



Kasumigaura Southern Coastal City Area

Development of Integrated Processing/Recycling System for Food- and Livestock-Related Biomass

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Core Research Organization

The Science and Technology Promotion Foundation of Ibaraki

Major Participating Research Organizations

Industry...JA ZEN-NOH, Baiolex Co., Ltd., Shintou Co., Ltd

Academia...University of Tsukuba

Government...National Institute for Environmental Studies, National Agriculture and Food Research Organization, Ibaraki Prefectural Government

Typical results of City Area Program

1. Development of a system to turn food waste and livestock manure into energy

Methane fermentation has been used in sewage treatment plants, etc., for a long time, but a recent subject of attention is methane fermentation facilities that simultaneously dispose of biological waste and produce energy. In the system we have developed, food waste and livestock manure are mixed and the resulting biomass undergoes efficient methane fermentation. The released biogas is combusted to produce electricity and to heat water, and residual liquid from the fermentation is cleaned by an electrochemical process. Thanks to two-phase methane fermentation, this system reduces the fermentation time to less than half what was previously required, and also reduces the size of the facility by half. With the reduction in construction and other costs, this system is expected to lead to commercial applicability.



Picture of the entire biomass energy recovery system

2. Establishment of a system to stabilize and reuse methane fermentation residue and solid waste such as sludge

We investigated the possibility and utility of carbonization (reduction/heat treatment) as a means of reducing the volume and increasing the reusability of organic waste products released in the process of treating livestock waste. It became clear that as the temperature of carbonization rises, the resulting carbon becomes more basic. It also has a much smaller surface area and larger pores than chemically processed activated carbon, and is consequently appropriate for the removal of large-diameter pollutants. This process is expected to find use in situations that involve the production of large amounts of organic solid waste, such as livestock farms and sewage treatment plants.



Equipment for waste carbonization (reduction and heat treatment) process (rotary kiln)

About the approach after the project

1. Construction of a demonstration plant by Tsukuba Bio-ecosystem Cooperative

Nine (9) companies from the western part of Ibaraki Prefecture (including construction and shipping companies), sympathizing with the idea of a "recycling society" advocated by Professor Emeritus Maekawa from Tsukuba University, founded the Tsukuba Bio-ecosystem Cooperative, headed by Mikio Takatsuka. A demonstration plant was designed based on the results of our research on a system to simultaneously dispose of and produce energy from mixed food/livestock waste. This plant was established with Bio-ecosystem Cooperative funds, and completed in March 2005. It began operations in the following month. It uses two-phase methane fermentation to process both livestock waste and solid wastes such as kitchen garbage.



Demonstration plants of Tsukuba Bio-ecosystem Cooperative

2. Development of a technique to make bottom sediment of China's Suzhou River into a useful resource

Due to waste water from dye factories that used to line both sides of the Suzhou River where it runs through Shanghai, the river bottom sediment is polluted with toxic substances such as heavy metals and dioxins. When we tried cleaning this complexly polluted sediment with a pilot version of our two-step carbonization (reduction/heat treatment) equipment, over 99% of the contaminating dioxins were decomposed, and the heavy metals such as chromium were nearly completely stabilized.

The scale of the plans will be enforced in the future to achieve an actual plant for this process in cooperation mainly with Shanghai.



Equipment for reduction and heat treatment (experimental site at Shanghai Jiao Tong University)