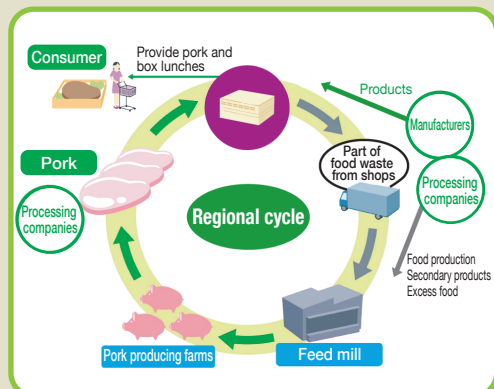


Japan's concrete measures for food waste, etc.

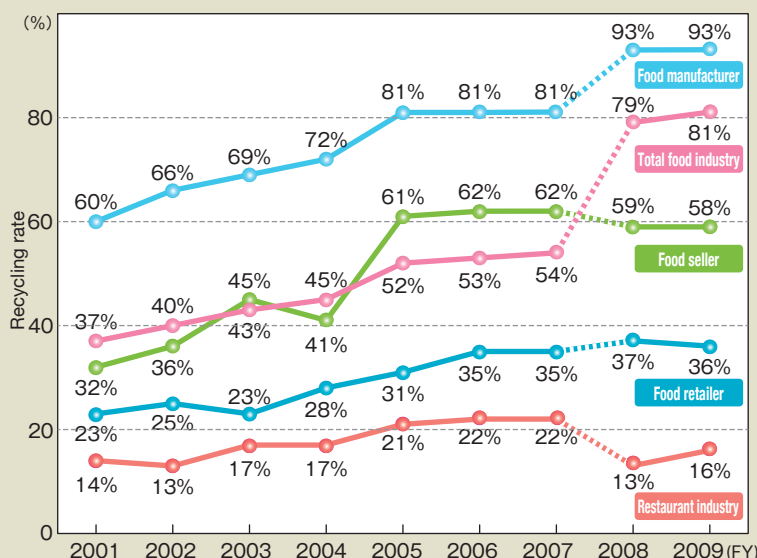
Fertilizer and feed producers, users, collection and transport companies cooperate to collect and treat two million tons of food waste, etc. annually. The waste is then recycled into feed and fertilizer, or gas fuel by methane fermentation for power generation.

There are cases in Japan of restructured pork production infrastructure that reuses and recycles food waste, etc. as feed in order to reduce CO₂ emission from incinerators.

Structure a society where recycling is completed within the region (Example)



Status of recycling food waste, etc.



※ Method of estimation for 2008 and onward better reflect the actual status; therefore comparison of the values before and after 2008 will not be accurate.

Law for promotion of Recycling and Related Activities for treatment of Cyclical Food Resources (Food Recycling Law)

The Food Recycling Law that came into effect in 2000 and calls for the reduction of food waste, etc. and their collection surpassing municipals to create a recycle loop for feed and fertilizers, with which a recycling society is achieved.

Column

Recovery of energy and other resources from food waste biomass

Foreign matter is removed from food waste to produce safe feed. Composting and methane fermentation facilities are actively recycling waste while employing technology to reduce foul odor and dirty water. Reduction in disposed food waste, etc. leads to a decrease in waste disposal cost and holds down greenhouse gas emissions.



Feed production facility



Composting facility

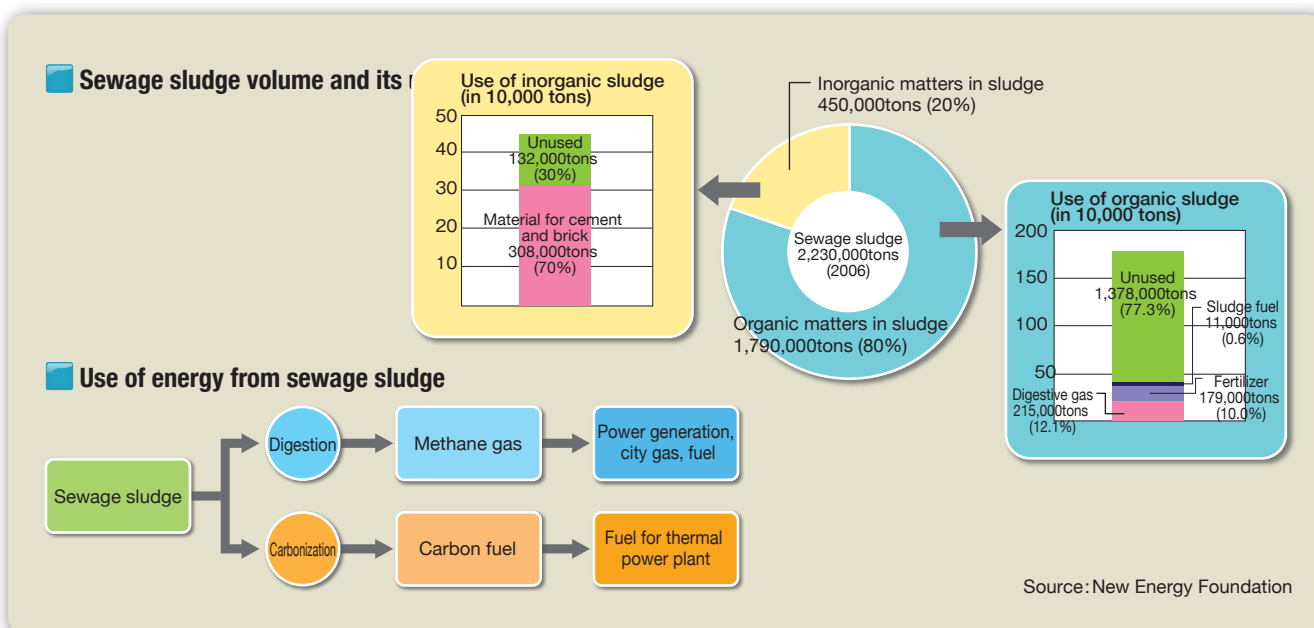


Methane fermentation and power generation facility

Using energy generated from sewage sludge

Sewage sludge collected at sewage treatment plants in Japan totaled 2,230,000 tons in the fiscal year 2006. Composition of the sewage sludge is approximately 80% organic matter (1,790,000 tons) and the remaining 20% is inorganic matter (450,000 tons). Seventy percent of inorganic matter is recycled as material for cement and bricks. Organic matter is recycled as fertilizer (10%), sewage gas (12%) and sludge fuel (0.6%), and the remaining 77% is incinerated or buried.

If 2,230,000 tons of sewage sludge is recovered as energy, heat equivalent to that produced by approximately 975,000 kiloliters of crude oil is generated. Fossil fuel is now being replaced by fuel obtained from sewage sludge in order to reduce CO₂ emissions. There are two methods of recycling sewage sludge as fuel: sewage gas (methane gas) generation and carbonization (carbon fuel). The figure below shows the recent use of energy from sewage sludge in Japan. Sewage sludge will always be generated by human activity. Seeing this as energy, energy from the sludge can be supplied stably in large cities, increasing the value of sludge as a resource. Recycling sewage sludge as energy is expected to increase to full-scale in the years to come.

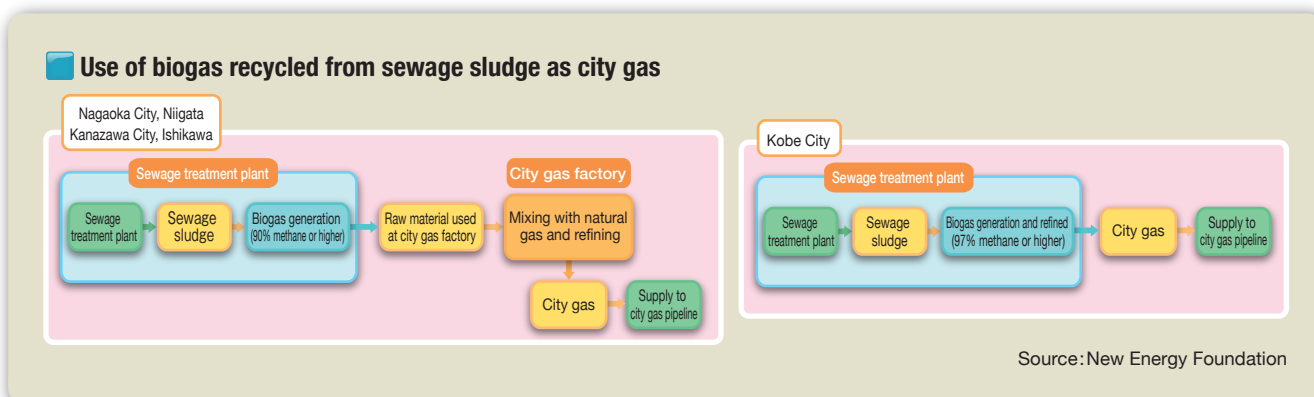


Use of Biogas from sewage sludge

Kobe City began a project in October 2010 through which biogas (97% methane or higher) from sewage sludge is injected directly into city gas pipes. Biogas generated from this project totals 800,000m³ per year, which is equivalent to the gas used by 2000 households. The effect on CO₂ emission reduction from this operation is said to be 1,200tons per year.

In other cases, biogas produced from sewage sludge - 600,000m³ in Nagaoka and 280,000m³ in Kanazawa per year - was supplied to city gas production plant, and used as fuel for plant operation.

The biogas business in Kobe employs the method of supplying the gas as city gas without passing through the city gas production plant. Gas is delivered directly into pipelines without detouring to the city gas production plant, which enables full use of the biogas generated at the sewage treatment plant.



Utilizing farming, forestry and paper industry biomass as energy

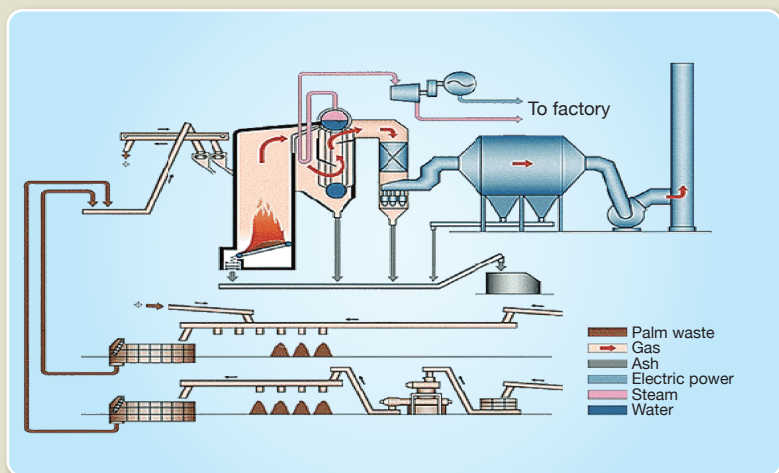
Biomass boilers in Asian countries

There is a high ratio of organic waste in waste products, and it is desirable to make effective use of organic waste generated from paper factories and from the palm oil production process.



■ Bark, wood debris incinerator boiler, power generation facility

Bark generated by paper factories, wood refuse generated by lumber and plywood factories, and wood debris generated from the dismantling of old homes and buildings are some of the wide-ranging material used for boilers. Moisture content and shape differ depending on where the waste is generated, and it is burned in several types of incinerators. In order to obtain steady supply of power, moisture content in fuel is unified, and the operational functions of high performance power plants is introduced.



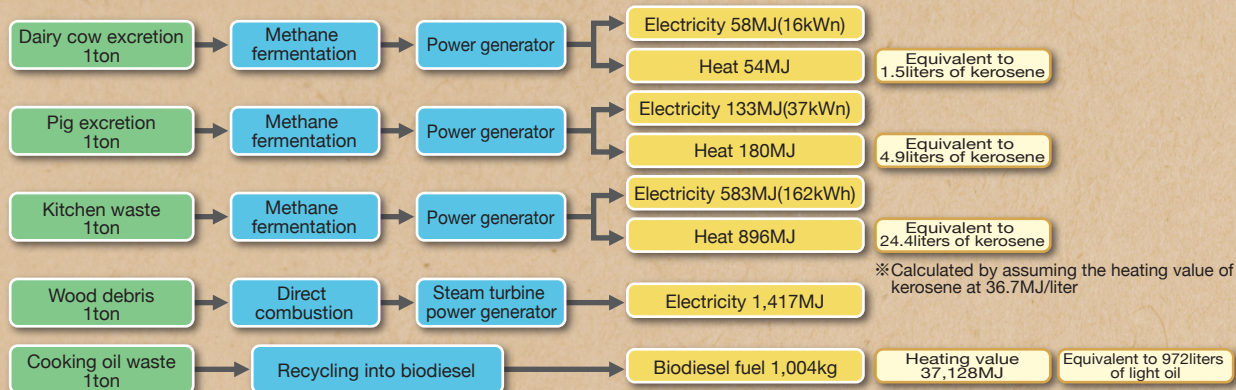
■ Palm incineration boiler, power generation facility

Cooking oil is extracted from palm. Palm oil is produced in Malaysia and Indonesia and plays a role in tropical farming as an export item. Palm waste is a valuable boiler fuel, and steam generated from boilers is used for oil extraction process or electrical power generation which responds to the electricity demand within the plant. This is a small-scale operation, but supports the driving force of the tropical industry.

Source: Takuma Co., Ltd.

Column

Transition from simple treatment to an energy source



※Substance or energy produced by transition of 1ton biomass feedstock

Excerpt from: Design and Evaluation of the Biomass Utilization System (Edited by the systemization sub-team of the biorecycling of wastes from agriculture, forestry and fisheries researching sector)