



# Japanese cases to establish a Sound Material-Cycle society

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# Introduction

We are facing serious problems

- Resource deficiency and Environment Problem
  - As economic increases, waste also increases. Waste increase causes illegal dumping and serious impact on ecosystem.



# Where we are going to...

- Nobody can stop economic growth all over the world.
- Growth without attention to resource and environment is not real growth, so called sustainable development.
- One of methods to realize sustainable development is to establish a “Sound Material-Cycle society”.



# Waste discharge and treatment in Japan

Japanese waste is divided into two kinds,

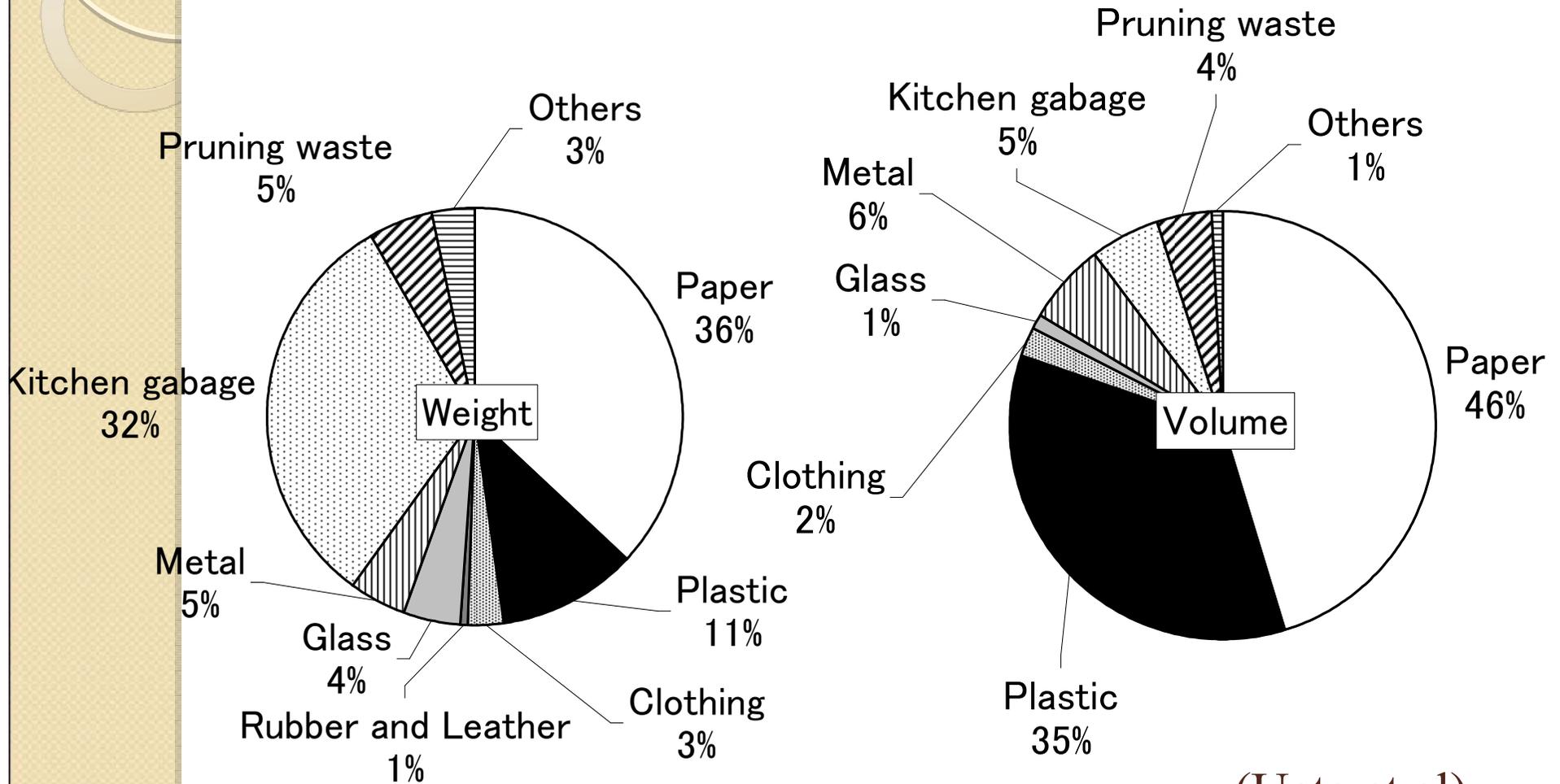
1. Industrial waste, which goes out of the factories
2. Municipal waste, which is the household rubbish.
  - The municipal waste includes not only waste from house but also waste from offices and restaurants.



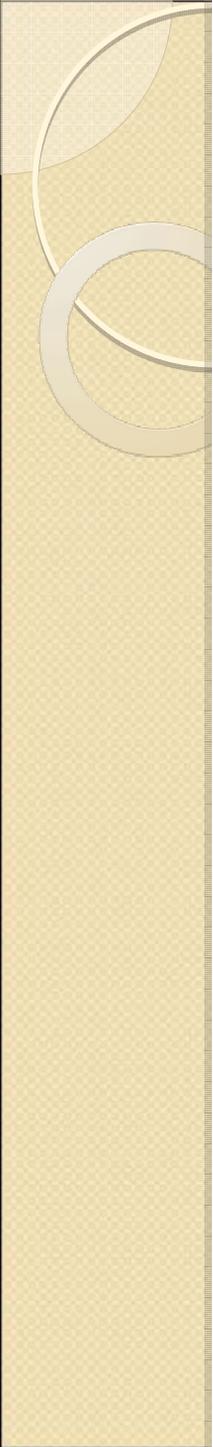
# Municipal waste

- Amount of the municipal waste was 52,036 kt in fiscal year 2006
- Waste amount each day a person totaled 1.1kg.
- Local government has responsibility to treat municipal waste.
- Majority of the household rubbish is kitchen waste and paper or plastic used as container or wrapping material.

# Breakdown according to weight and volume household garbage



(Ueta et al)



## Recycle of municipal waste in Japan

- Recycled waste is 10,217 kt in fiscal year 2006
- Intermediate processing: 7,158 kt
- Group collection: 3,058 kt
- Recycle ratios is 19%
  - $\text{Recycle waste} / \text{total processing}$



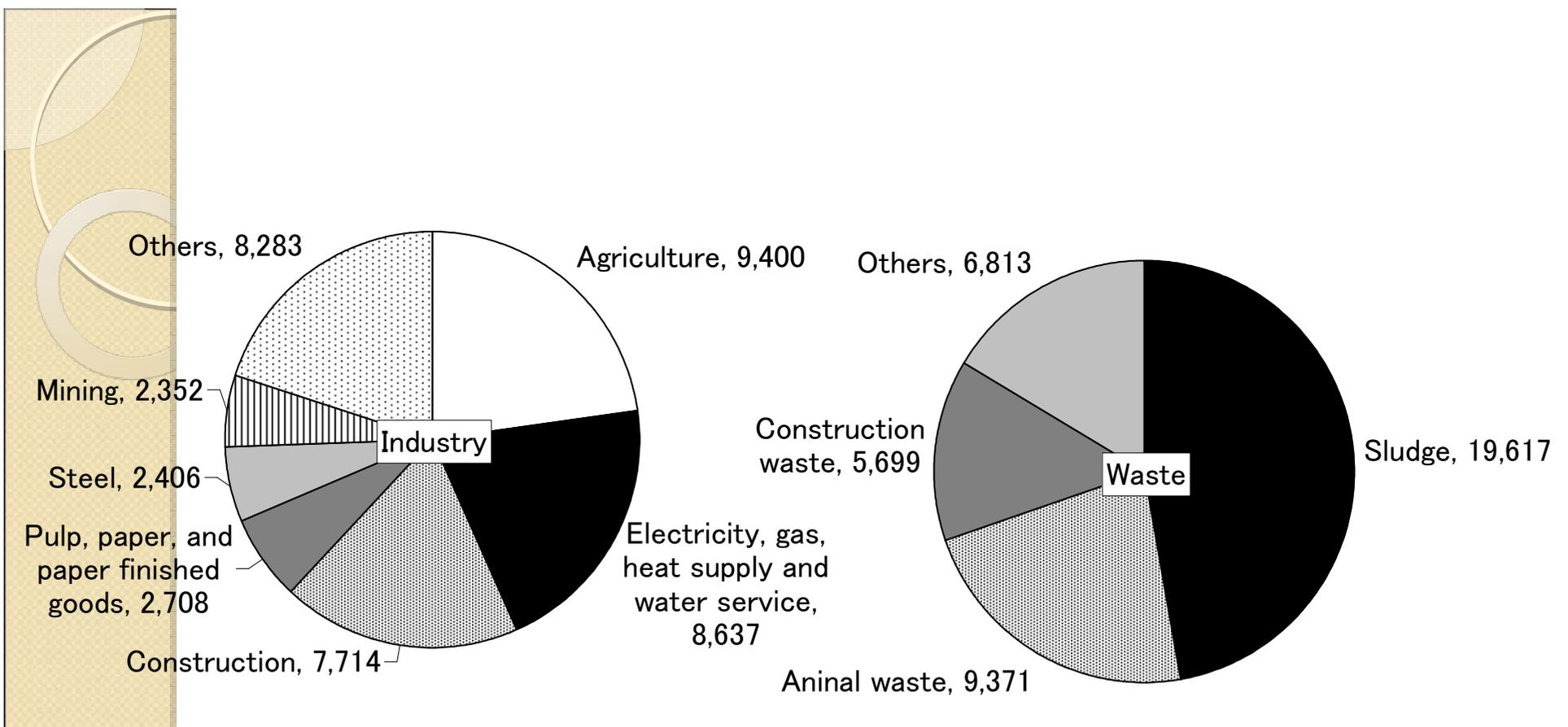
## Final disposal of municipal waste

- Weight loss rate of waste in treatment is 91.4%
  - Direct incineration rate is 78.0%
  - Intermediate processing rate is 13.4%.
- Final disposal to land fill is 8.6%
  - with decrease tending for these several years.
- Remaining capacity of land fill is 130 Mm<sup>3</sup> and the remainder years are 15.6 years
- Reduction in final disposal is requested strongly
  - difficult to construct a new disposal place by the citizen protest.



# Industrial waste

- Each enterprise has responsibility to treat their own waste
- Total emission exhaust was about 418 Mt in fiscal year 2006.
- 80 % is occupied by six industrial sectors
  - • agriculture • electricity, gas, heat supply, water service • construction • pulp, paper, paper finished goods manufacturing • iron and steel • mining.
- 80 % is occupied by three kinds of waste
  - • sludge • animal waste • construction waste.

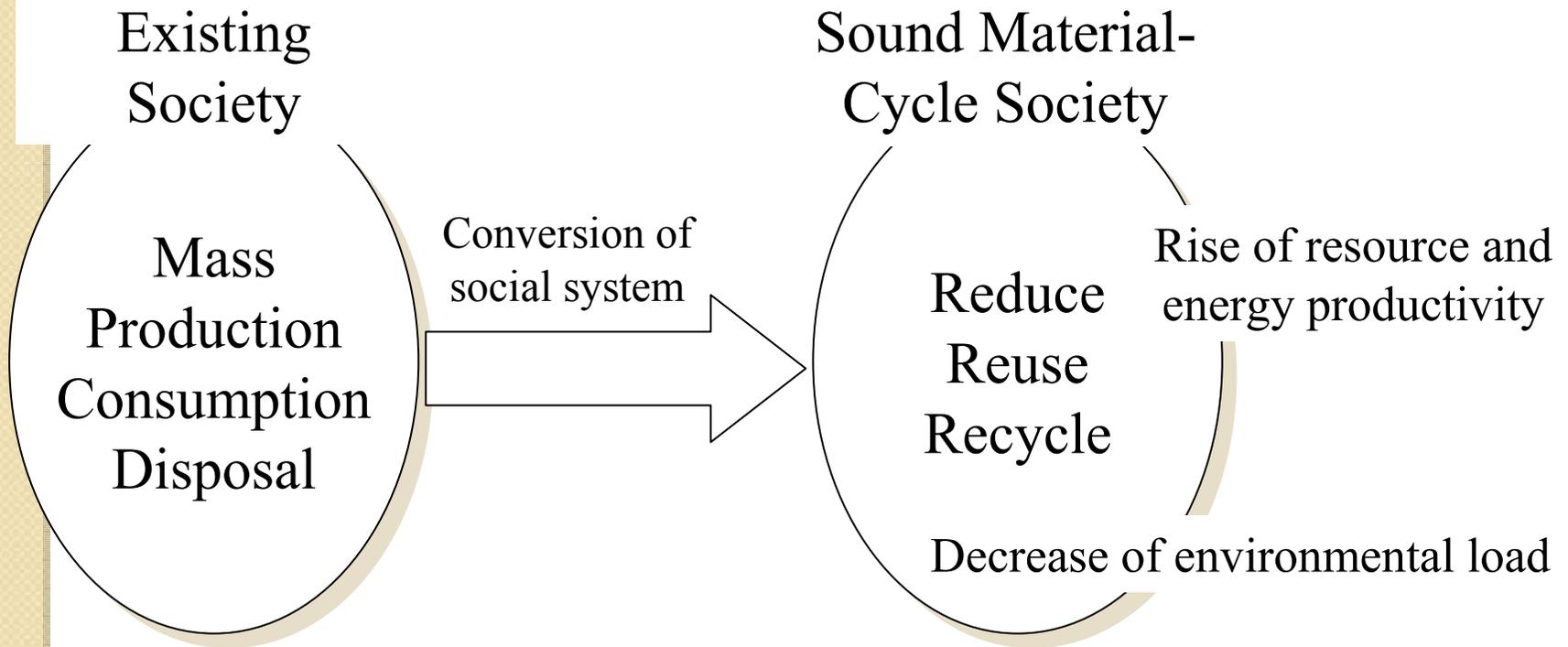


Industrial waste discharge according to industry sector and kind of amount  
(The Ministry of Environment)



## Concept of a Sound Material-Cycle society

- Society which does not discharge waste into the society by recycling and so on
  - the narrow sense
- Society which achieves sustainable development by improving the productivity of the resource and energy by the saving and recycling
  - the wide sense.



Conversion from mass consumption society to  
Recycling based society

# Three Rs

## 1. Reduce

- Decrease the emission of waste by developing a new productive process.
- It includes reduction by incineration and dryness.

## 2. Reuse

- Waste is used again as it is without putting a hand on it.
- Use them again after washing collected glass bottle.

## 3. Recycle

- Conversion waste to resource again by using energy.
- Build in the glass bottle again after crushing the collected glass bottle, and use it as a road pavement material.

Besides these three R, there are Refuse, Refine and Repair.

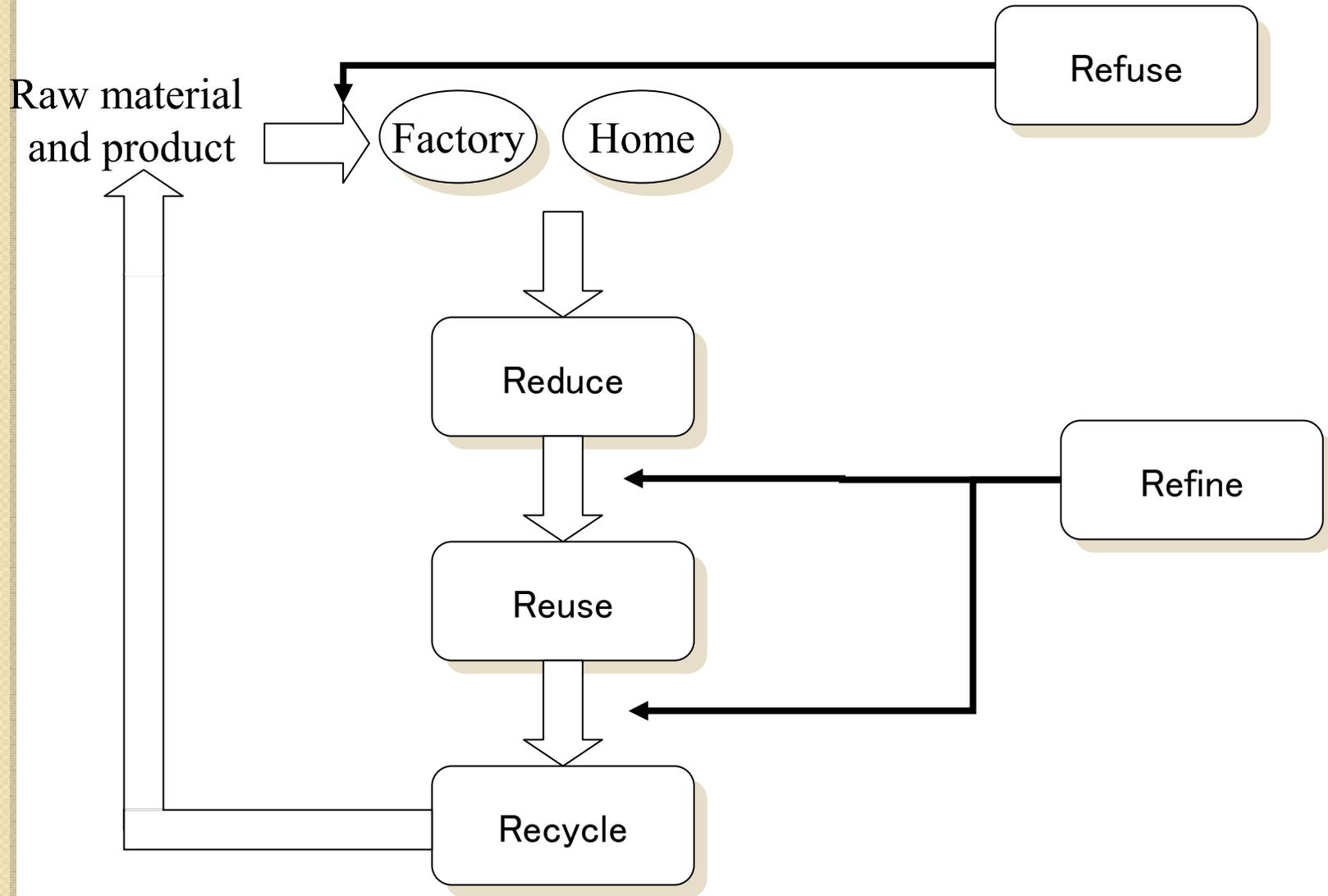


Diagram of a Sound Material-Cycle society



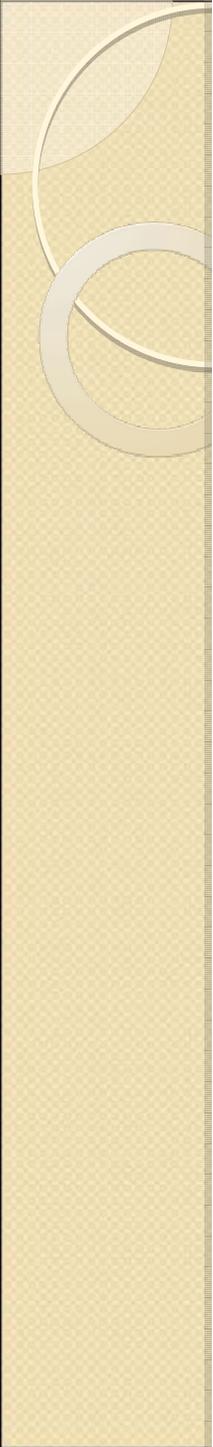
# Recycle

- Effect of decrease the amount of the final disposal
  - converting the material which has been finally disposed up to now as waste into the resource and energy
- New resource and energy should be input on to recycle.



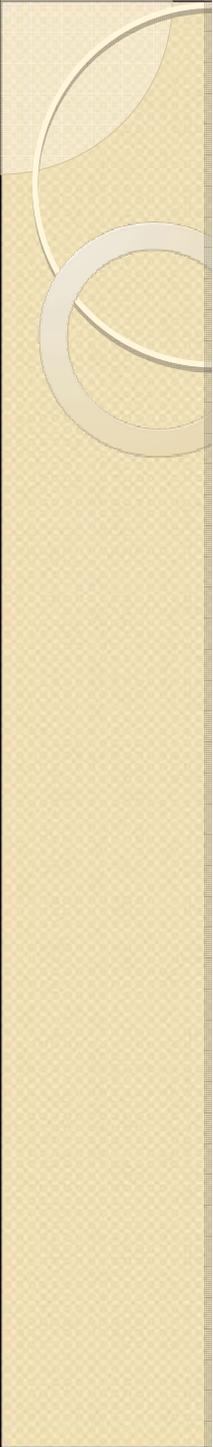
# 3 kinds of Recycle

1. Material recycle
  - Generally, recycle is material recycle,
  - Material is recycled in case of conversion waste to resource again.
2. Chemical recycle
  - To recycle waste as a raw material of chemical industry, and it is a kind of the material recycle
  - Making the PET bottle oil, and obtaining monomer which is the raw material correspond.
3. Thermal recycle
  - To incinerate waste and collect heat.
  - It can be said to convert that waste which is unused resources cannot be used twice
  - The last means of recycle.



# Problem of recycling

- Though the introduction of recycle is worthy in the point to decrease the exhaust of waste to the society, there are two problems
- Input energy and Merchantability.



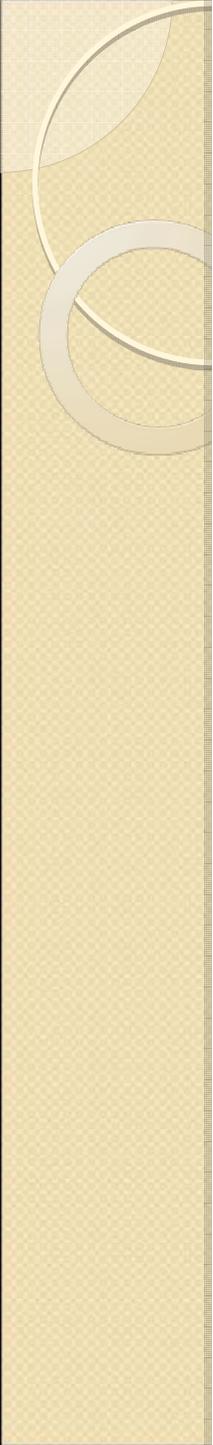
## ① Energy turned on to recycling

- Energy is necessary for recycle.
  - There is a possibility that the environmental load increases when energy necessary for recycle produces by using the virgin raw material if it is large.
- Reduction should be first.
  - Reduction discharges fewer environmental loads than reuse and recycle does.
- Next is reuse, and final is recycle.



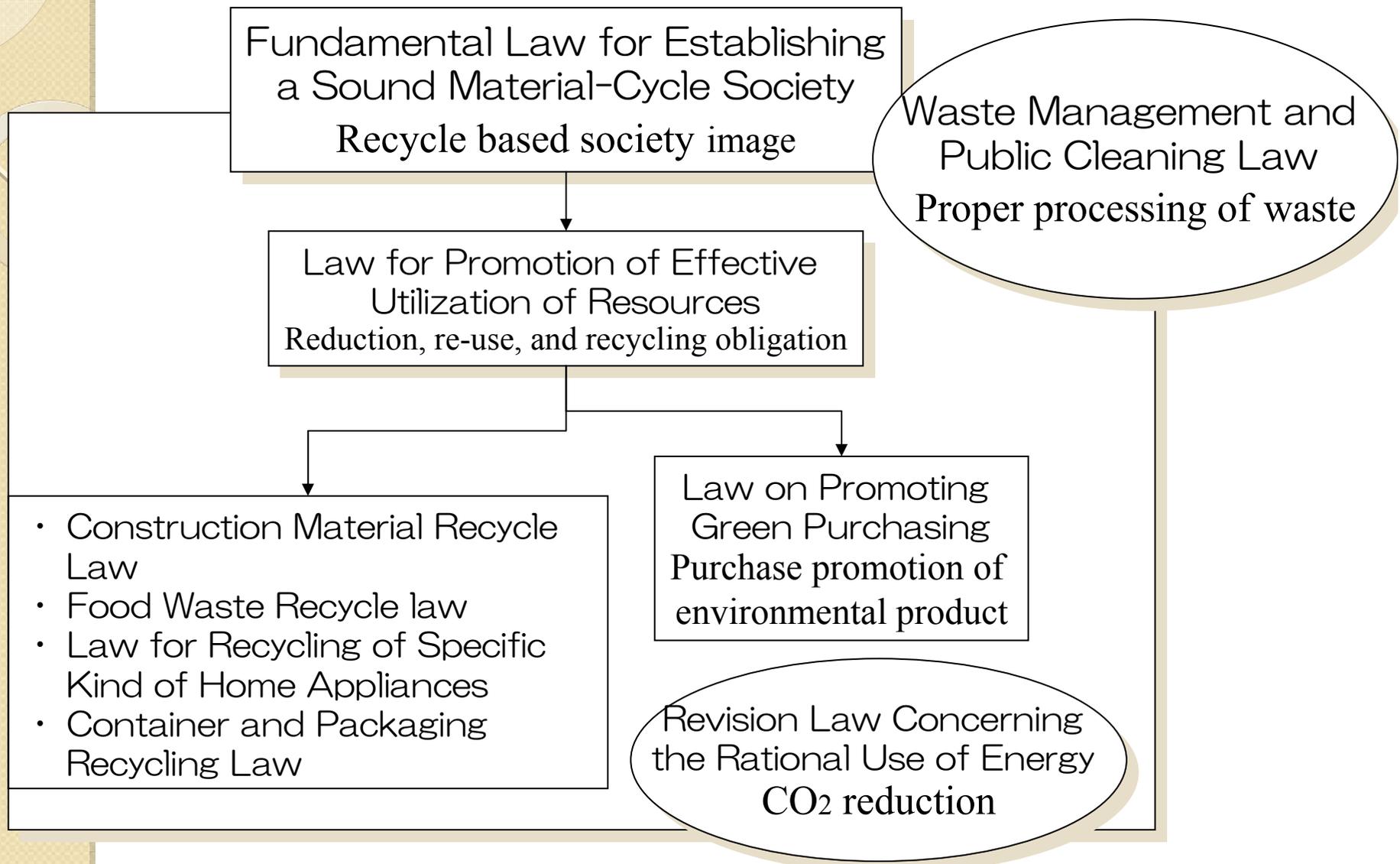
## ② Demand for recycled goods

- Kitchen waste is recycled as organic fertilizer.
- If there is **no receiver** of the organic fertilizer, organic fertilizers accumulate in the society.
- We should consider not only is recycled products but demand of the products.
  - The Law on Promoting Green Purchasing enacted to solve such a problem promotes the consumption of the reproduction goods.



## Recycle is a last measure.

- Recycle should be recognized the final means because the resource and energy is necessary, and the receiver of the reproduction goods is not secured.



Related chart of various laws which aim at Sound Material-Cycle society



## ① Fundamental Law for Establishing a Sound Material-Cycle Society

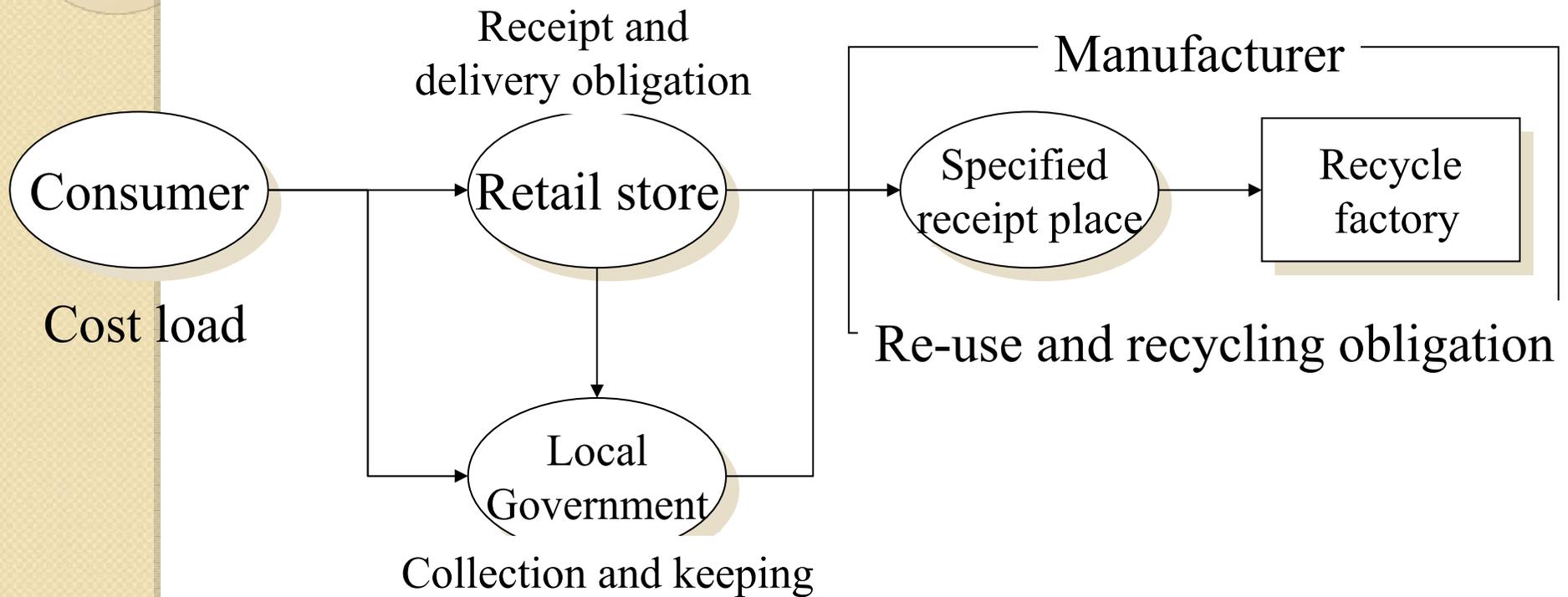
- This law defines “a Sound Material-Cycle Society” as
  1. Consumption of natural resources is minimized and the environmental load is reduced as much as possible
  2. Promoting appropriate recycling of products, etc. when they have become recyclable resources
  3. Securing appropriate disposal of the recyclable resources not recycled
- Sound Material-Cycle Society should include not only waste reduction but also concept of a future society.



## ② Law for Recycling of Specified Kinds of Home Appliances

- In 90', Local government collects 20 % in a used consumer electronic and shops collect 80 % of the remainder as a bulky garbage item.
- These used consumer electronics are serious problem of reclamation as waste disposal place at the remainder years.
- Processing became a problem from respect of the fluorocarbon collection about the abolition refrigerator.

### ③ Law for Recycling of Specified Kinds of Home Appliances



**Related chart of consumer, retail store, manufacturer, and local government in recycle act for electrical appliances**



## Law for Recycling of Specified Kinds of Home Appliances

- Responsibility of stake holders for fair cost load.
- Recycling processing to the manufacturer
  - Manufacturer assumes that the processing cost can be claimed to the consumer
- Collection to the retail store.



## Problems of Law for Recycling of Specified Kinds of Home Appliances

- Appliances are broken down to mainly metal, plastic and mixed waste.
- Metal is easy to recycle.
- Plastic is not easy to recycle, because there are many different kinds. In order to recycle plastic, waste plastic should be separated according to material.
- Plastic includes numerous chemicals. Such chemicals make plastic recycling difficult, and there is no information which chemicals are used for plastic.
- Manufacturing company is trying to unify the kind for plastic for electrical appliance parts.

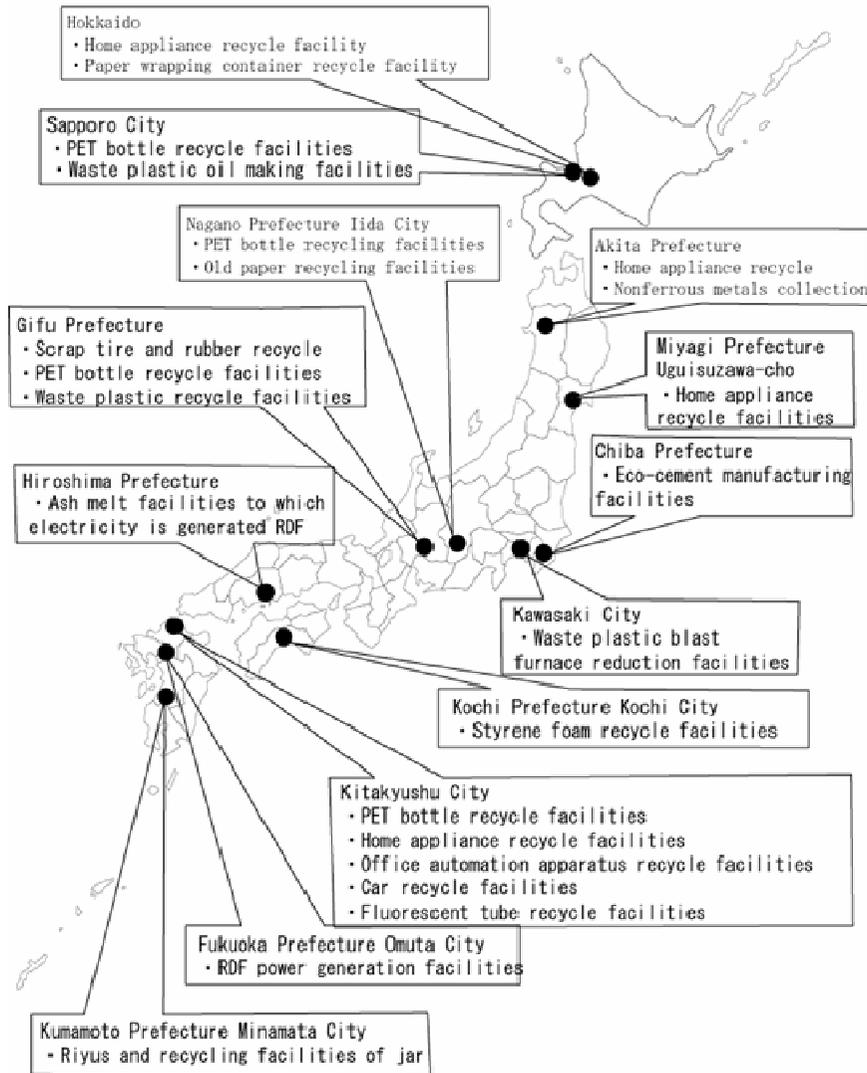


# Eco-Town

- New environmental city plan to promote the Sound Material-Cycle society,
- “Eco-town” was founded by the Japanese government in 1997.
  - ①Promotion of environmental industry which makes the best use of existing industry in individual regions
  - ②Environmental harmony type system which aims at a Sound Material-Cycle society in the region, the public-sector, and the consumer are included.

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- Local government makes the promotion plan.
  - Approval makes several supports, subsidy for construction and maintenance of recycle facility by private company

Approval region map of eco-town business 2001





# ① Sapporo City

- Sapporo Eco-town is one which collected the recycling facilities of municipal waste and the construction waste.
- As for private companies other than plastic facilities of making to oil, the profit is taken.
- It is difficult for the oil making facility to make a successful bid for the whole quantity, because the receipt of plastic is a competitive bidding.



# Problem of Eco-town

- Unfortunately some eco-towns have almost all failed. Whether an Eco-town succeeds or not depends on several reasons.
  1. Willingness of local government
  2. Commitment of private company



# Problem of Eco-town

- Subsidy

- At the beginning stage, a huge subsidy from national government is given to the eco-town.
- As the national government subsidy has a limited period, then local government must continue to pay the subsidy

- Technology

- The facilities in an Eco-town often introduce more novel technology than traditional waste treatment facilities, so the cost to the eco-town facility is very high.
- Local government pays more money for treatment costs compared with traditional combustion facility.

- Each facility in eco town should be independent from government subsidy.



## 5. Conclusion

- ① All environmental loads in production and consumption should be considered in society and resource • energy expenditures.
- ② Government, consumer and entrepreneur share the load fairly.
  1. Entrepreneur develops a reproduction of waste and a new commodity
  2. Consumer maintains the lifestyle which supports the waste circulation system
  3. Government maintains the system of law that the Sound Material-Cycle society functions enough to establishment.
- ③ Information of Environment should be common sense not only in stakeholders but also in society.