[Korea] Food Waste Management

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Contents

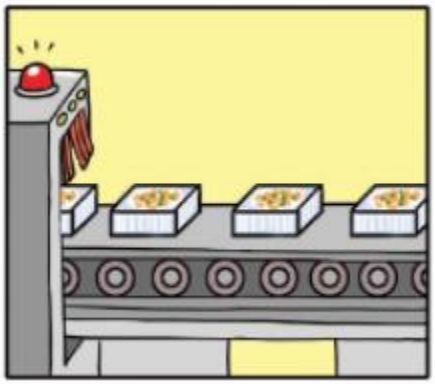
I

Food Waste Generation State

Ⅰ. Food Waste Generation State

What is Food Waste?

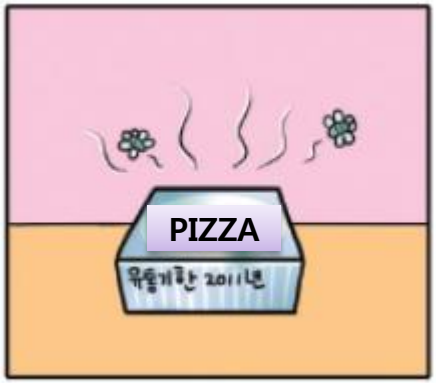
- Korean Local Governments Act [Definition of Food waste]
  - In terms of the food waste is remained cooking ingredients or wastes generated during food processing, distributing, cooking, storing or retailing, etc. and thrown out food.



Food Processing

Household

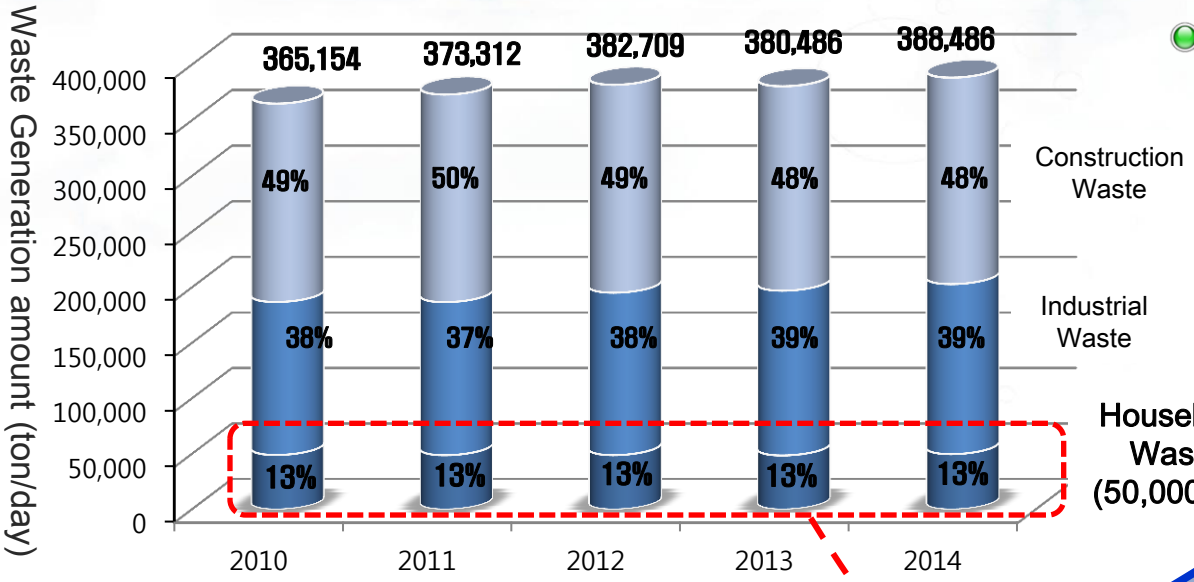
Kitchen and Restaurant



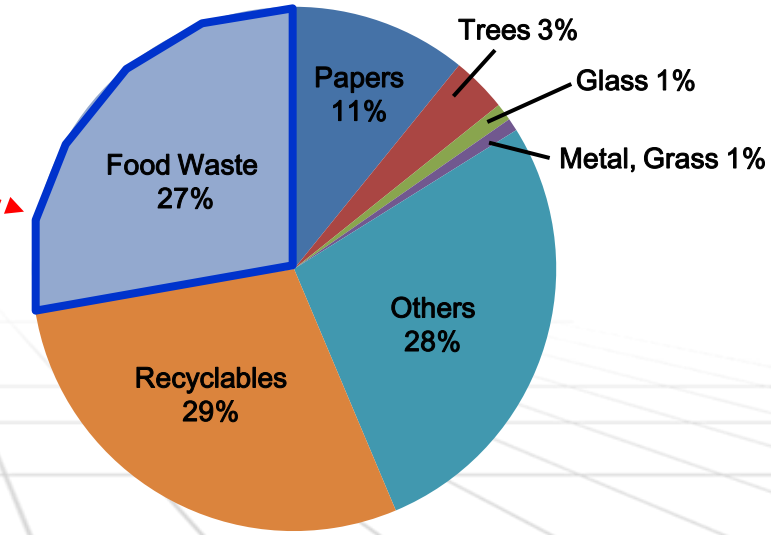
Retail

Ⅰ. Food Waste Generation State

Food Waste Generation State



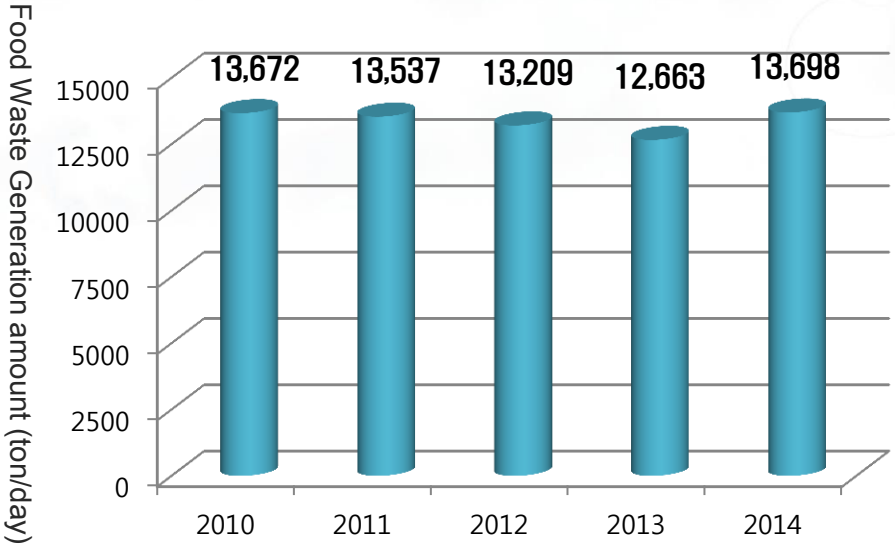
- Around 13% of total waste is household waste.



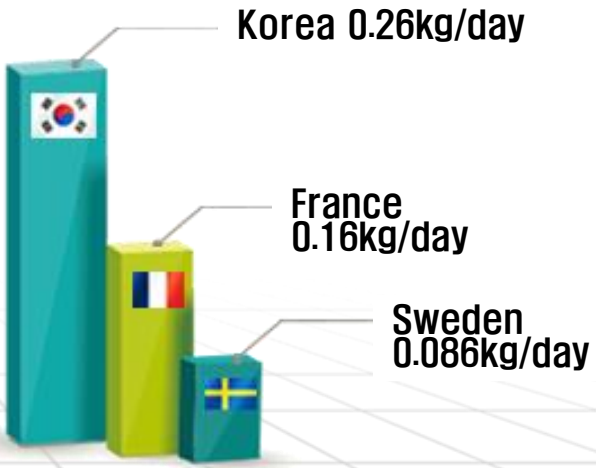
- Household waste includes paper, recyclables, food waste, etc. And around 27% of total waste is food waste (around 14,000Ton/day).

Ⅰ. Food Waste Generation State

Food Waste Generation State

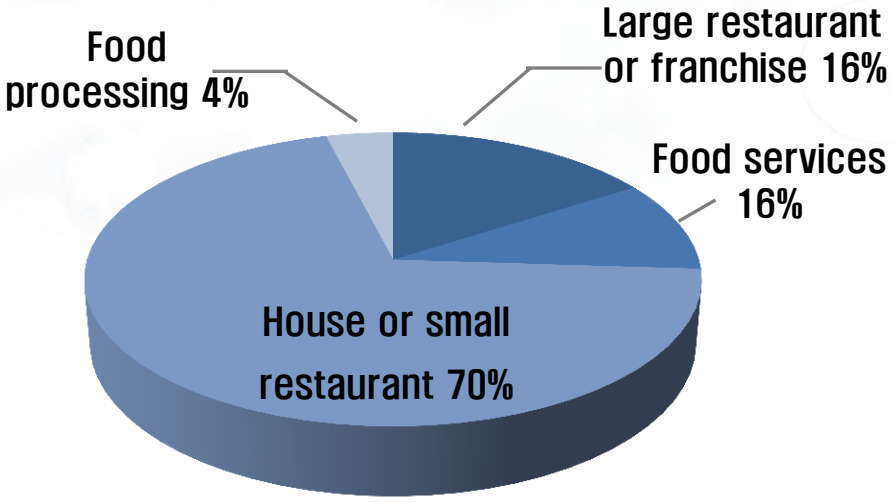


- Daily generation amount of Korean food waste is approximately 14,000ton.
- Korean waste generation per capita is 0.26kg/day which is comparatively higher than other developed countries.



Ⅰ. Food Waste Generation State

Food Waste Generation Places



- 70% of Food waste is generated from houses and small restaurants.
- In the case of food waste from houses, cooking waste has the highest portion. In case of restaurant and food services, remaining food has the highest portion.

〈 House 〉 〈 Restaurant〉 〈 Food services 〉 〈 Wedding, buffet 〉

Ⅱ

Food Waste Treatment Condition and Policy Direction

Ⅱ. Food Waste Treatment Condition and Policy Direction

Political Background of Food Waste Disposal System

In 1995 : Volume-rate garbage disposal system
- Reduction of household waste and lead to recycling
- Household waste recycling and Establishment of recycling system

In 2005 : Direct land-filling of Food waste is not allowed.
- Environmental pollution by odor and leachate
- Expansion of number of food waste treatment plant and high treatment unit cost

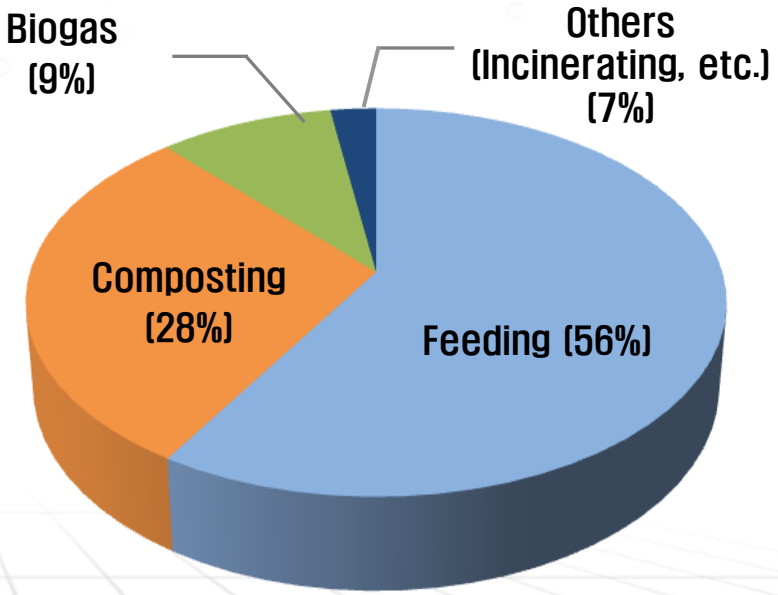
In 2013 : Prevention on dumping food waste into the ocean
- [London Convention] Convention on the prevention of marine pollution by dumping of wastes and other matters
- Land food waste treatment system, Leachate treatment and use

Ⅱ. Food Waste Treatment Condition and Policy Direction

Status of Food Waste Treatment Plant

- Basically, recycling method is the way to treat food waste. (Recycling rate : 93%).
  - [Feeding and Composting plants] Total Capacity : approx. 16,000ton/day, 84% of the total plants
  - [Biogas] Total Capacity : approx. 1,700ton/day, 9% of the total plants

Item	Capacity (ton/day)		
	Public	Private	Sum
Feeding	3,220	7,666	10,886
Composting	2,066	3,387	5,453
Biogas	1,741	-	1,741
Others (Incinerating, etc.)	422	32	454
Total	8,449	11,085	19,534

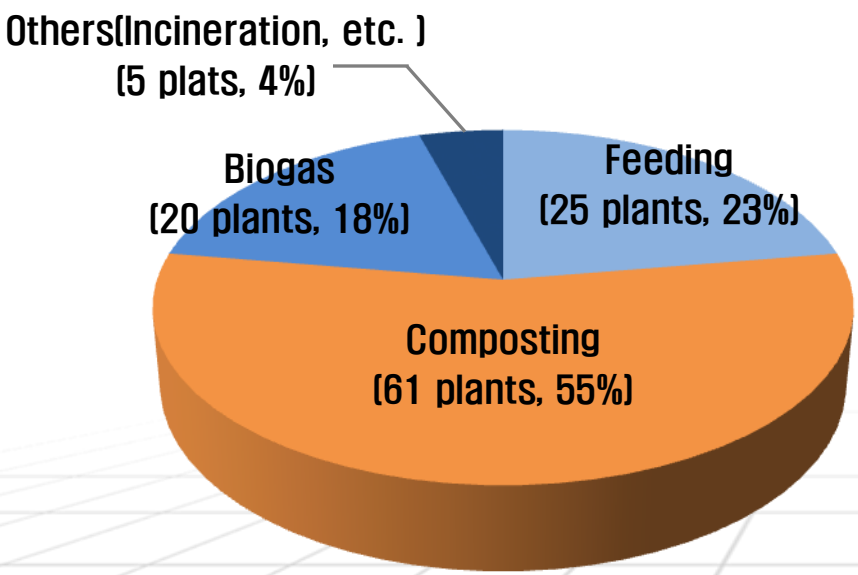


< Capacity of food waste treatment plants >

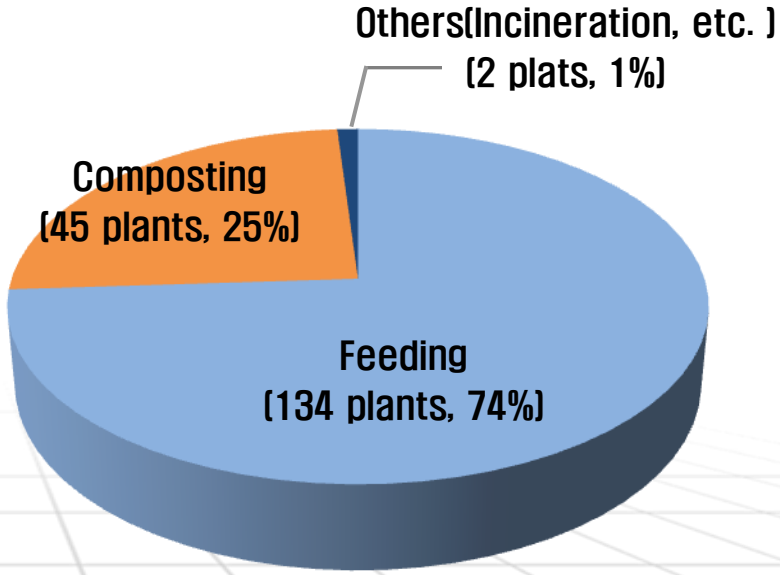
Ⅱ. Food Waste Treatment Condition and Policy Direction

Status of Food Waste Treatment Plant

- Generally, Food waste is treated by the food waste treatment plant and 292 plants are being operated recently. (Public : 111 plants (37%), Private : 181 plants(63%))
- The treatment methods of the public plants are normally selected by different local condition and mainly consists of composting, feeding, biogas, etc.
- Normally, the private plants select the feeding method which is possible to ensure low production cost and sales revenue.



< Public Plant (111 plants) >



< Private Plant (181 plants) >

Ⅱ. Food Waste Treatment Condition and Policy Direction

Food Waste Treatment Plant (Feeding)

Food waste → Intake/ storement → Segregator/ Crusher → Dewatering → Dryer → Cooler/ Packer

< Pretreatment Plant>

< Main treatment Plant >

Ⅱ. Food Waste Treatment Condition and Policy Direction

Food Waste Treatment Plant (Composting)




< Pretreatment Plant>

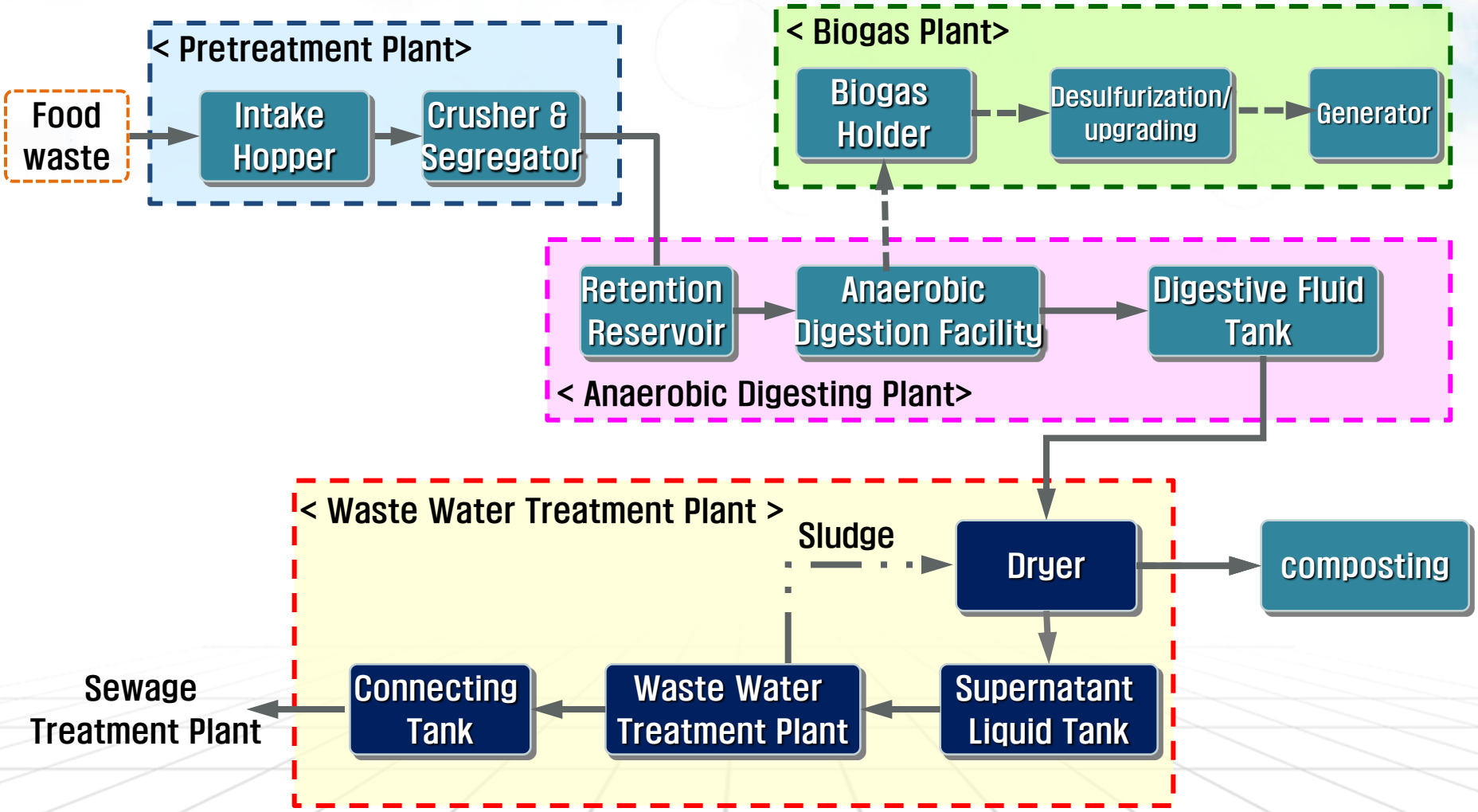
Food waste → Intake/ storement → Segregator/ Crusher → Dewatering → Mixer → 1st fermentation → 2nd fermentation → Packer

< Main treatment Plant >



Ⅱ. Food Waste Treatment Condition and Policy Direction

Food Waste Treatment Plant (Biogas)



Ⅱ. Food Waste Treatment Condition and Policy Direction

Food Waste Leachate Treatment Plant

- Food waste consists of 80% of moisture and organic which is easily decomposed.
  - Much of food waste leachate is generated during storing, treatment, recycling (Composting, Feeding) processing for food waste.
- Food waste leachate
  - [Before 2013] Mostly dumped to the ocean
  - [After 2013] Mostly treated by the treatment plants (the Pubic sewage treatment plant, public wastewater treatment plant, leachate treatment plant, etc.) or the anaerobic treatment by biogas plant (Generating biogas)

Item	Connecting treatment	Biogas	Recycling	Total
Treatment throughput (ton/day)	7,252	1,854	558	9,664
Portion	75%	19%	6%	100%

Ⅱ. Food Waste Treatment Condition and Policy Direction

Waste Treatment Policy Direction

Item	Past Policy	Current Policy
Issue	Waste pollution	Climate change, exhaustion of raw materials and energy
Purpose	Clean Environment Society	Resource Circulation Society
Strategy	Separate collection → Recycling → Treatment	**Efficient consumption and emissions(reduction)** → Recycling → **Waste to energy** → Advanced treatment
Concept	“Waste”	“Resource Circulation”

Ⅲ

Food Waste Reduction Management

Ⅲ. Food Waste Reduction Management

What is the Volume-Rate Disposal System for Food Waste ?

- The best way to reduce food waste is "To reduce from the generation".
- The volume-rate disposal system for food waste
  - Method : Charge a fee depending on waste amount same as electricity or tap water
  - Purpose : Lead to reduce food waste amount / Borne by discharger / Actualize charging fee

Existing Method

Even lots of waste amount, same charge

Unit Cost × 2 = Unit Cost × 1

Volume-Rate Disposal System Method

Proportional Charge

Unit Cost × 2 > Unit Cost × 1

Ⅲ. Food Waste Reduction Management

How to Do for The Volume-Rate Disposal System for Food Waste

- The volume-rate disposal system is operating by three types.

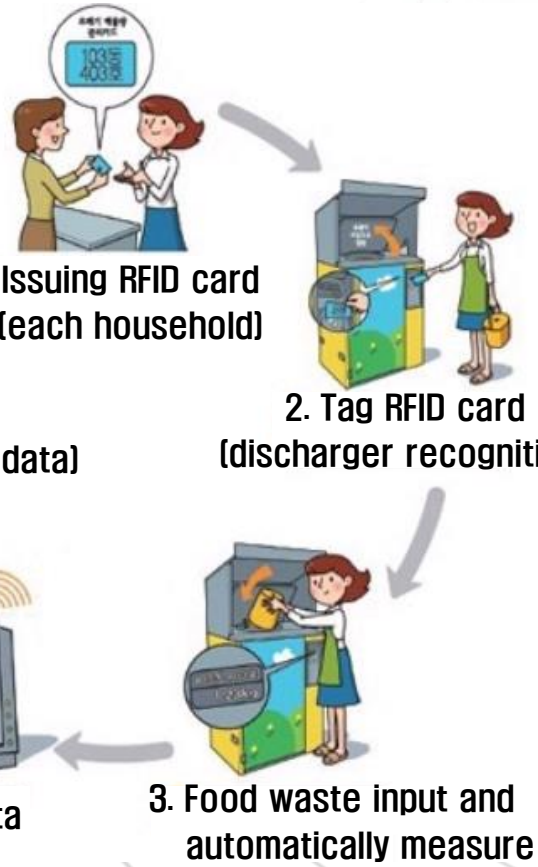
Item		System
RFID		• RFID card recognition, discharging → Discharger and waste weight information automatically transfer to the main system (Ministry of Environment). – Charge fee: ① Fee distribution to each family housing through information in the main system ② Charge by the payment card
Pay chip		• Discharger sticking pay chip to the container – Charge fee : Payment chip purchasing cost
Food waste bag		• Discharger buys the food waste bag – Charge fee : Purchasing cost for food waste bag

※ RFID : Radio Freqence IDentification

Ⅲ. Food Waste Reduction Management

Food Waste RFID System

- What is RFID (Radio Freqence IDentification)?
  - By the RFID card, automatically identify discharger and measure weight of waste.
  - Based on the data, discharger get a waste bill and pay a waste fee.



Ⅲ. Food Waste Reduction Management

How to Do for The Volume-Rate Disposal System for Food Waste

- Payment based on weighting RFID System is the most effective.

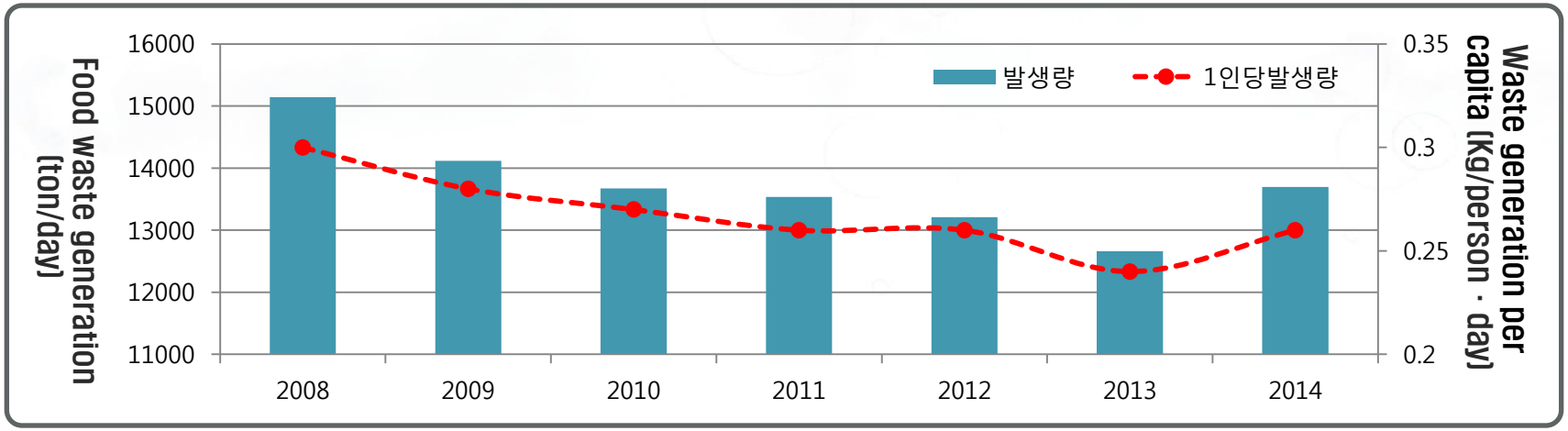
Item	Discharger recognition	Measuring	Charge	System Connection
RFID	Possible (Electronic tag)	Weight	By each household	O
Pay chip	X	Volume	By each household	X
Food waste bag	X	Volume	By each household	X

- In Korea, apartments or large scale of houses try to adopt RFID system step by step.
- Among 146 of targeted local governments for the volume-rate disposal system, 119 local governments adopt RFID (81%), residential use rate is around 30% (Dec.2015).

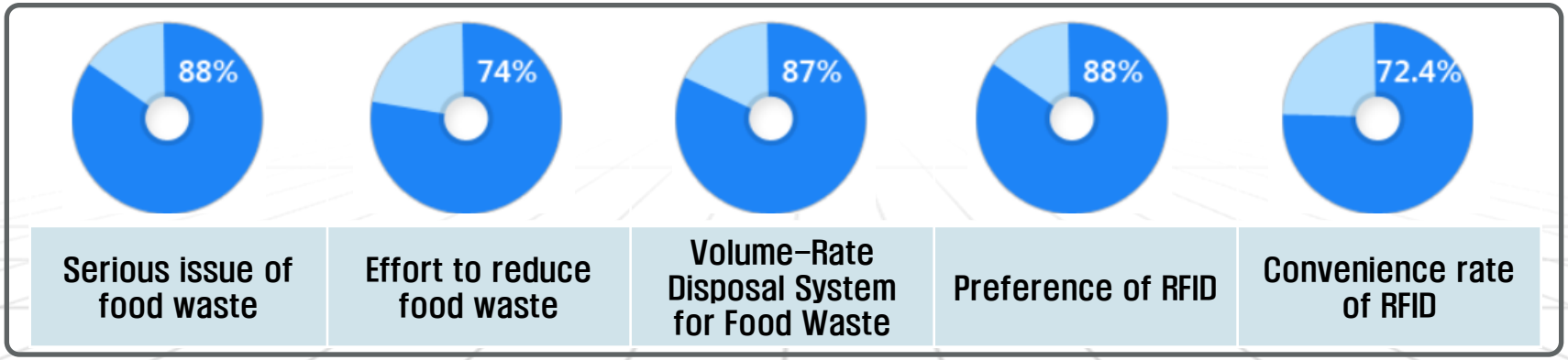
Ⅲ. Food Waste Reduction Management

Effects of the Volume-Rate Disposal System for Food Waste

Food Waste Generation Trend



National consciousness for food waste reduction



Ⅳ

Energy Management from Food Waste

Ⅳ. Energy Management from Food Waste

Issues of Organic Waste Treatment

Food waste (Leachate)

- Lack of effort on food waste leachate recycling and energy recovery
- Operation Difficulty such as increase of connecting pollution load
  - From 2013, due to prevention of food waste dumping to the ocean mostly food waste leachate connecting to S.W.T

Livestock

- Increase on livestock amount
- Livestock causes nonpoint pollution to natural water stream
  - Public livestock treatment rate = 10%
  - Nonpoint pollution by liquid compost

Sewage Sludge

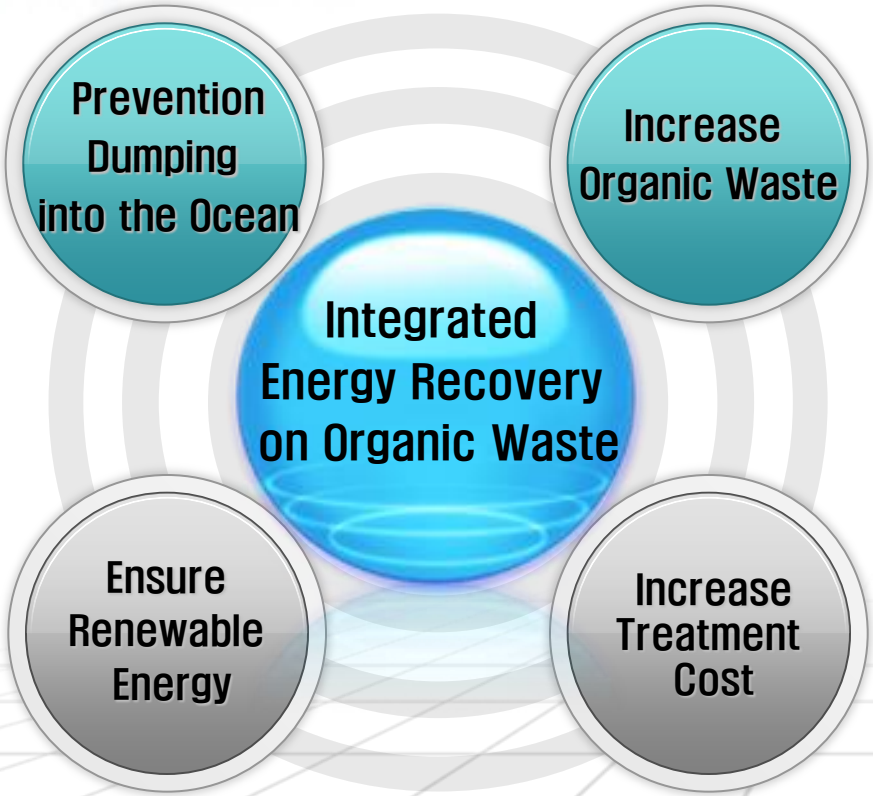
- 6.4% of sewage sludge increases annually.
  - Expansion and development of public S.W.T, T.P treatment
- Increase on the treatment cost of sewage sludge on ground
  - From 2012, all sewage sludge treated on ground(drying, incinerating, carbonization, etc.)

Ⅳ. Energy Management from Food Waste

Integrated Energy Recovery on Organic Waste

Establishment Policy of Integrated Energy Recovery on Organic Waste

– Increase on amount of organic waste such as food waste, Food waste leachate, sewage sludge, livestock, etc. and prevention on dumping into the ocean



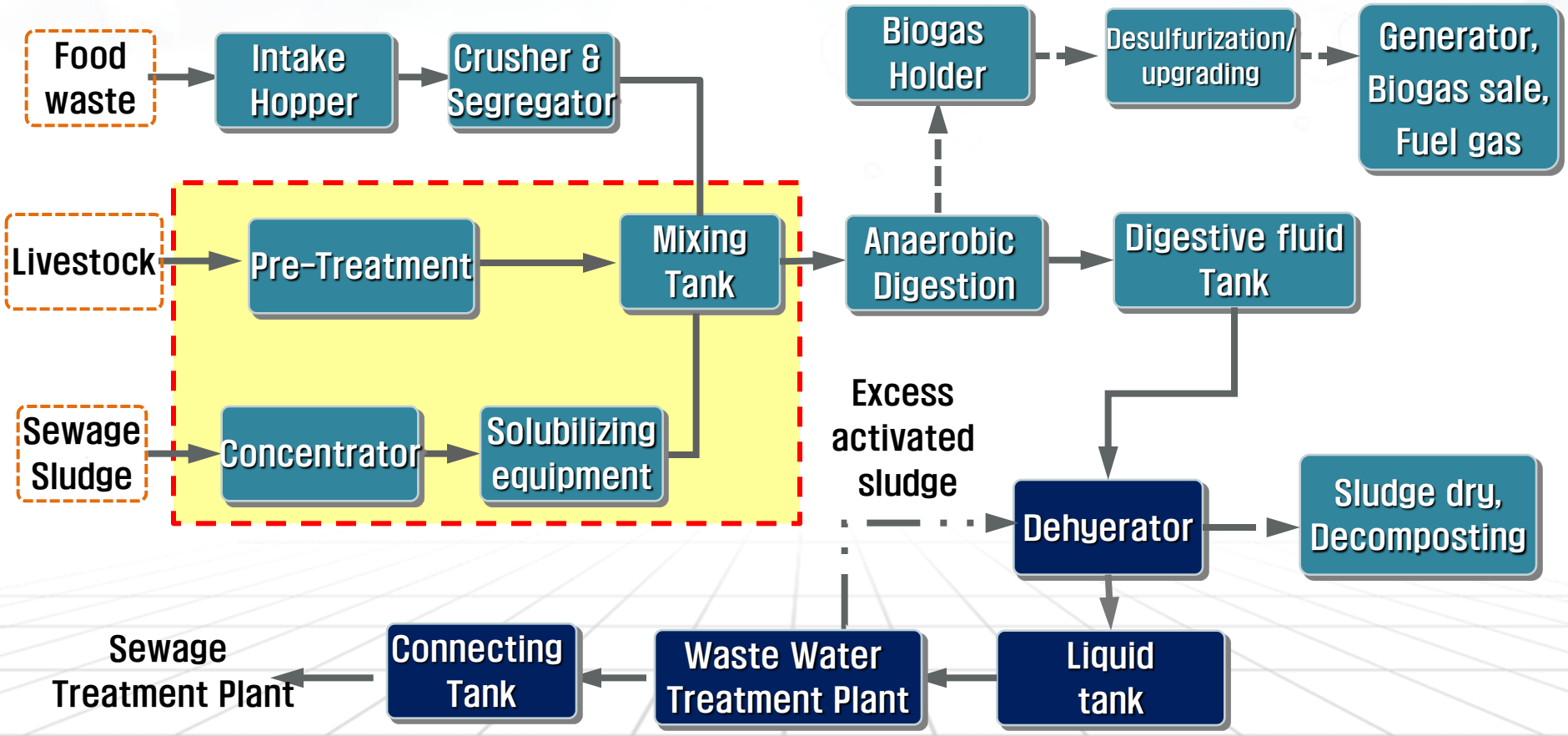
Integrated Energy Recovery

- Renewable Energy by treatment of high concentrated organic waste
- Cut fossil energy cost and Greenhouse gas emission reduction, etc.
- By the integrated energy recovery on organic waste, saving construction and operation cost (against Individual facilities)

Ⅳ. Energy Management from Food Waste

Progress Map of Integrated Energy Recovery on Organic Waste

- Similar as "Food waste Biogas plant Process"
- Depending on the characteristics and condition of organic waste, main facilities such as pretreatment facility, anaerobic digestion facility, etc. are selected.



Ⅳ. Energy Management from Food Waste

Trial Project of Integrated Energy Recovery in Seo-san

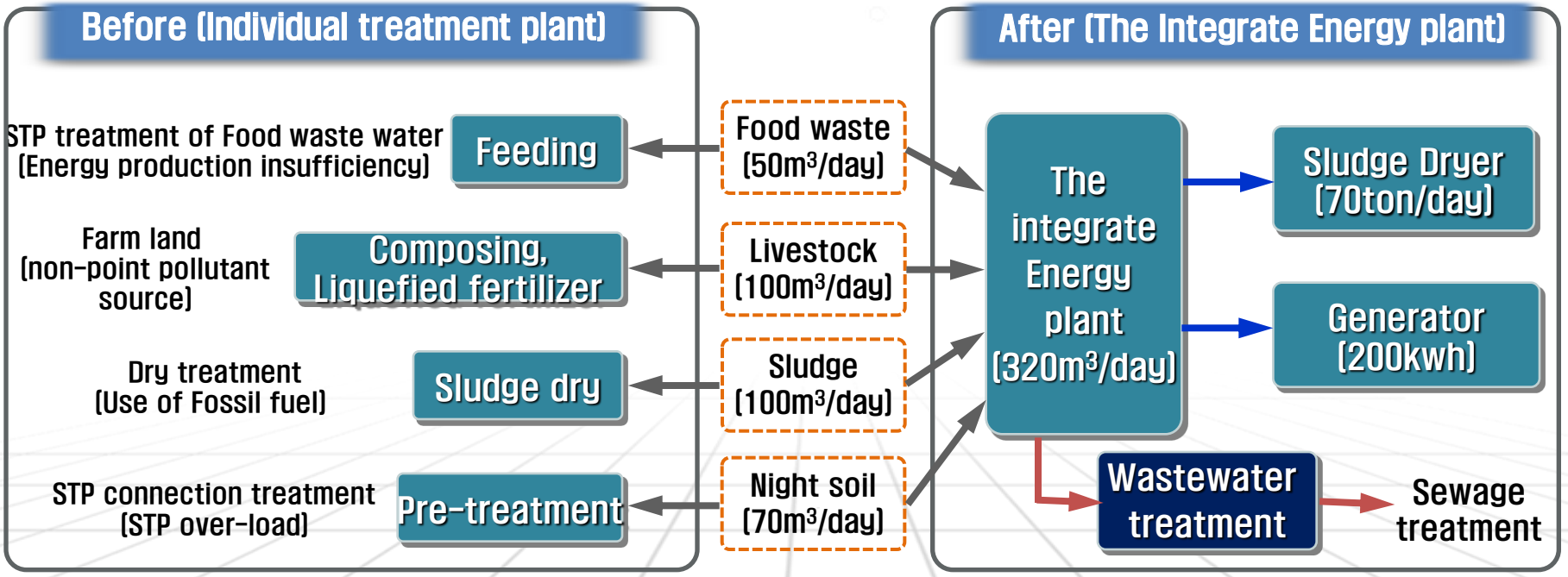
- [Trial Project of Integrated Energy Recovery] Integrated organic waste treatment

  → "Resource recycling type Bio gasification Plant in Seo-san"

  – ① Biogas usage, ② Organic waste reduction, ③ Low fossil fuel use,

    ④ Cheap treatment cost, ⑤ Low water quality load (Easy connection to S.W.P.)

    ⑥ decline of non-point pollution



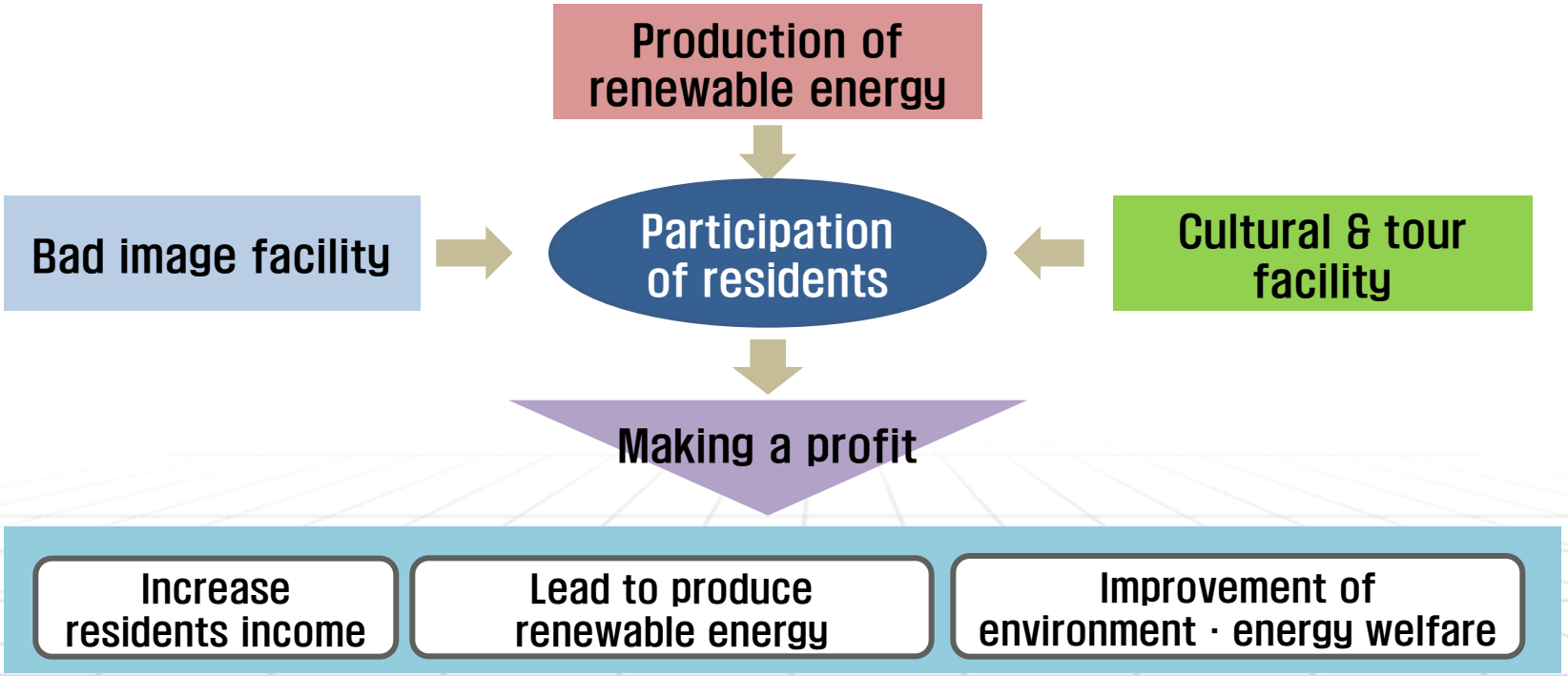
Ⅳ. Energy Management from Food Waste

Eco Energy Town Concept

- The concept of Eco Energy Town is to provide convenience facilities for residents such as cultural, tour and other relevant facilities by utilizing renewable energy plant and avoid bad image on such environment facilities

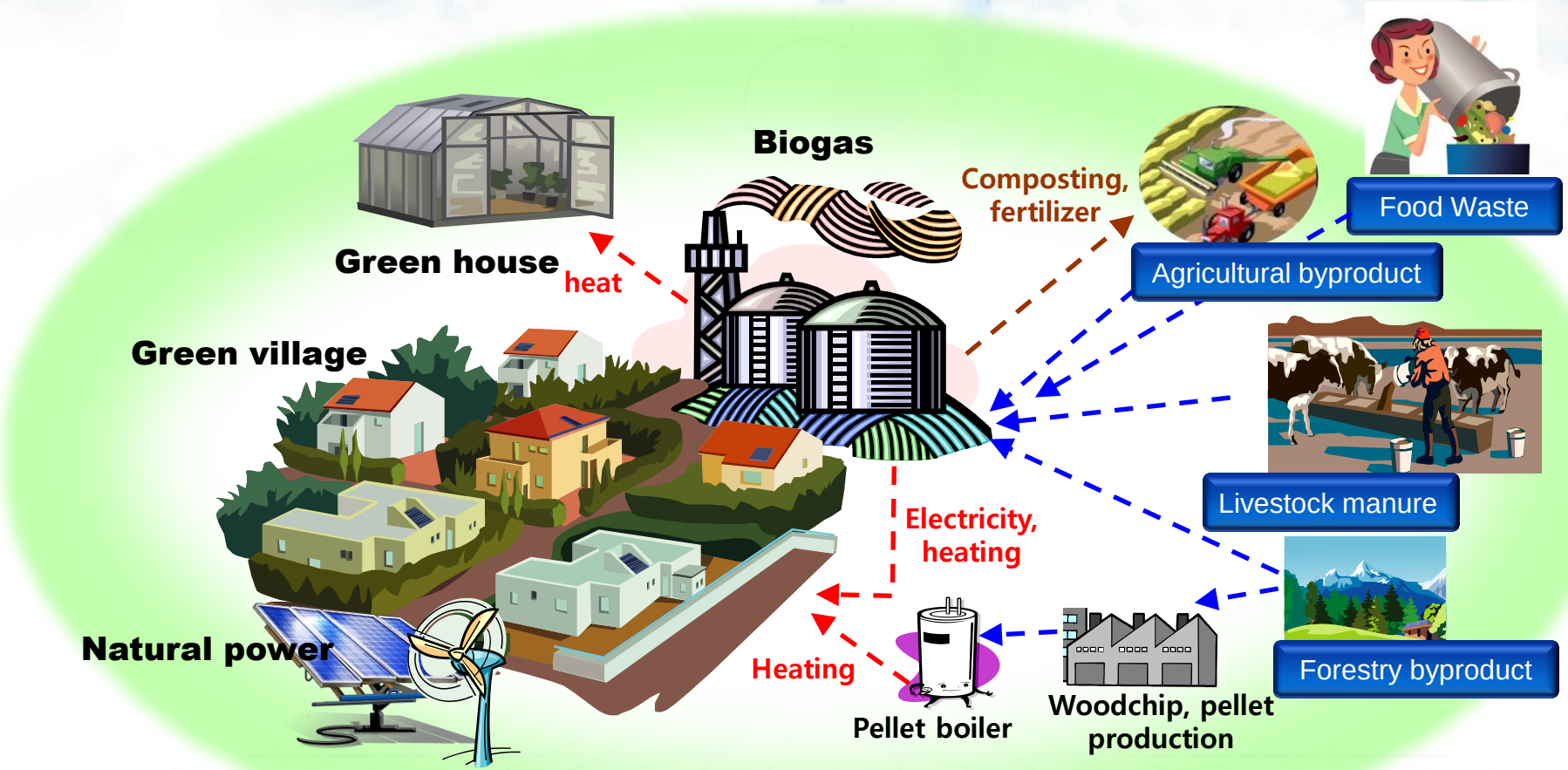
  → ① Lead to produce renewable energy by organic waste treatment facility

  ② Encourage to install waste treatment plant by residents



Ⅳ. Energy Management from Food Waste

Eco Energy Town Concept



<Insectarium>

<Paprika Farm>

<Auto-Camping site>

Ⅳ. Energy Management from Food Waste

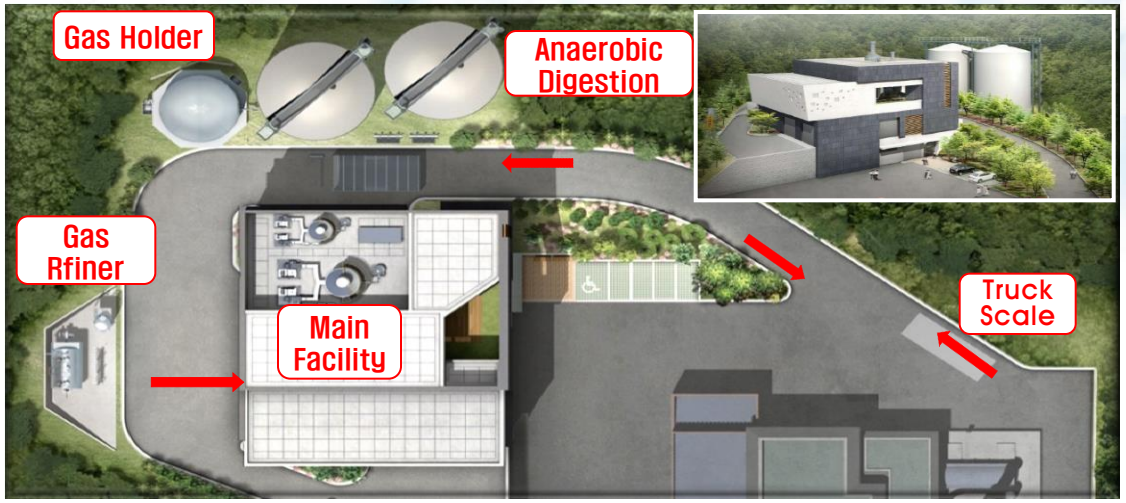
How to Eco Energy Town (Hongcheon-Gun)

Capacity

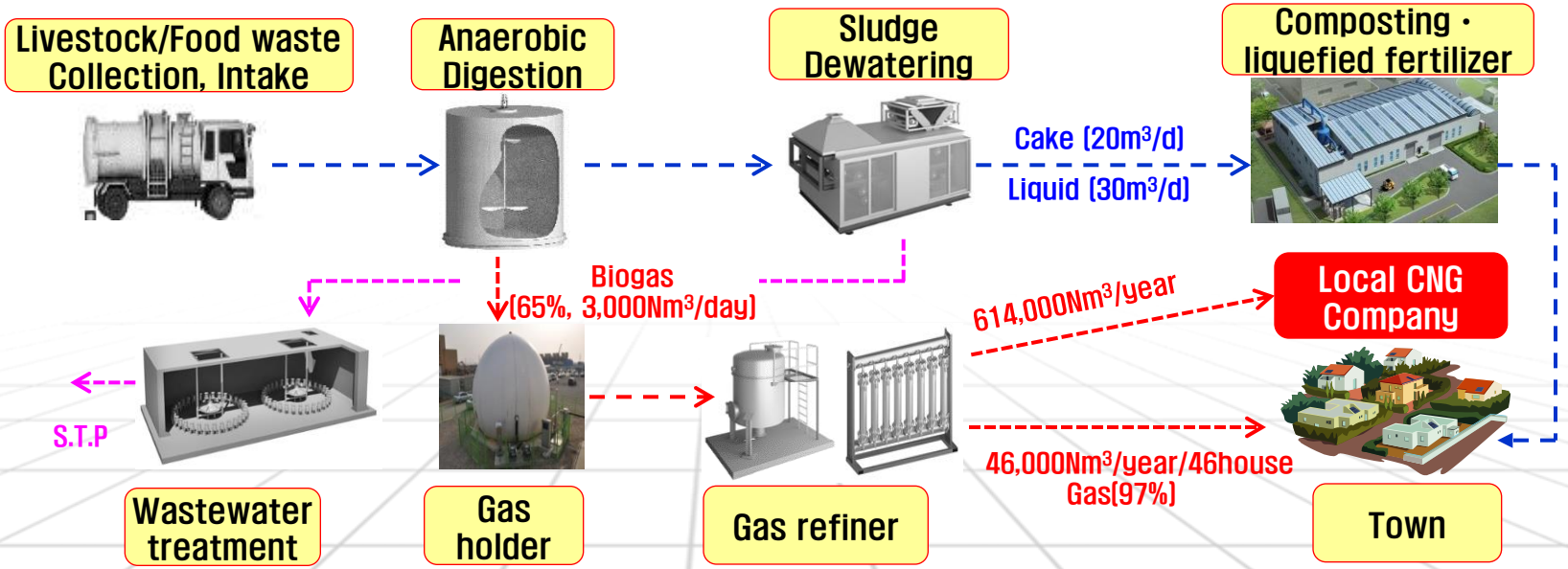
- Q = 100 t/d
  (Stock manure: 80,
  Food waste : 20)

Main Facility

- Intake hopper : 3 days(60m³)
- Anaerobic Digestion : 35 days (4,400m³)
- Gas holder : 3 hours(370m³)
- Gas refiner : (Methane 97%)
- Wastewater treatment facility : (120m³/d)



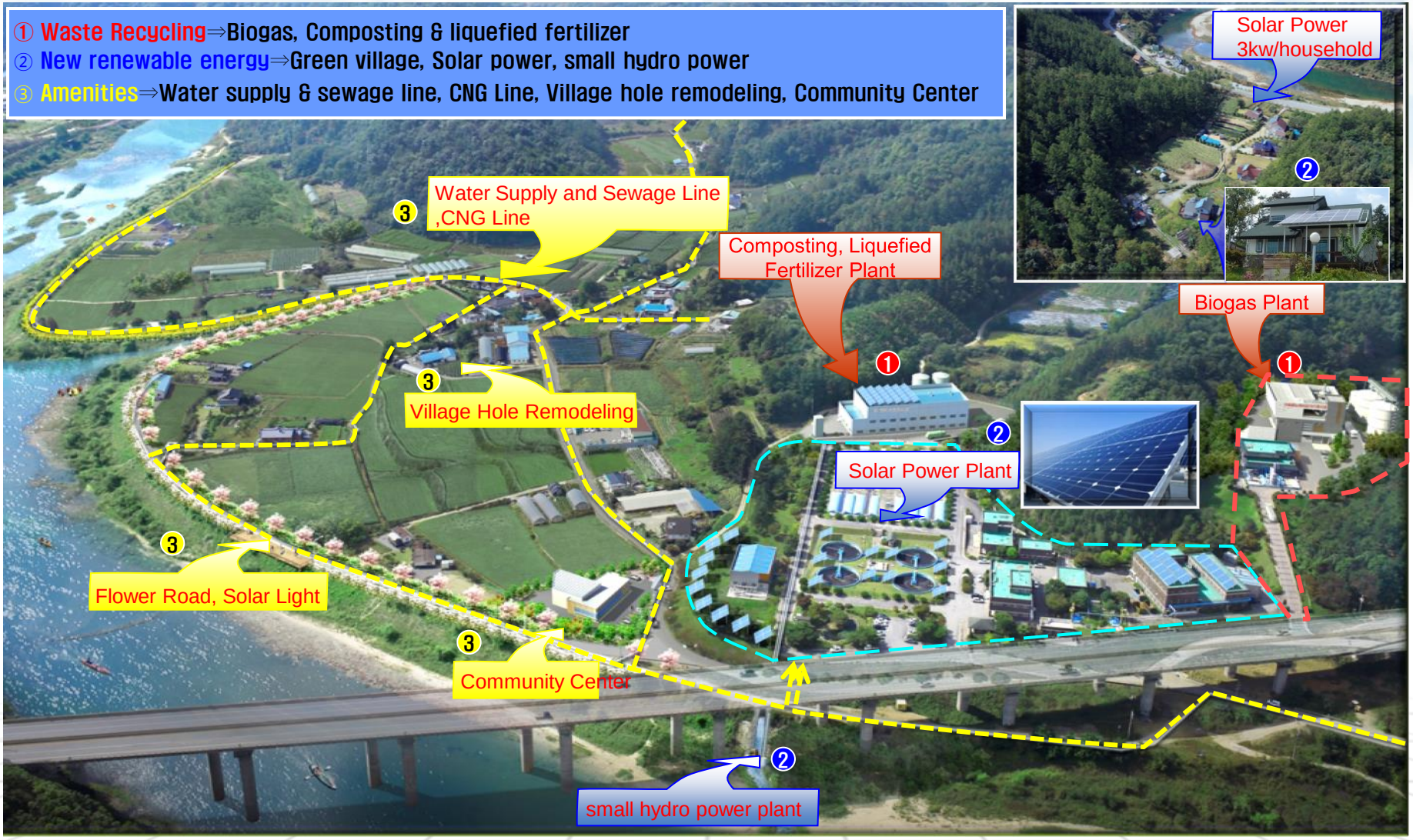
Main Process



Ⅳ. Energy Management from Food Waste

Eco Energy Town (Hongcheon-Gun)

① Waste Recycling⇒Biogas, Composting & liquefied fertilizer
② New renewable energy⇒Green village, Solar power, small hydro power
③ Amenities⇒Water supply & sewage line, CNG Line, Village hole remodeling, Community Center




Thank you!!