Containers and Packaging Recycling System in Japan

Today's Contents

1. Background
2. Scheme of Containers and Packaging Recycling Law
3. Plastic Container and Packaging Recycling
4. Activities of Waste Prevention
5. Conclusion

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2. Scheme of Containers and Packaging Recycling Law
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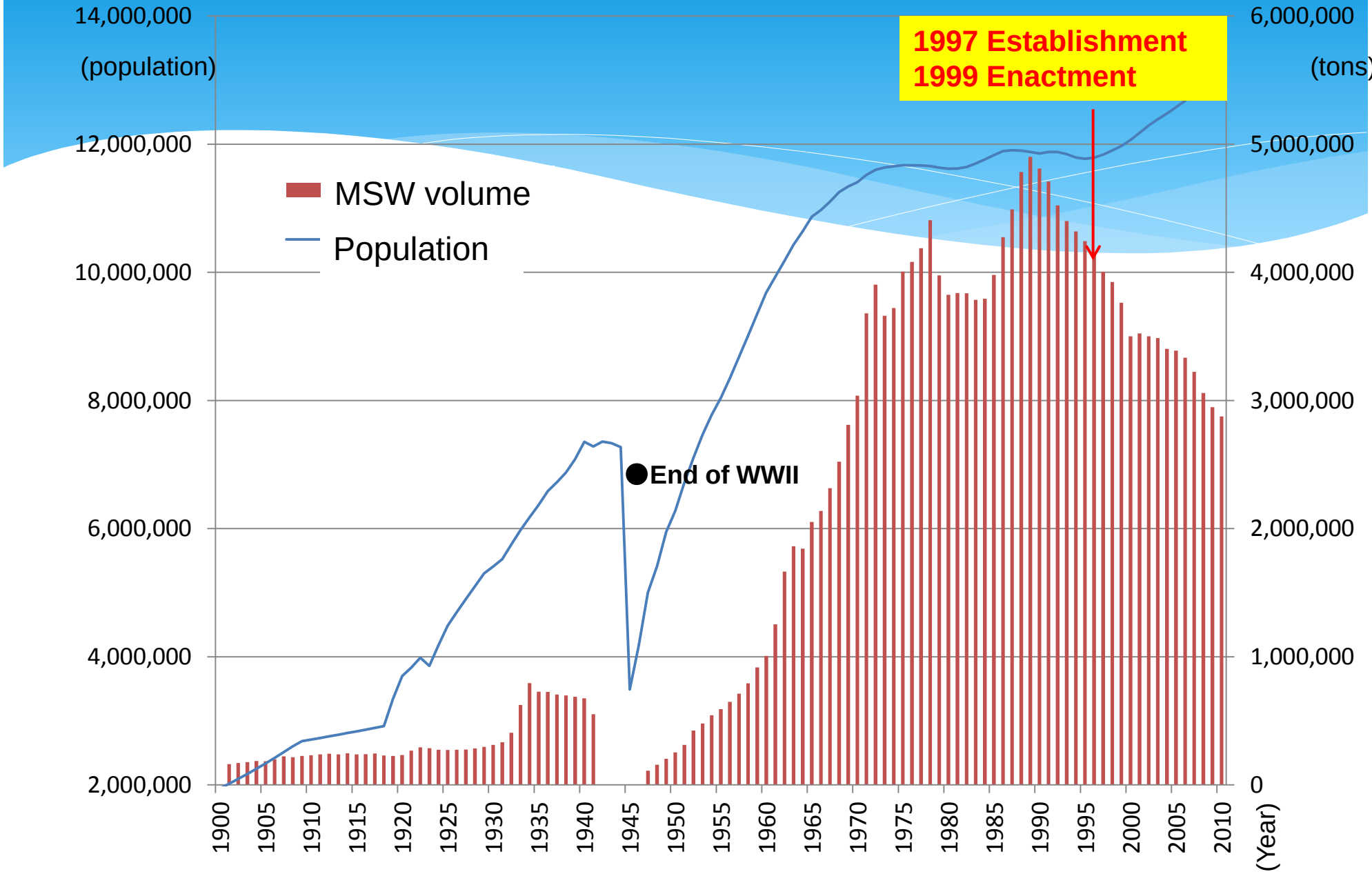
Background of legal framework

Keywords are “final disposal site”, “60%” and “Germany”.

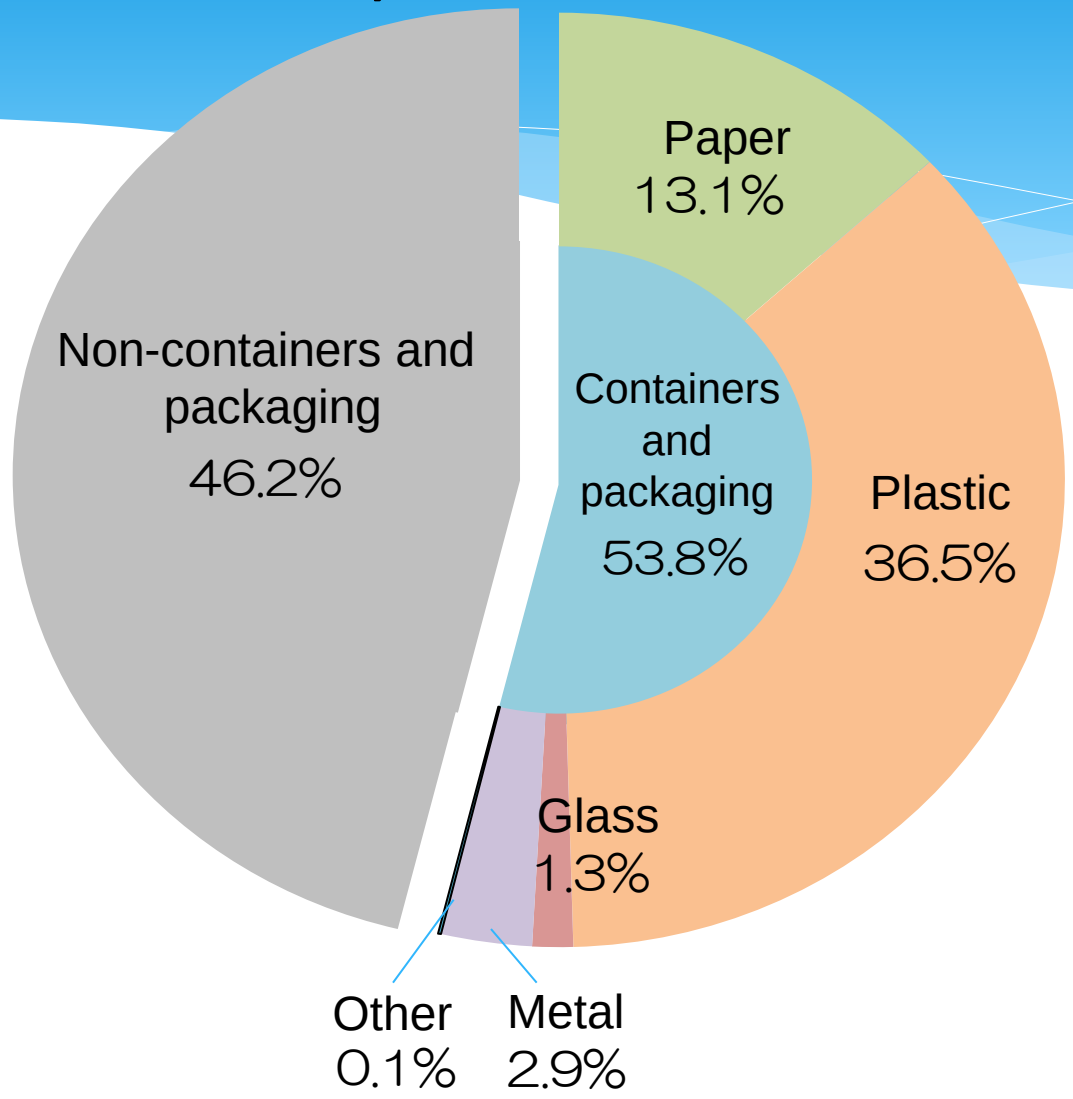
- When the law was established(1997), landfill sites would have reached their capacity in 7 to 9 years if no countermeasures were taken.
- As containers and packaging accounted for approx. 60% (in volume) of domestic waste, it was decided to take action.
- Germany started recycling containers and packaging in 1991 (4 years before the enactment of the containers/packaging recycling law), and Japan decided it could not fall behind other countries.

Waste generation in Tokyo (23 Cities Area)



The remaining capacity of landfill sites across Japan was only 8.5 years when the law was enacted.

Ratio of containers and packaging in household waste (FY2012, in volume)



(Source: Survey on use and disposal of containers and packaging waste by the Ministry of the Environment)

Today's Contents

1. Background
2. Scheme of Containers and Packaging Recycling Law
3. Plastic Container and Packaging Recycling
4. Activities of Waste Prevention
5. Conclusion

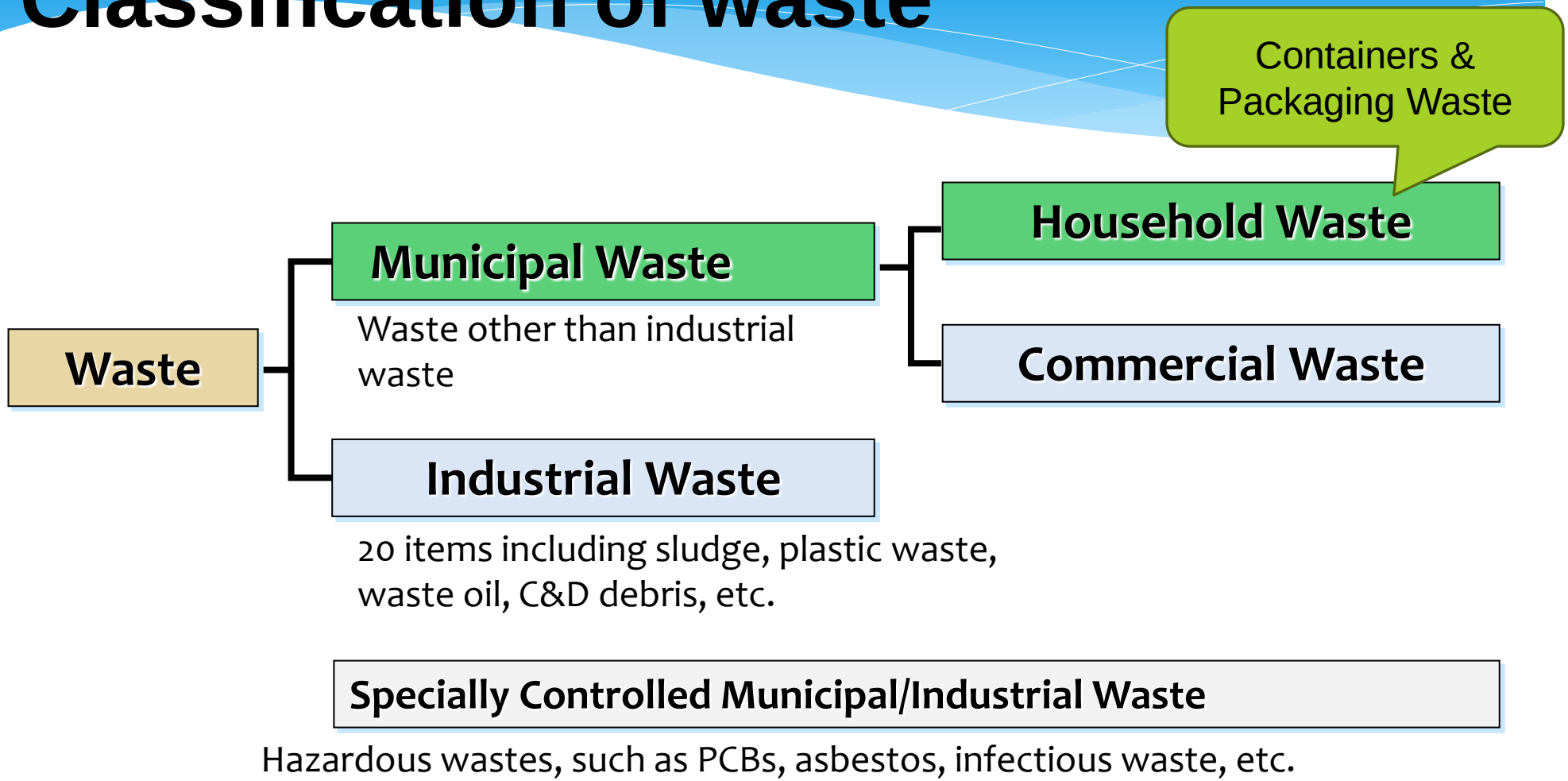
Purpose and features of the law

- It aims at household waste reduction and effective use of resources by developing a recycling program of containers and packaging waste discharged as general domestic waste.

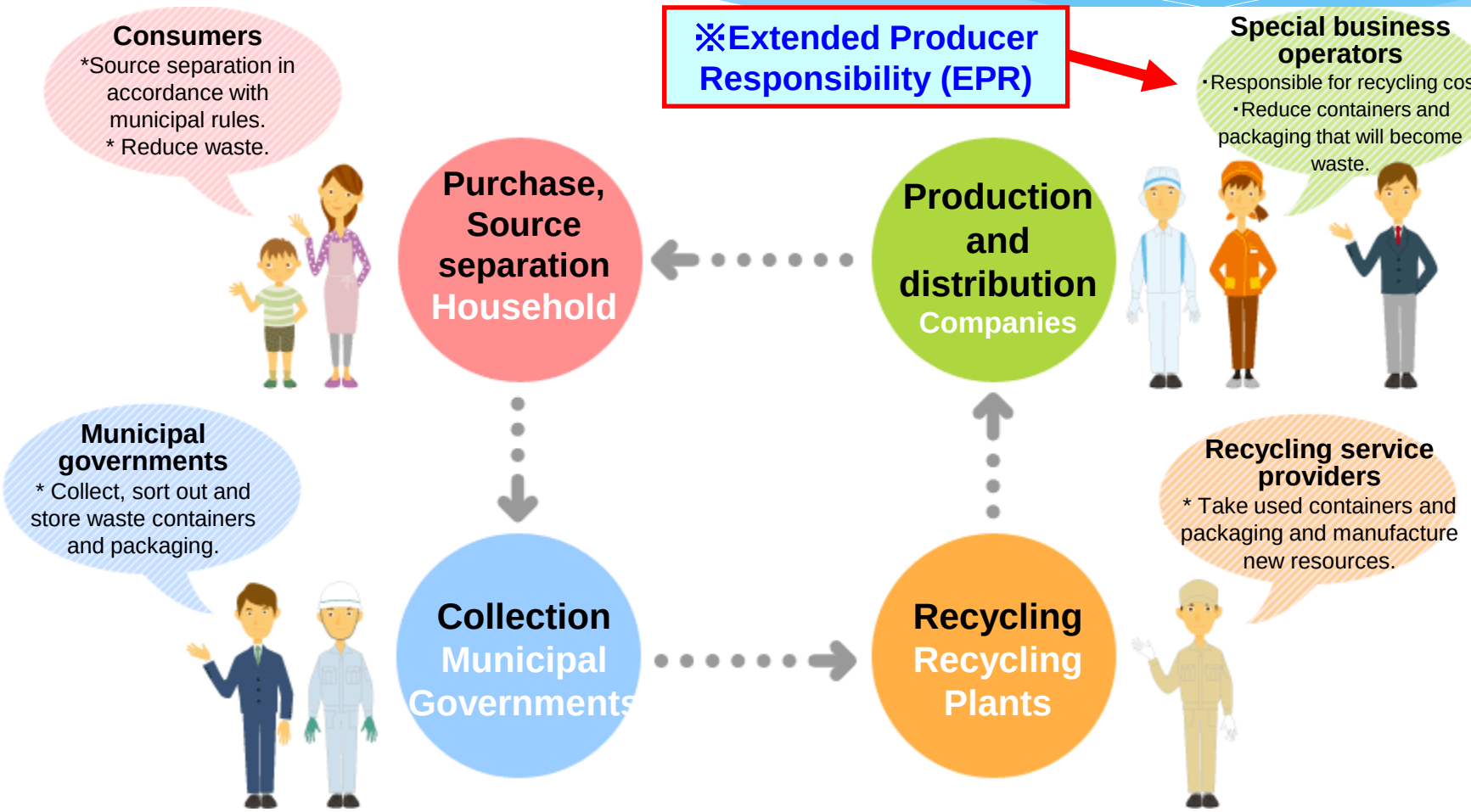
- It clarifies the division of responsibilities:

  service providers are responsible for recycling. (extended producer responsibility)

Classification of waste



Roles and responsibilities




Companies
Produce plastic containers.
Pack goods.
Sell food.
Purchase
Households
Eat food.
Rinse containers that can be cleaned easily
Keep them temporarily.
Discharged in appointed day(s)
Municipalities
Collect them.
Separate what cannot be recycled.
Press them into blocks and store them.
Transport
Recycling plants
Produce raw materials.
Pallet-making plant
Pallet-making plant
Iron-making plant
Chemically decompose them for use.

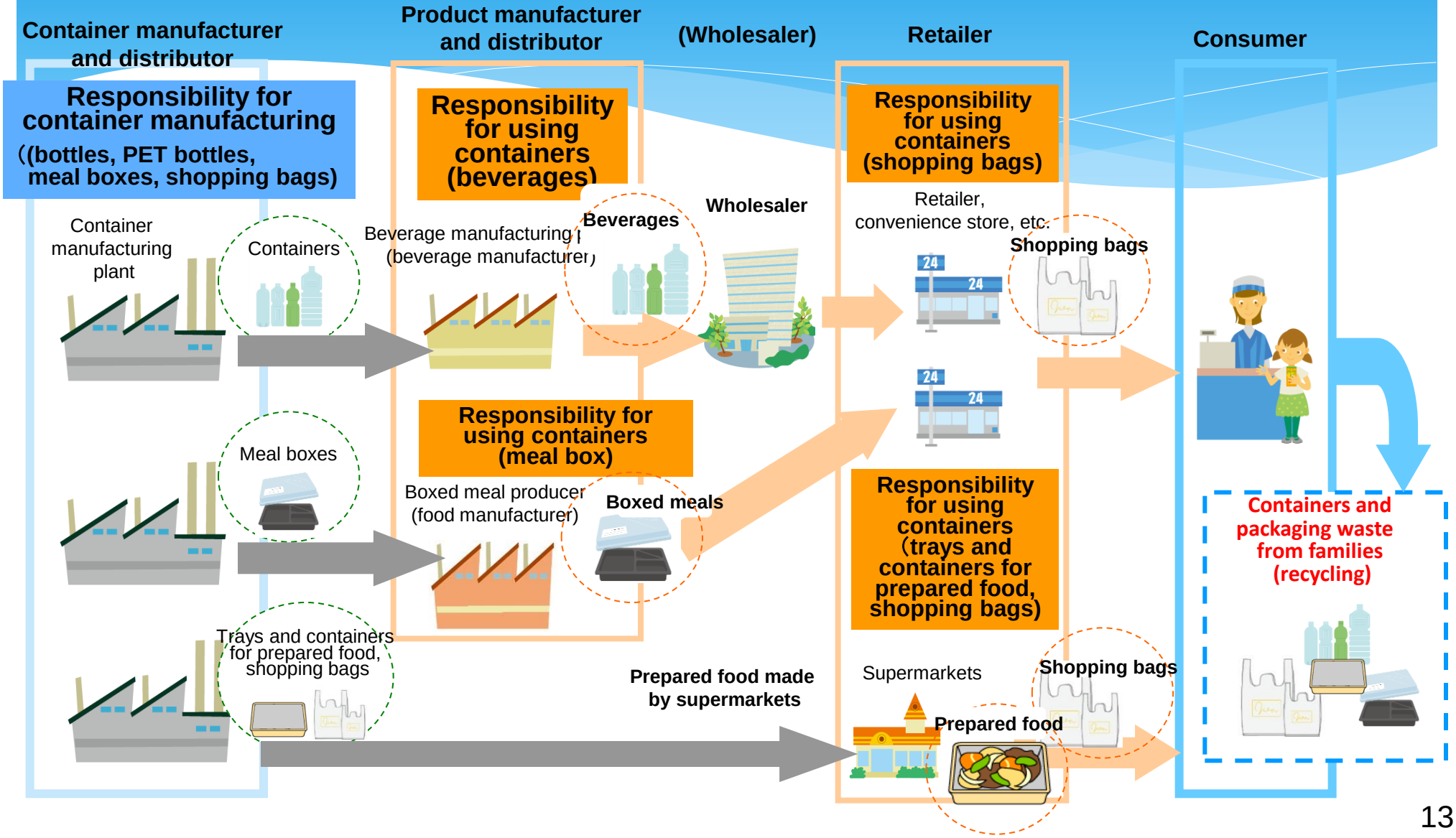
EPR（Extended Producer Responsibility ）

EPR was defined by the OECD. It is an environmental policy approach of extending physical and financial responsibilities fully or partially to manufacturers who most affect the design and manufacturing of products including containers and packaging.

EPR was introduced to Japan when the responsibilities for containers and packaging waste disposal, which municipal governments used to have, were partially transferred to business operators based on the enforcement of the containers ad packaging law.

Who is responsible for recycling?

＜General case＞ Business operators that newly use the target containers and packaging are responsible for recycling.



What are Containers and Packaging?

Amount of separated collection of containers and packaging recycling in all municipalities (FY2013)

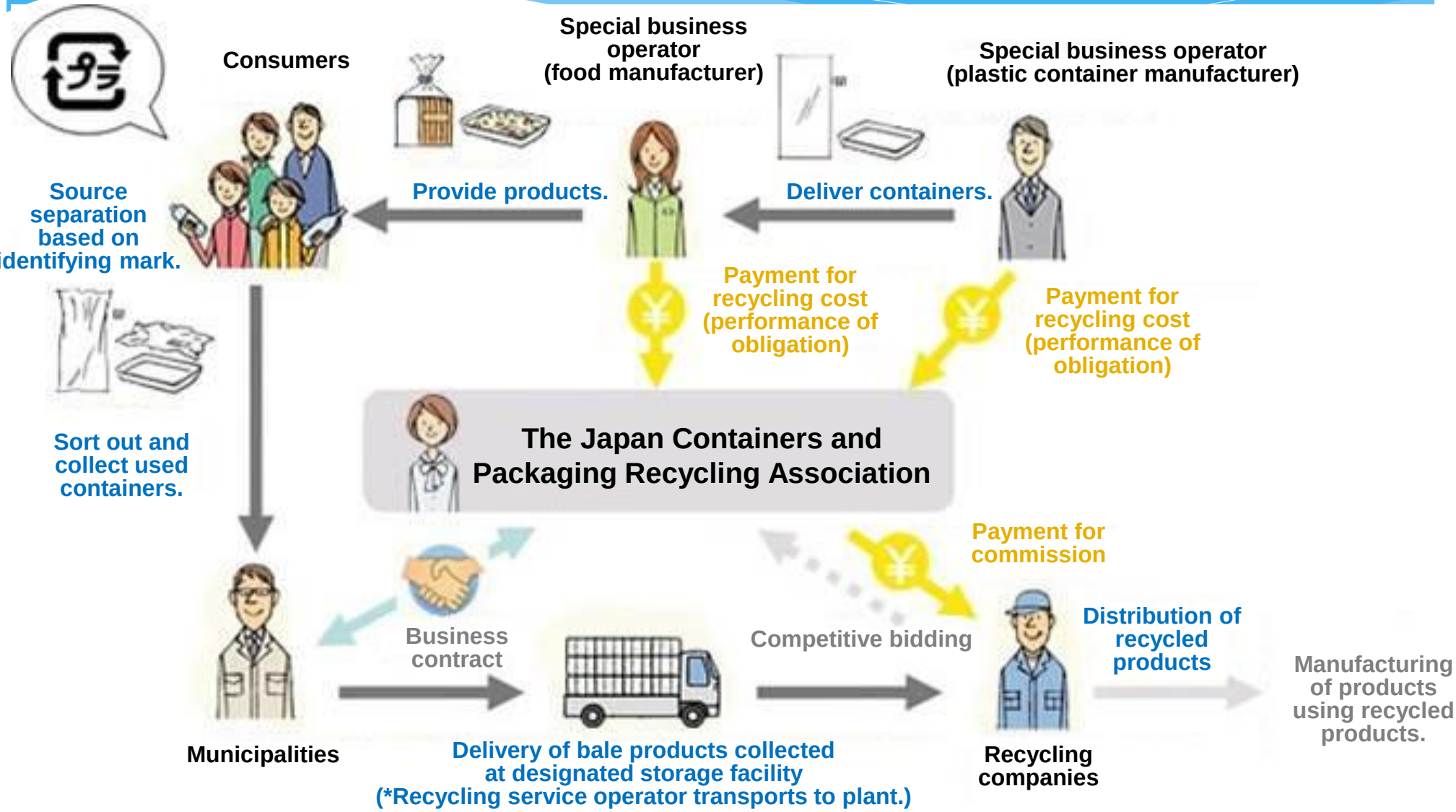
Classification of containers and packaging		Amount of sorted collection（in 1000 tons）
Steel containers		194
Aluminum containers		131
Paper containers for beverage		14
Corrugated cardboard		610
Glass bottles	**（no color）**	326
	（brown）	273
	（other colors）	201
PET bottles		302
Paper containers and packaging		91
Plastic containers and packaging		737

6 products for obligatory recycling

（1,931,000 tons）

（Source）”Newsletter: changes in ratio of sorted collection of all municipalities in 2013 after enforcement of Container and Packaging Recycling Law” The Ministry of the Environment（March 9, 2015）

Recycling Flow



Case of Meguro City

Residents

Collection and Transportation by Meguro city

Shinagawa Unyu (Compressing/baling)

Role of Local Government

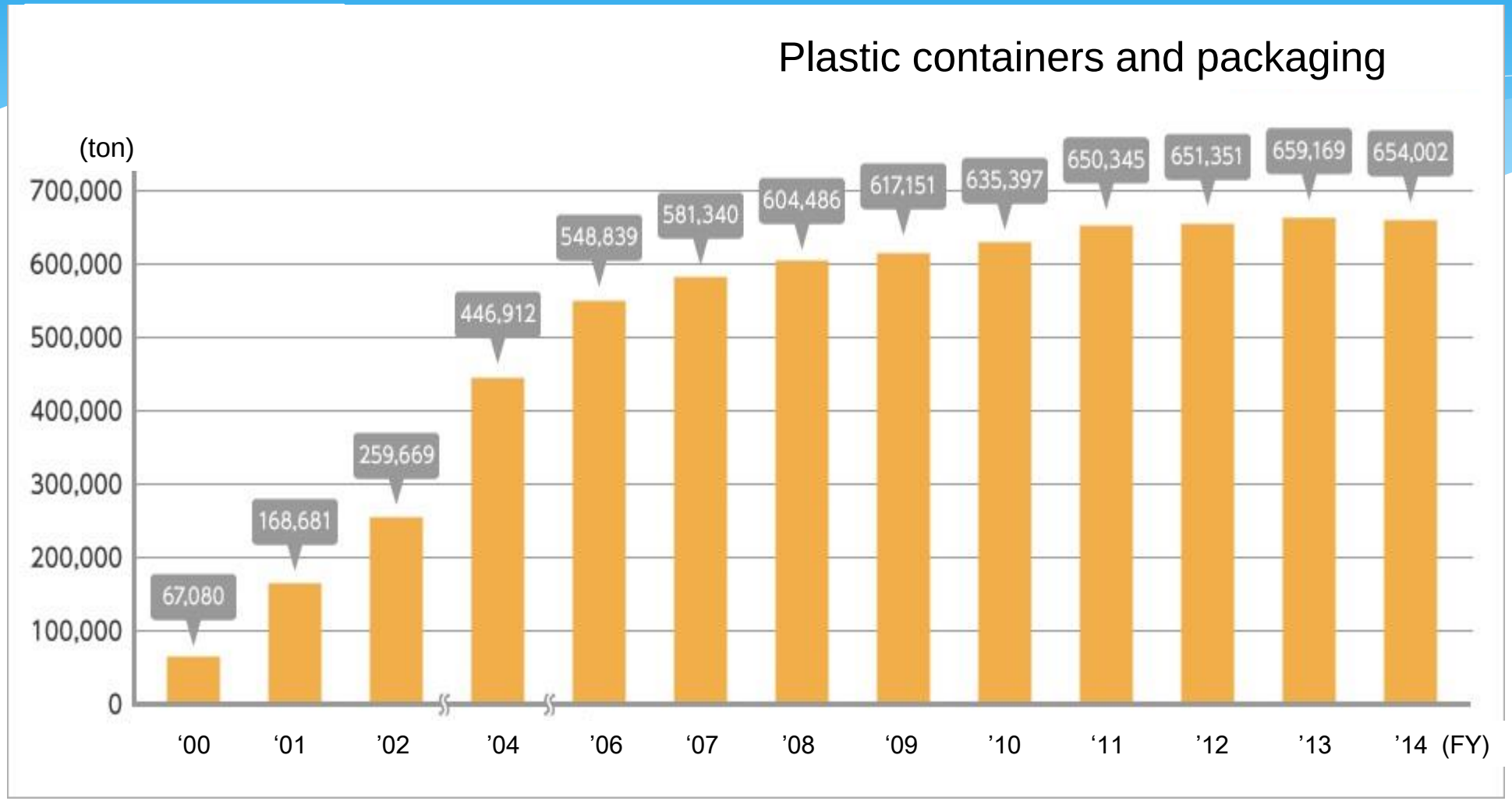
MM Plastic (Material Recycling)

Showadenko (Chemical Recycling)

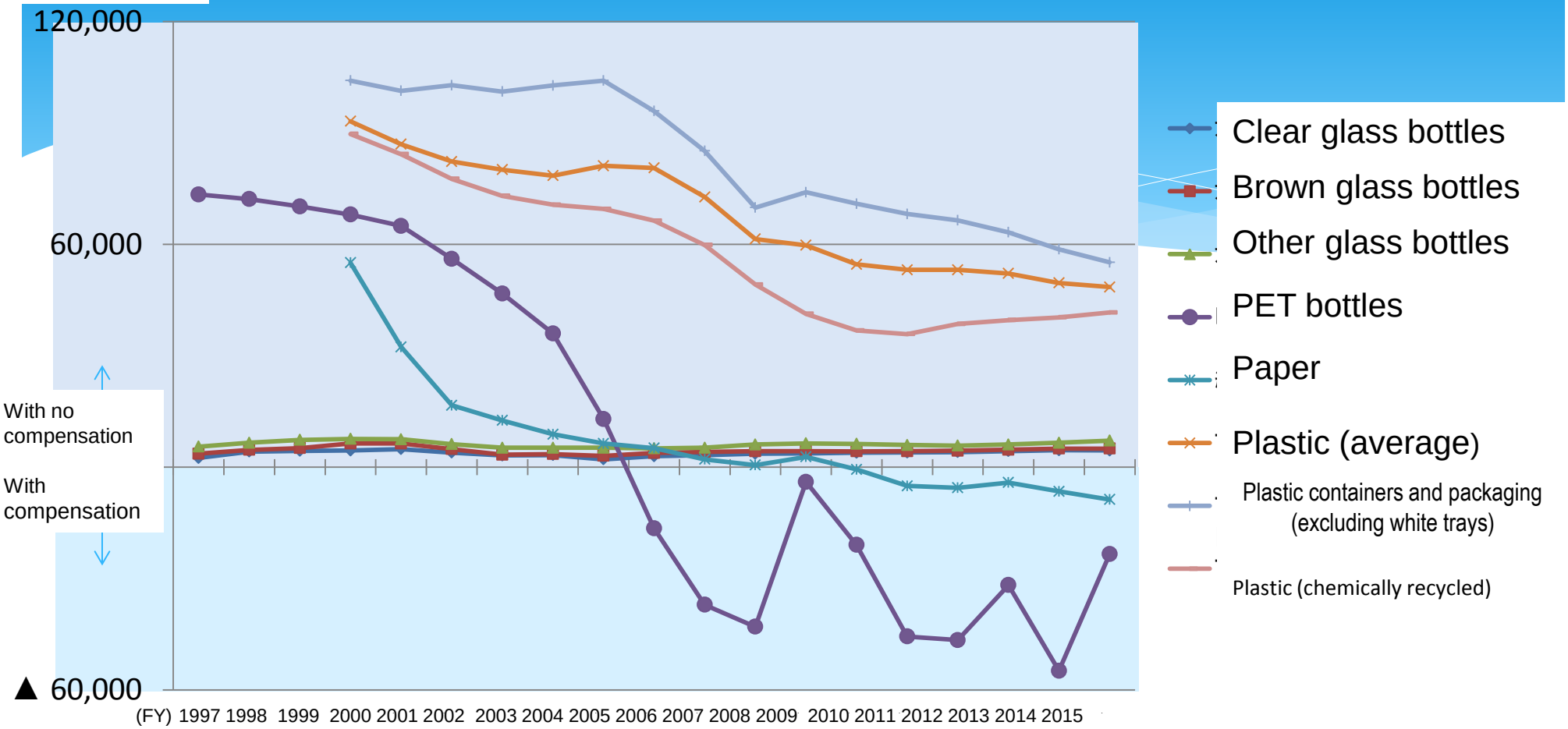
Role of producers of products using containers and packaging

Source: Sinjuku city

Trend of Trade Volume



Trends in Bid Prices（weighted average）



(c.f.)net prices

(source)Created by METI in accordance with data published on the home page of the Japan Containers and Packaging Recycling Association

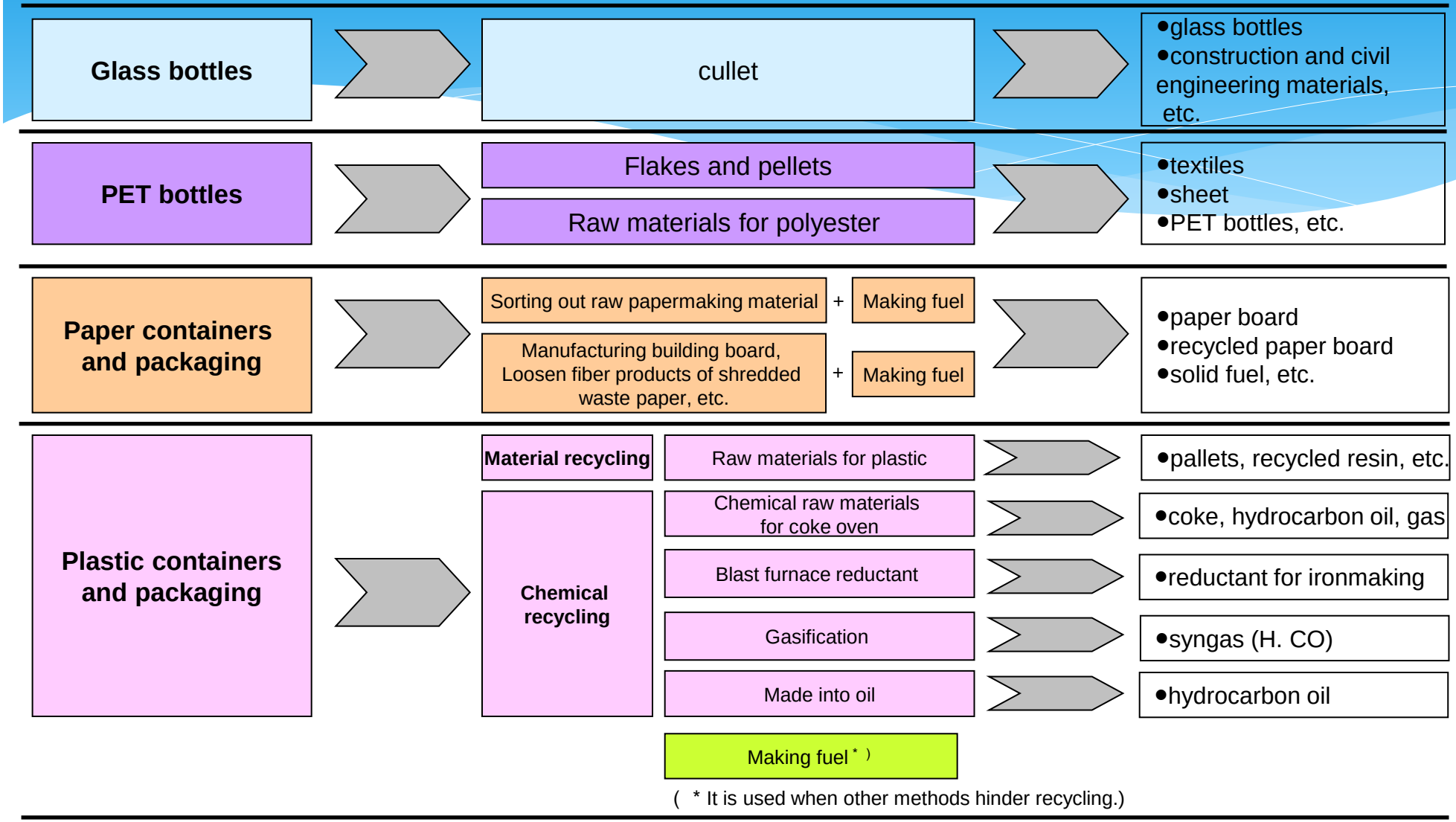
Today's Contents

1. Background
2. Scheme of Containers and Packaging Recycling Law
3. **Plastic Container and Packaging Recycling**
4. Activities of Waste Prevention
5. Conclusion

Recycling Methods

★There are several plastic container and packaging recycling methods.

(Examples of recycling)



Recycling Methods

Plastic containers and packaging (FY2013)

Plastic container and packaging waste

Emission from households **1,116,000 t*1**

*1 Plastic Packaging Recycling Council materials

From businesses

Industrial waste

Collected by municipal governments **737,000 t*2**

*2 Ministry of the Environment PR materials

Managed by municipality

Transferred to associations (entrusted to recyclers) **659,000 t**

Material recycling 346,000 t

Residue: RPF, cement raw fuel incineration energy retrieval, etc.

Recycled materials 173,000 t
Flake, fluff, pellet

Recycled products

Chemical recycling 312,000 t

Residue

Recycled materials 264,000 t
Chemical raw materials with coke oven 175,000 t
Synthesis gas 61,000 t
Blast furnace reducing agent 29,000 t
Thermally decomposed oil 0 t

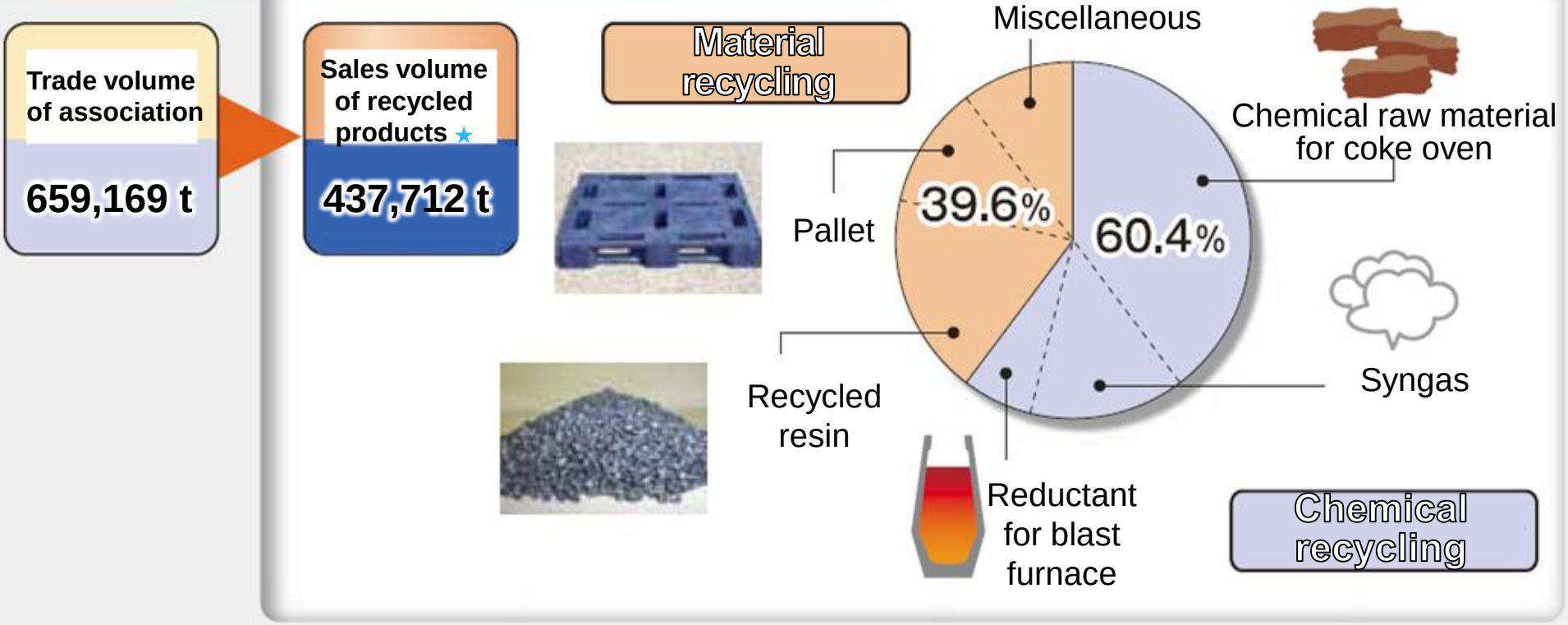
Solid fuel, etc. 0 t

Use of Recycled Plastic Containers and Packaging

Approx. 60% and 40% of recycled plastic is used for chemical recycling and material recycling, respectively.

Plastic traded in FY2013

Recycled products and use (white trays excluded)



★ Actual value of plastic that was received in FY2013 and recycled by the end of June 2014.

Plastic Containers and Packaging: Flow of Material Recycling

Plastic containers and packaging recycled into pallet

START

Recycling plant

1. Transported to recycling plant and put into machinery.

2. What cannot be recycled is removed and broken into small pieces.

3. Pressed into small grains.

Pallet-making plant

4. Grains are melted and send to machinery.

5. Melted matter is placed on machinery.

6. It is machine-pressed.

7. Two pressed pieces are put together.

8. Pallet

GOAL

Source: What is the Containers and Packaging Recycling Law on Japan Containers and Packaging Recycling Association website

Raw chemical material for coke oven (conducted by Nippon Steel and Sumitomo Metal Corp., etc.)

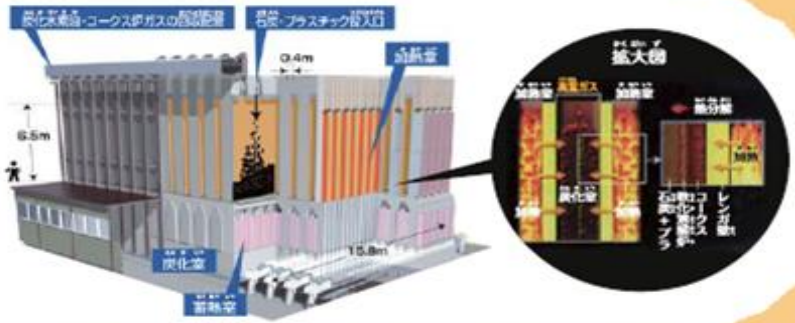
Coal

Household plastic waste

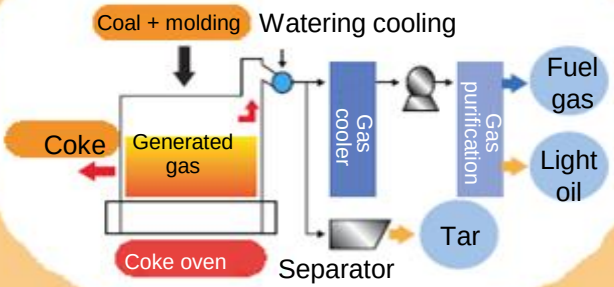
Coke oven

Thermal depolymerization process

Escallop plastic at 1,200℃ in oxygen-free condition for thermal depolymerization.



Gas purification process

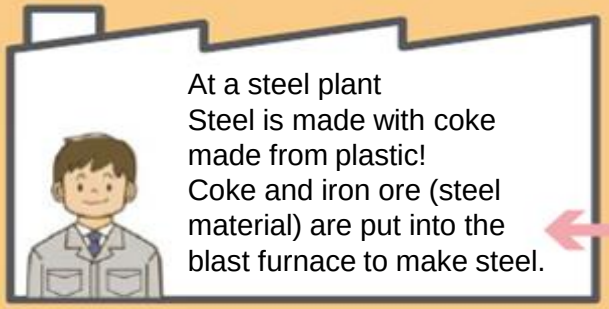


Chemical material

40% **Coke oven gas**
Used at a power plant at a steel plant.

40% **Hydrocarbon oil**
Used as a chemical material at a chemical plant.

20% **Coke**
Put into the blast furnace and oxygen is removed from iron ore (steel material).



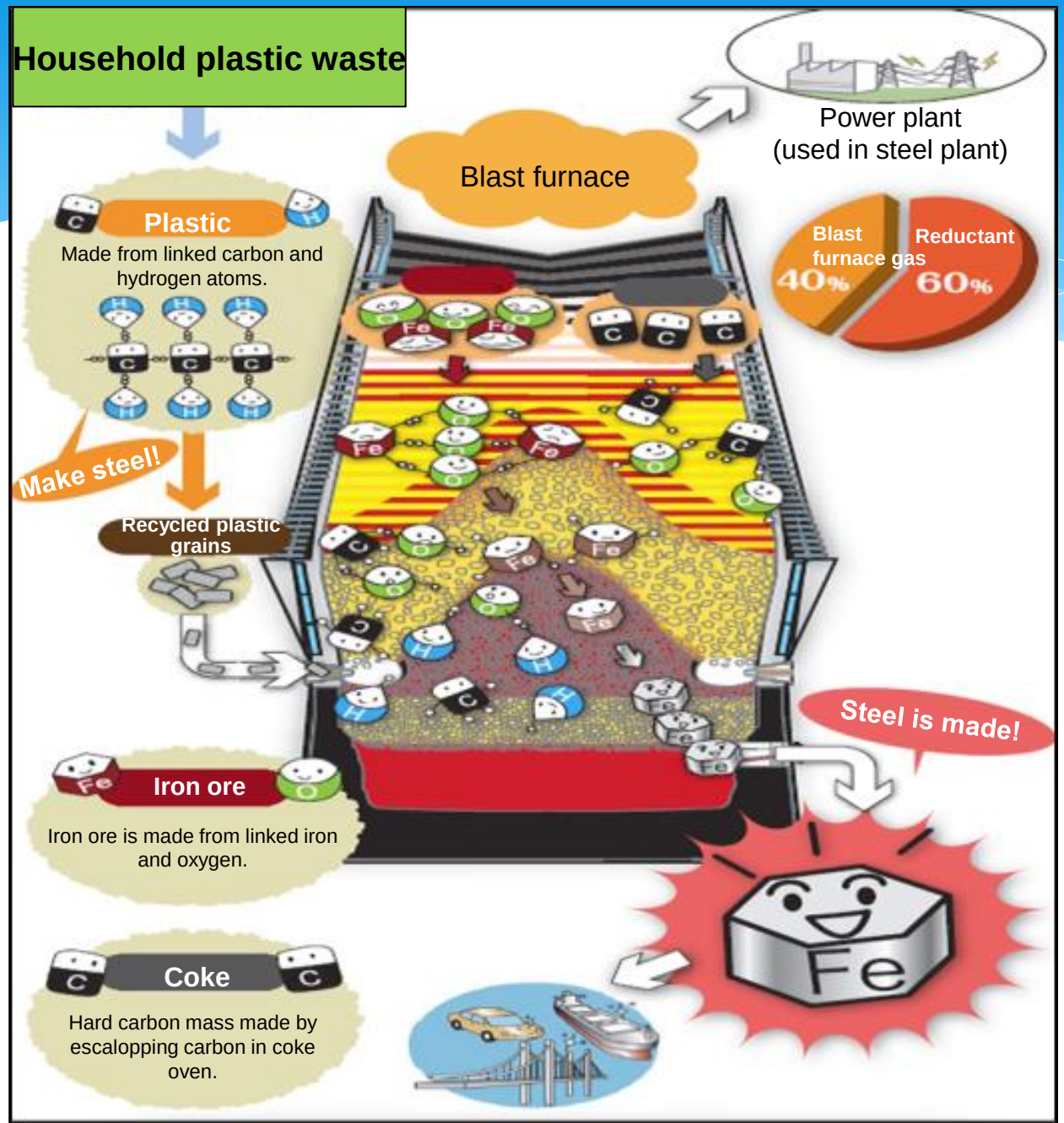
Iron and PVC are removed from waste plastic (bale) transported from municipalities to the recycling plant and heated at 100℃ to make into grains.

It is mixed into coal at the ratio of 1 to 2% and put into the carbonization chamber of a coke oven.

The carbonization chamber is oxygen free heated to 1200℃ and waste plastic is thermally decomposed.

Decomposed high-temperature gas is cooled and made into coke oven gas (40%) for power generation, hydrocarbon oil (40%) to be used as a chemical material, and coke (20%) to be used as blast furnace reductant.

Blast furnace reductant (performed by JFE Plastic Resources Corp.)



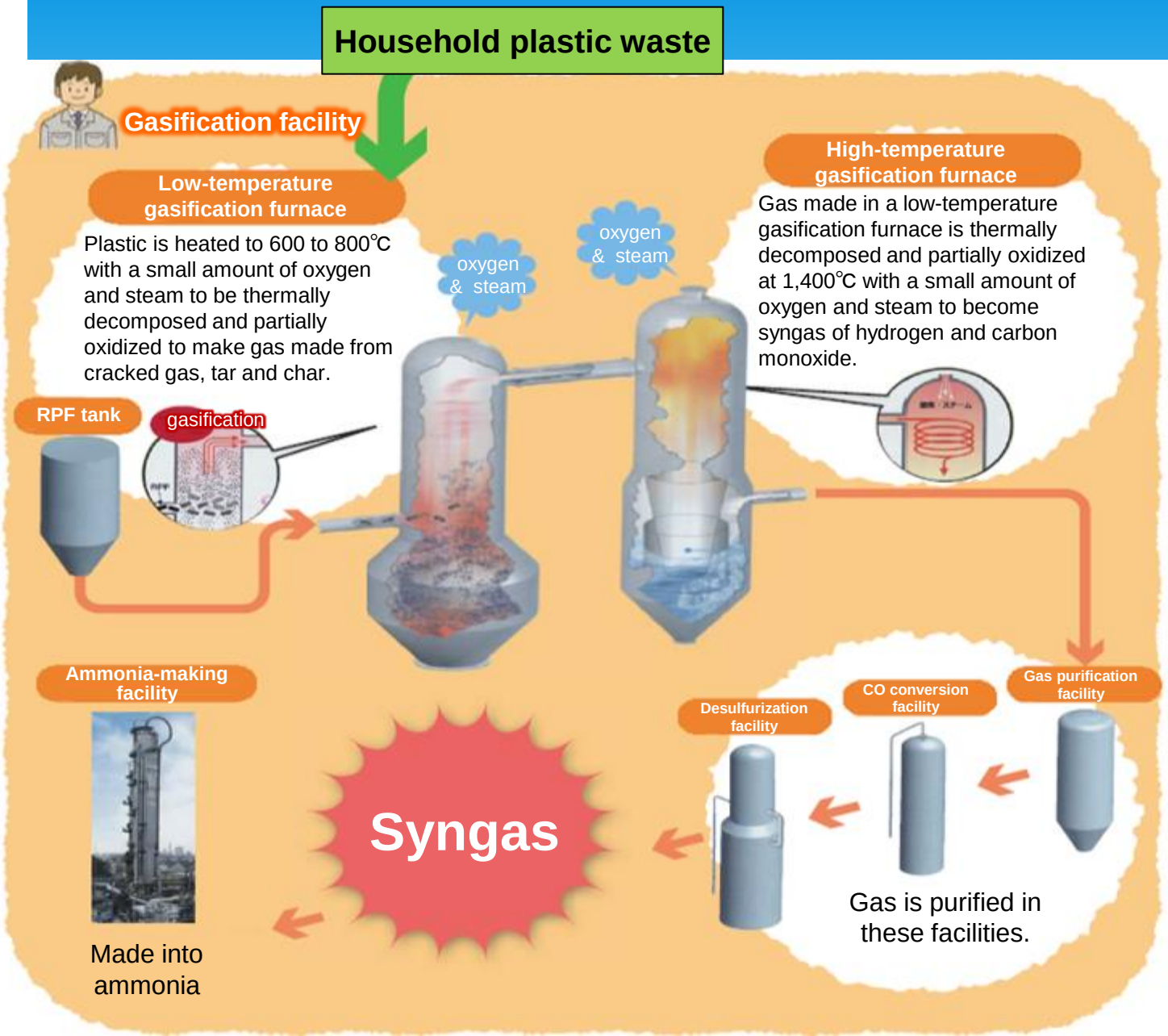
Iron and PVC are removed from waste plastic (bale) transported from municipalities to recycling plants and are crushed into small pieces and pressed to reduce their volume to make recycled plastic grains.

Recycled plastic grains are put into a blast furnace at a steel plant at approx. 350℃ in oxygen-free conditions.

Recycled plastic grains serve as reductant to remove oxygen (O) from iron ore (Fe_2O_3) in a blast furnace to make steel.

Gas generated in the process is used for power generation.

Gasification (performed by Showa Denko K.K., etc.)



Waste plastic (bale) transported from municipalities to a recycling plant is crushed into small pieces and firmly pressed.

It is then put into a two-stage gasification furnace.

Sand heated to 600-800℃ flows into a low-temperature gasification furnace and waste plastic makes contact with it to be decomposed into hydrocarbon, carbon monoxide, hydrogen and char (carbonized solid).

Gas generated in a low-temperature gasification furnace is put into a high-temperature gasification furnace at 1,300-1,500℃ and reacts with steam to become syngas, which is mainly made from carbon monoxide and hydrogen.

Generated syngas is used as a raw material at chemical plants producing ammonia, hydrogen, methanol, acetic acid, etc.

Today's Contents

1. Background
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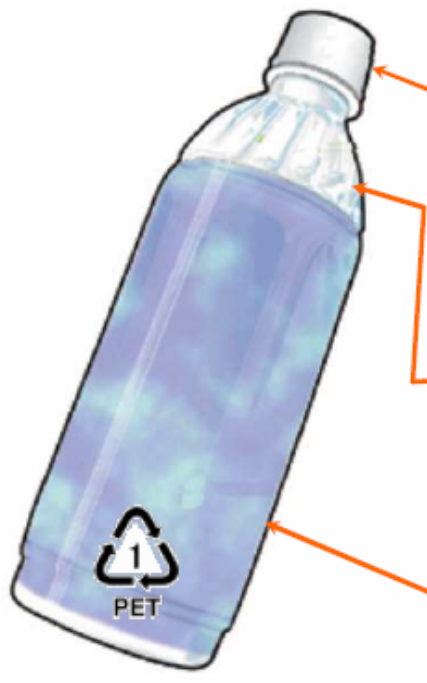
5. Conclusion

Design for Environment (DfE)

Voluntary Design *Guideline* for Designated PET Bottles (1992)

Soft drinks (including milk beverages), Specific flavoring (soy sauce), Alcohol

* The Law for the Promotion of Effective Resources -> products with specific labels [promotion of sorted collection]
* 2009 Revision of Classification system for PET bottles Bottles for soy sauce are classified as bottles for specific flavoring



Caps -> Plastic caps (PE/PP ratio must be less than 1 and must float)
1998 Prohibited to include aluminum caps

Bottles -> PET bottles only (no color, transparent)
1998 Prohibited to include base cups
2001 Prohibited to include colored bottles

Labels -> Must be easily removable by hand
1994 Prohibition of PVC materials (to prevent discoloration of recycled materials)
1994 Prohibition of paper labels that have glue over entire surfaces

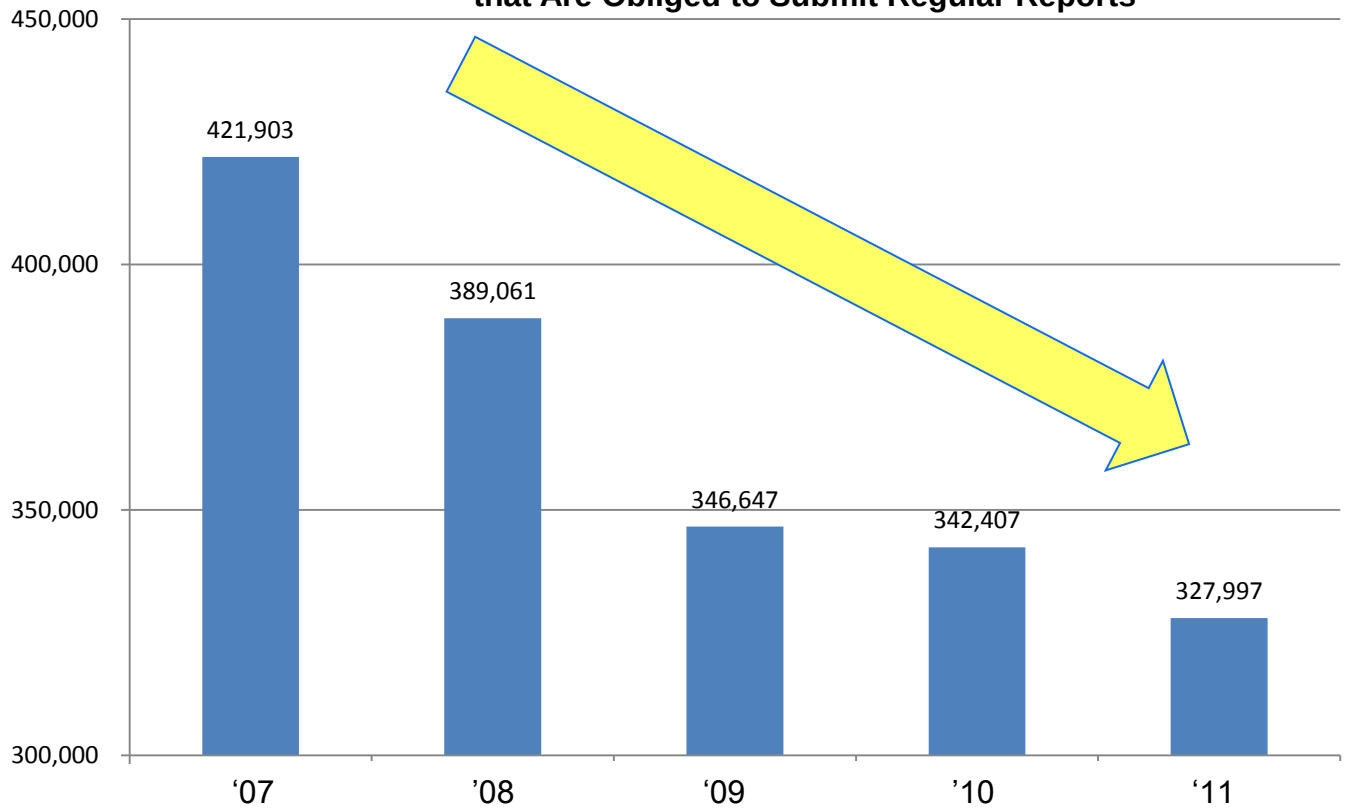
Source: Handouts used for Promotion-consortium of PET bottles (the joint meeting of METI working group of containers and packaging recycling, and Central Environmental Council working group for promotion of 3Rs for containers and packaging recycling, Dec. 5., 2013)

Discharge Control Effect of Regular Reporting System

- **Regular reporting system**
  Business operators that use more than 50 tons of containers and packaging annually (business operators that use a large volume of **containers** and packaging)
  - Obliged to report the volume of containers and packaging they use, efforts for usage rationalization (charge fees on shopping bags, encourage non-use, etc.) and their effects and usage unit of containers and packaging every fiscal year.
- **Containers and packaging reduction after introduction of regular reporting system**

Unit: ton

Trend of Total Amount of Containers and Packaging Used by Business Operators that Are Obliged to Submit Regular Reports



Reduction Efforts by Business Operators

FY2012 Results of Reduction (compared to FY2004)

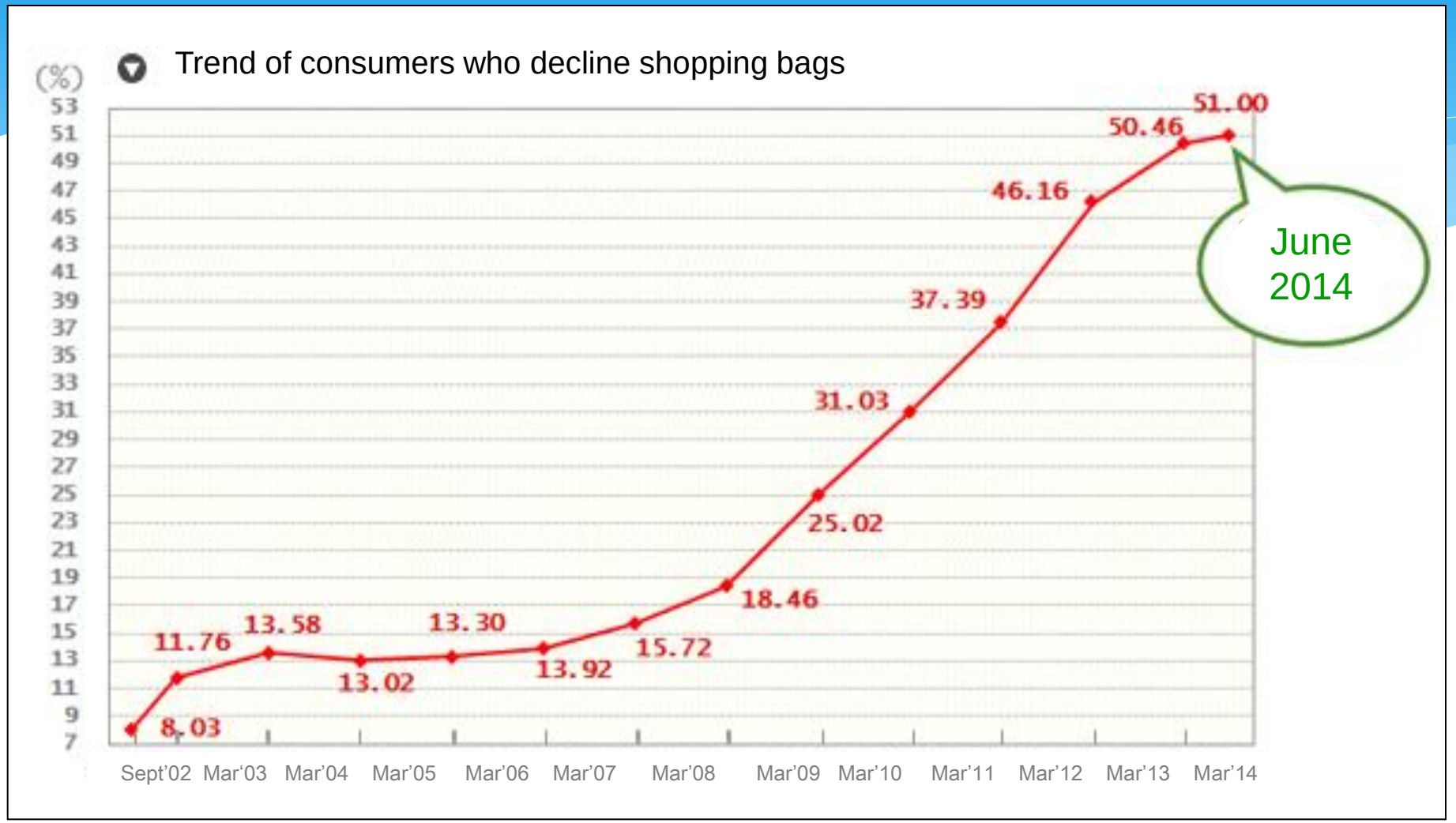
Material	FY2015 target (compared to FY2004)	FY2012 results	Total reduction from FY2006	Note
Glass bottle	2.8% reduction by average weight per bottle	2.1%	143,000 tons	
PET bottle	15% reduction for all designated PET bottles	13.0%	331,000 tons	Upward revision of 2015 target from 10%
Paper containers and packaging	11% reduction in total amount	9.9%	711,000 tons	Upward revision of 2015 target from 8%
Plastic containers and packaging	13% reduction	11.5%	58,000 tons	
Steel can	5% reduction by average weight per can	4.9%	115,000 tons	Upward revision of 2015 target from 4%
Aluminum can	3% reduction by average weight per can	3.8%	53,000 tons	
Paper beverage container *2	3% reduction for paper 500-ml milk pack	1.0%	165,000 tons	
Cardboard	5% reduction by average weight per 1 square meter	3.6%	985,000 tons	Upward revision of 2015 target from 1.5%

*1 Targets of each organization are reviewed and revised as needed.

*2 Compared to 2005. Specifications of raw paper and pack paper are compared.

Source: 2013 Follow-up report on 3R Suishin Dantai Renrakukai website

Consumers' Efforts (shopping bags)



Source: Japan Chain Stores Association website

Ratio of Containers and Packaging in Household Waste

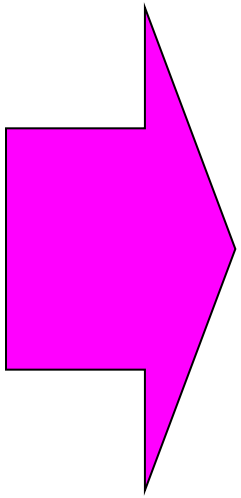
【1995】

In volume

60 %

In wet weight

25 %



【2012】

In volume

53.8 %

In wet weight

24.3 %

(Source: Survey on use and disposal of containers and packaging waste by the Ministry of the Environment)

Today's Contents

1. Background
2. Scheme of Containers and Packaging Recycling Law
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5. Conclusion

Cooperation with residents for success of the law

* Source separation
  * To set various categories
  * To be practiced perfectly through residents' cooperation and understanding

Photo: Toshima City

Challenges Facing Containers and Packaging Recycling System

* Hard to understand separation criteria in households
* No recycling scheme for plastic goods that are not containers or packaging
* Municipality participation ratio in this system
* Cost reduction

Thank you for your attention!