

Renewable Energy Creation and Development of Recycle-Oriented Agriculture

Kyotango City



Background

In a region like this city with a long coastline, a rise in the seawater level resulting from global warming is feared to have a significant effect on citizens' lives. Therefore, the utilisation of energy sources that would replace fossil fuel is required. The city adopted the Kyotango City Biomass Town Concept in 2007 to promote effective use of biomass that exists in the region and to work to create a recycle-oriented society.

Purpose of Project

Clean energy (electricity generation) and liquid fertiliser for agriculture are produced from food scraps previously disposed of as waste, for effective local use. Through doing so establish a sustainable recycling-oriented society that is environmentally friendly. Agricultural produce made with the liquid fertiliser carry the "Power of the Ring" brand.

The liquid fertiliser made from food waste is used as a tool to add value to agricultural produce, in order to enhance incomes at producers.

Outline of Project

In October 2009, Kyotango City acquired without cost a biogas power generation facility, the core equipment in a NEDO demonstration project. The facility was renamed the Kyotango City Eco Energy Centre and started business anew.

The Eco Energy Centre is regarded as a central facility in the work to build a recycle-oriented so-

ciety in Kyotango City. The centre receives food waste from food factories as materials, puts the waste through a methane fermentation process and conducts biogas-fired power generation.

The key by-product from the methane fermentation after the biogas is procured, called digestive fluid, can be used in agriculture as liquid fertiliser. After examination on effective use of resources and efficiency of the facility, the use of all of the methane fermentation digestive liquid in agriculture started.

As a result of this, it has become possible to produce electricity and fertiliser from disposed waste. At present, the share of locally procured materials used in the project is low. But work is progressing to create a circle of resources recycling in the region by expanding in stages the number of households whose food waste is separated for recycling, so that all food waste from all households in the city will be supplied to the facility from fiscal 2018.

In fiscal 2014, the facility began receiving all food waste from the meal services provided at all nurseries and elementary and junior high schools in the city. At the same time, rice produced with the liquid fertiliser was provided in school meals as part of food cycle-related work.

Features and Advanced Aspects

The two useful resources of clean energy (electricity generation) and liquid fertilizer for agriculture are produced from food scraps in the region that were previously disposed of as waste.

Under the manager designation system, the city appointed a private company rich in knowhow and experience in the environmental and related areas as the manager and operator of the facility. This has enabled efficient facility operation that would not have been achieved if the facility was run directly by the city.



Kyotango City Eco Energy Center



"Power of the Ring" Paddy-Field Rice Cultivated with Liquid Fertilizer

Effects of Project

Demand is rising for lifestyles more harmonious with the environment and for the production of safer energy, while hopes are increasing for the establishment of a model of local electricity production and consumption ahead of the full liberalisation of power retailing. Against this background, there are rising expectations that biogas power generation equipment with stable energy supply capabilities will play a key role as a base-load electricity resource.

There is room for further improvements in how to ensure stable facility management and how to use digestive liquid from the methane fermentation process. The management method at the Eco Energy Centre, which procures energy efficiently

by using waste as a material, could become a model case of resources recycling.

Problems and Responses

◆Before Project Implementation

The Kyotango City Eco Energy Center was built as a NEDO demonstration facility and was given to Kyotango City after the end of the demonstration project. It is a considerably large-scale facility for a biogas power plant, so the burden of operation costs, including repair expenses that arise every year, is heavy.

In order to ease the fiscal burden, electricity from the facility is sold on favourable terms through the feed-in-tariff (FIT) system, under which electricity from renewable energy sources is sold at preset prices. It was also for the sake of improving the facility's income-spending balance that the highly costly wastewater treatment process was scrapped and that a decision was made to use all digestive liquid from the methane fermentation process in agriculture.

Such profitability improvement measures would be essential to make biogas-fired clean energy power generation projects sustainable.

◆After Start of Project

The Kyotango City Eco Energy Center scrapped its wastewater treatment process in December 2012 in order to improve the centre's profitability. This has made it necessary to use all methane fermentation digestive liquid in agriculture. So it has also become essential to keep a good balance between the amounts of materials (food waste) that the facility receives and the amounts of the liquid fertiliser sprayed.

An excessively high intake of materials gives rise to a liquid fertilizer surplus, making it necessary to dispose of it externally. If too much liquid fertilizer is sprayed, the fertilizer runs short, making it impossible to fully meet demand from agricultural

producers.

It is necessary to continue highly sophisticated adjustment in cooperation with Amita, in order to keep a good balance between materials intake and the amounts of liquid fertilizer sprayed.

Outlook

On Oct. 30, 2015, Kyotango City was selected one of the "Biomass Industrial Communities" by the central government. From fiscal 2016, industrialisation projects will be promoted in order to materialize Kyotango City's concept of creating a biomass industrial city. Among them, the "'Power of the Ring' Town Creation" project based at the Eco Energy Center is the main one, as it is aimed at setting up a recycle-oriented society.

The city has set a plan to convert all food waste from households collected from across the city into a resource at the Eco Energy Center by fiscal 2018. Every year, the city works to expand the area where such conversion is carried out.

As for electricity generated at the Eco Energy Centre, leftovers from what is consumed at the facility are sold to a power company. From the next fiscal year, the city will consider whether the centre can provide electricity in a stable fashion to a planned regional power company for which the city is conducting feasibility research.

Reference URL

https://www.city.kyotango.lg.jp/kurashi/kankyo/kankyo/eco_energy/index.html *Japanese

<http://www.maff.go.jp/j/shokusan/biomass/pdf/kyotan.pdf> *Japanese

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Flow Chart of System to Produce Electricity and Fertiliser from Food Waste

