

Reference 4

Case Examples of Biomass Towns in Japan

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# Case Examples of Biomass Towns in Japan

- These Biomass Towns in Japan can serve as references for the needs and issues ASEAN countries have.

Characteristics of the two example regions

## **Town of Oki, Fukuoka Prefecture**

- Aims to create recycling-based town by using waste material as resource
- Important initiative is to encourage for people to use liquid fertilizer and biogas produced by methane fermentation of food waste, human waste, and septic tank sludge. Separated waste collection system in cooperation with the local community is a creative activity.
- Projects implemented after many testing operation in cooperation with university and research institutions, before the Biomass Town Plan was finalized.

## **Town of Moteji, Tochigi Prefecture**

- Composting project is a central activity of Moteji's Town Plan, and the town is an example to produce high quality compost.
- Projects are conducted in cooperation with both local community and farmers at every stage of the process, from raw material collection to sales of the produced compost.

# (1) Summary of the Biomass Town Plan

## Facts about Oki (As of March, 2011)

Rural community in southern Fukuoka Prefecture

Population: about 14,500

Numbers of households: about 4,600

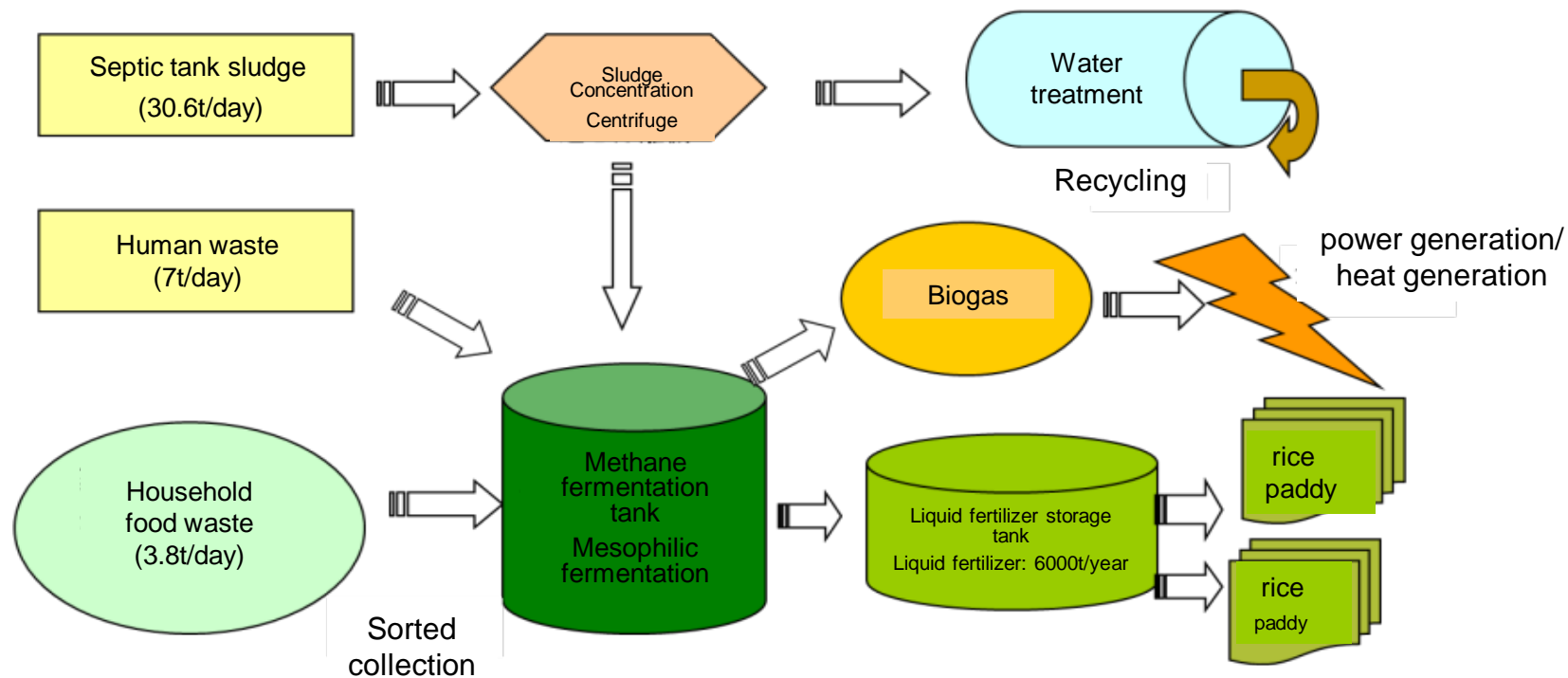
Area: 18.43 km<sup>2</sup>

Biomass Town Plan formulation: February in 2005

## Abstract of Oki's Biomass Town Plan

- Energy use generated from biogas made from food waste, human waste, and septic sludge.
- Methane fermentation byproduct, digestive liquid, is used as organic fertilizer.
- The amount of garbage treated is cut by approximately 50%.

## Biomass cycle in Oki



## (2) Biomass Potential and Status of Utilization in Oki

Biomass	Biomass potential	Conversion/treatment method	Utilized amount	Use/sales	Rate of use
(Waste biomass)					
Food waste	about 1280 t/year	Composting	about 109t/year	Field restoration	about 8%
Cooking oil waste	about 70 kl/year	BDF production	about 3kl/year	Light oil substitute fuel	about 4%
Livestock waste	about 1,100 t/ year	Composting	1,100t/year	Field restoration	100%
Septic tank sludge	about 6,300 kl/ year	Effluent after treatment			0%
Human waste	about 2,800 kl/ year	Effluent after treatment			0%
Sawdust waste from mushroom cultivation	about 13,200 t/ year	Composting	13,200t/year	Field restoration	100%
Wood scrap from furniture makers, etc.	about 6,600 t/ year		about 2,000t/year	Livestock bedding	About 50%
		Chipping	about 1,500t/year	Recycled board	
(Unused biomass)					
Rice straw	about 3,175 t/ year	Field restoration			0%
Wheat straw	about 875 t/year	Field restoration			0%
Rice husks	about 150 t/year	Smoked charcoal, livestock bedding	about 150t/year	Soil improvement material, livestock bedding	100%
Rice bran	about 300 t/year		about 300t/year	Sold for enoki mushroom cultivation beds	100%
Recoverable water plants (harvest potential)	about 14,400 t/year 1,440 t/year	Untreated			0%

### (3) Biomass Utilization Goals

- Waste Biomass

- Food waste: 100% utilization of household and industrial food waste through separated waste collection
- Human waste/septic tank sludge: 100% utilization
- Sawdust waste from mushroom cultivation: Present utilizing 100%. Aiming to provide high quality compost.
- Cooking oil waste: 100% utilization in fuel production
- Pig excrement, urine: 100% utilization in compost
- Lumber/furniture waste wood: 80% utilization in spa facility's heat sources, boiler fuel, etc.

- Unused Biomass

- Rice/wheat straw: Presently shredded and used in soil improvement agent. Considering possibility of alcohol production.
- Rice husks: Present utilizing 100%. Considering possibility of new use methods such as soil improvement agent.
- Rice bran: 100% utilization
- Water plants (water hyacinth, etc.): Establishing harvest and collection system, and aiming 50% utilization of them primarily in compost.

## (4) Summary of Primary Utilization Projects

Project name	Facility type	Facility name	Scale, etc.
Construction of a recycling center	Methane fermentation	Raw material collection/pre-treatment facility	Food waste; 3.8 t/day
			Human waste/sludge; 14.3 t/day
		Biogas plant	Scale; 18.1 t/day
		Energy generation facility	30 kW × 2
		Liquid fertilizer storage facility	1,200 t
		Water treatment facility	30 m <sup>3</sup> /day
		Deodorizing facility	
	Regional recycling promotion	Organic liquid fertilizer analysis center	Liquid fertilizer analysis room and equipment
		Recycling education center	Hands-on corner
			Audio-visual room, etc.
		Local production - local consumption promotion center	Farm produce tasting room
			Farm produce sales corner
		Office	Office/conference room
	Organic liquid fertilizer supply	Liquid fertilizer storage tanks	1,200 t × 2
		Liquid fertilizer applying pipeline	Total of 2,000 m
		Liquid fertilizer spray vehicle	1
		Vacuum truck	3
	Liquid fertilizer verification test		1,500 m <sup>3</sup>
Field mustard Project	BDF	BDF production plant	200 L batch process

## (5) Action Schedule

- Installation of biomass recycling education facility and recycling facility for food waste, human waste, and septic tank sludge
  - August, 2005                      Facility Construction starts
  - June, 2006                        Facility Construction finishes
  - July – October 2006          Test Operation
  - October, 2006                  Operation starts
- Separated food waste collection starts in all town
  - July, 2006
- Paddy rice cultivation using organic liquid fertilizer
  - 2007
- Separated collection of cooking oil waste and BDF production
  - September, 2003: Household cooking oil waste separated collection starts, BDF is utilized for fuel of collection vehicle
- Utilization of waste sawdust from mushroom cultivation, livestock manure composting, and applying service start
  - 2007
- Utilization of lumber off-cuts from factories for fuel
  - Pending
- Water plants composting
  - Verification testing of liquid fertilizer is done in biogas plant since 2006
- Alcohol fermentation and distillation from rice/wheat straw
  - Pending

## (6) Advantages of Projects Implementation

- Amount of waste treated was reduced (by 47% from 2005 to 2010) through waste separating and effective utilization as biomass resources, etc.
- Waste treatment expense was reduced (by 23% from 2005 to 2010)
- Four thousands visitors per year came.
- Resident environmental awareness was fostered through separated collection activity.



## (7) Characteristics of the Biogas Plant

- Odorless due to complete anaerobic fermentation
- Methane gas is collected and used to generate energy for the plant, resulting in drastic reduction of treatment costs.
- Merit to use digestive juice as organic fertilizer



Reference: Town of Oki, Fukuoka Prefecture

## (8) State of Digestive Liquid Utilization

- Approximately six thousands tones of digestive juice is produced annually and used as liquid fertilizer in paddy rice, wheat and other crop production.
- Oki town uses tank vehicle to apply the liquid fertilizer with charge.
- From 5 to 7 tones of the liquid fertilizer per 10 hectare is applied in 50 hectare of rice paddies and 50 hectare of wheat fields.

### Fertilizer components

Item	Content
Phosphates	0.12 %
Total potassium	0.11 %
Total nitrogen	0.25 %
Ammonium nitrate	0.13 %



## (9) Food Waste Collection

- Households separate their food waste after removing foreign materials and put waste in collection buckets on designated time of fixed days.
- Collection buckets are placed at fixed site in the evening before the collection day.
- Waste is collected twice a week free of charge.
- Food waste from households is carried by residents in a special drainage bucket.

