaimed land gas have been surveyed and statistical analysis performed to study methods of estimating the quantity of methane produced by the landfill disposal of industrial waste material in Japan. In the sewage field, the conventional process and the A₂O process have been compared to clarify operating conditions, the relationship between influential factors and the quantity exhausted, and the N₂O production reduction and cost reduction effects in a case where N₂O exhaust measures have been implemented in a sludge incinerator. In the wastewater and waste treatment field in North-east Asia, a study of the quantities produced by wetlands and soil treatment widely used in the region and factors controlled were studied to clarify the operating conditions for treatment methods that can be introduced in the future. In the field of agricultural and forest land, the quantity produced by forest soil was measured, the quantity of CH₄ from paddy fields and related factors clarified, and the measurement of N₂O from upland fields commenced to identify the effects of differences between regions and soils and demonstrate the importance of optimizing control methods. In the stock farm field, the quantity of CH₄ produced by water buffalo and dairy cattle numerous throughout South-east Asia was surveyed, showing that adding potatoes to pasture land is an extremely effective way to increase the quantity of milk produced and cut the generation of methane gas. The quantity of CH₄ generated by the treatment of deposited manure was studied in relationship to operating conditions to demonstrate the importance of rationalizing manure management.

Through the success of these studies conducted in various fields, methods of accurately evaluating the inventory of all these emission sources have been studied in order to obtain more precise inventories of the quantities of CH₄ and N₂O that are generated and absorbed. And to prepare a reduction action plan to contribute to the efficient reduction of GHG, studies and trial calculations of cost based evaluation methods have been performed accounting for original goals: the reduction effects of reduction measure technologies that are now being developed, or in the case of water treatment, efficient treatment.