

Asia Pacific Conference on Recycling of Plastics



Current Status of Containers & Packaging Plastics Recycling in Japan

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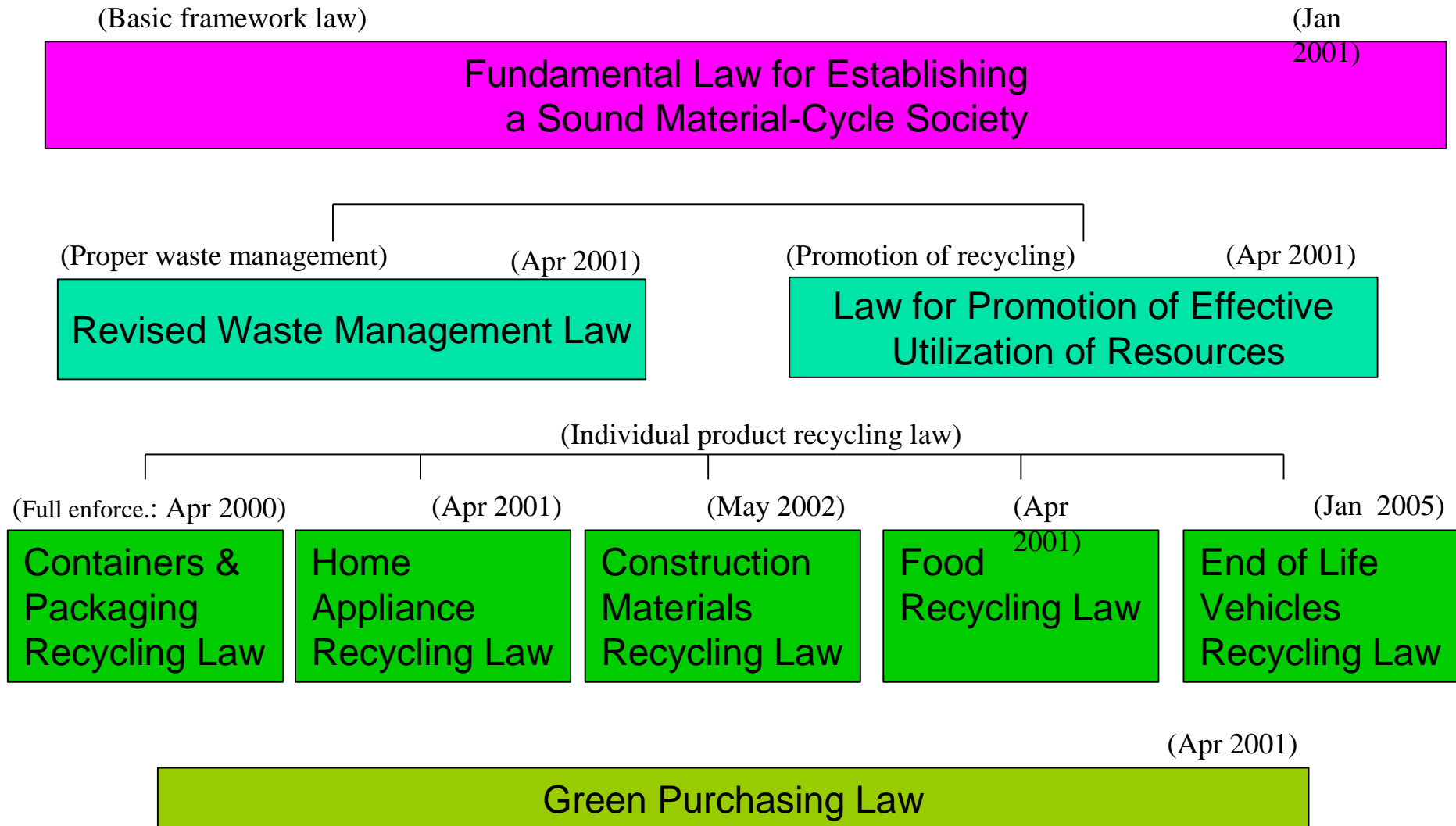
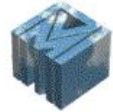


Presentation Topics

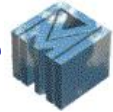


1. Legislative & Voluntary Framework
2. Flow of Plastic Products, Wastes and Recycling
3. Status of Recycling under C & P Recycling Law
4. Summary
- (5. Introduction of PWMI)

Legislative Framework to Form Sustainable Development Society



Industrial Structure Council Guidelines for Waste and Recycling



The guidelines indicate measures to be taken by businesses for waste treatment and recycling with aim of promoting voluntary actions, with respect to 35 product categories and 18 business sectors.

<Example>

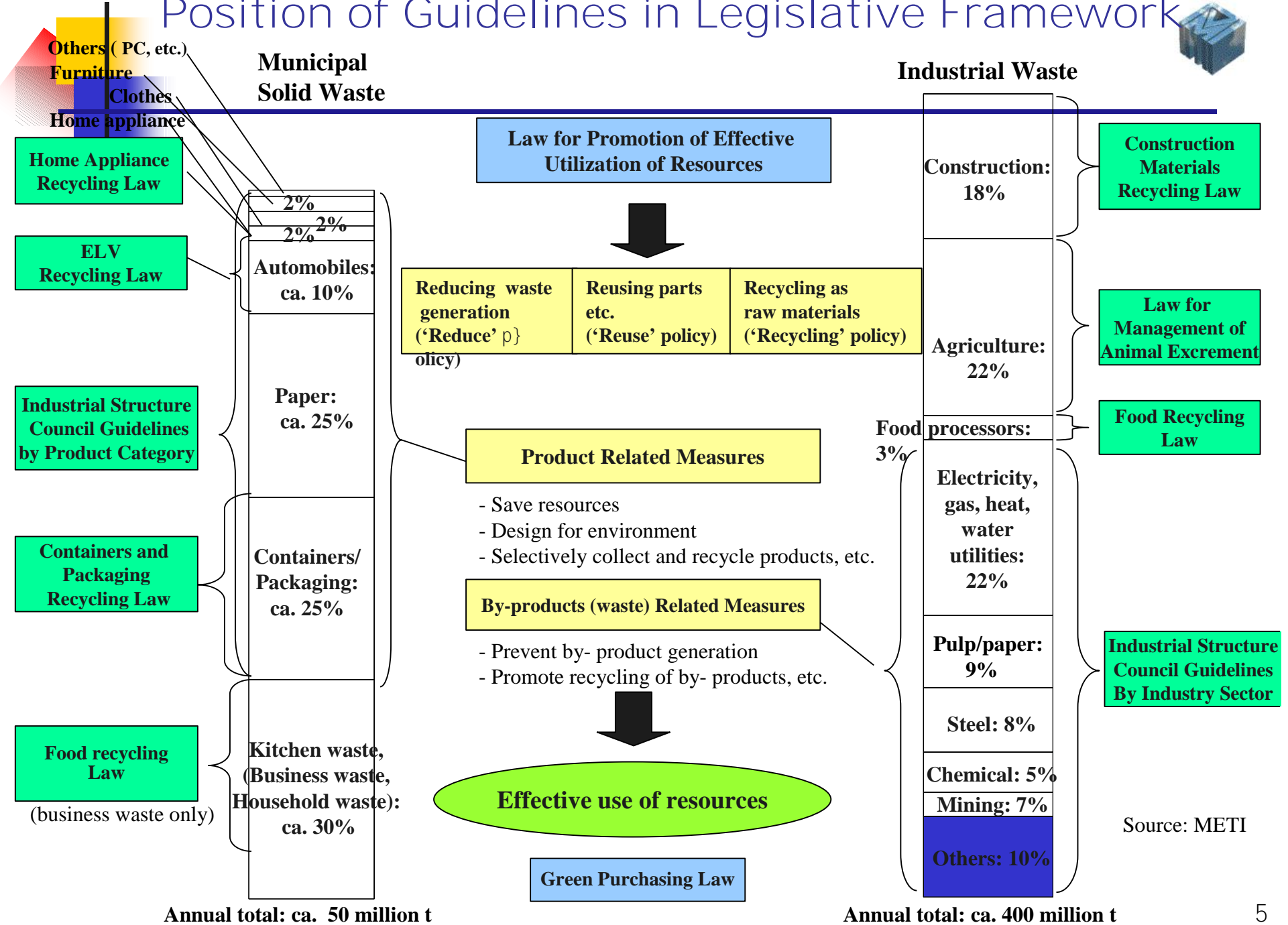
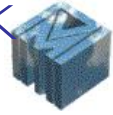
Plastic product category:

PET bottles	Collection rate 80% (2014)
EPS fish boxes and packaging for home appliance	Recycling rate 75% (2010)
PVC agriculture films	Recycling rate 70% (2006)
PVC pipes and fittings	Recycling rate 70% (2010)

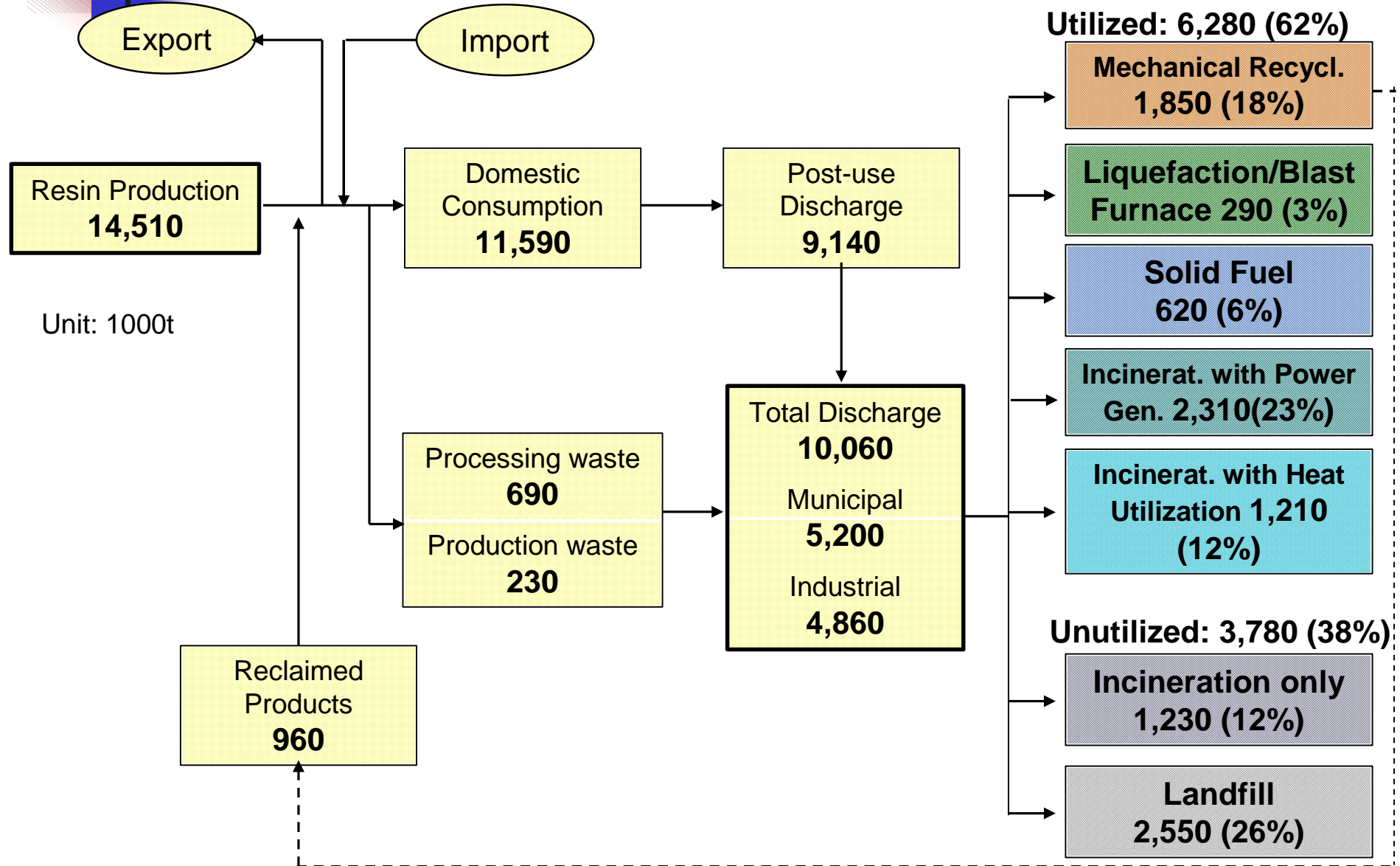
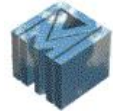
Distribution business sector:

Japan Franchise Association	Reduction of shopping bag 35% (2010 vs 2000)
Japan Department Stores Association	Reduction of packaging materials 25% (2010 vs 2000)

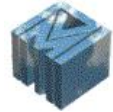
Position of Guidelines in Legislative Framework



Flow of Plastic Products, Wastes, and Recycling (2005)

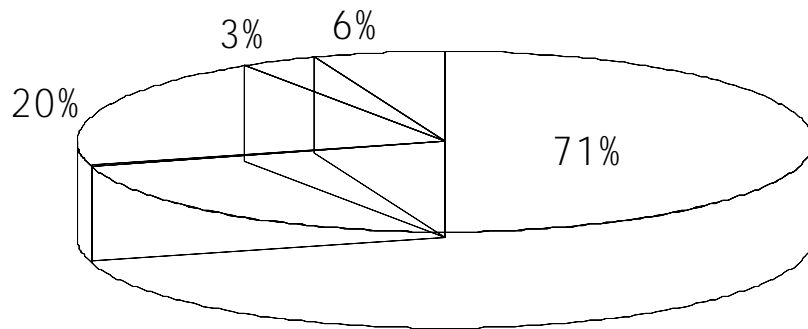


Breakdown of Plastics Waste Discharge (2005)



Municipal Plastics Waste (5,200 Kt)

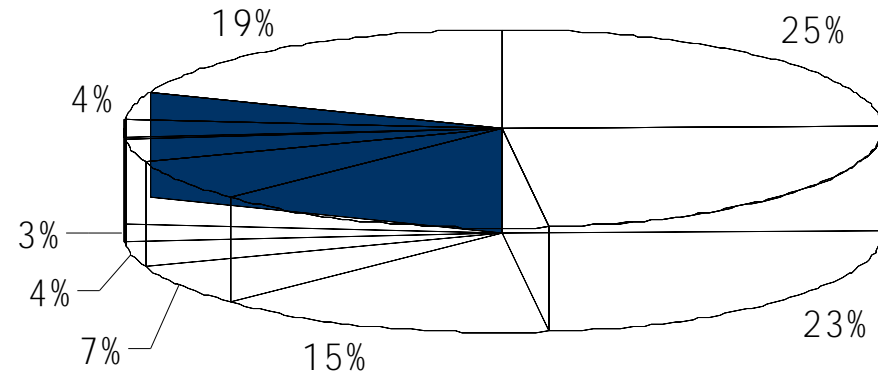
Containers & packaging accounts for 71%



- Containers & Packaging
- Household
- Elect. & Machinery
- Others

Industrial Plastics Waste (4,860 Kt)

Electric & machinery and containers & packaging account for 25%, and 23% each.



- Electric & Machinery
- Building
- Agriculture
- Others
- Containers & Packaging
- Transportation
- Household
- Production loss

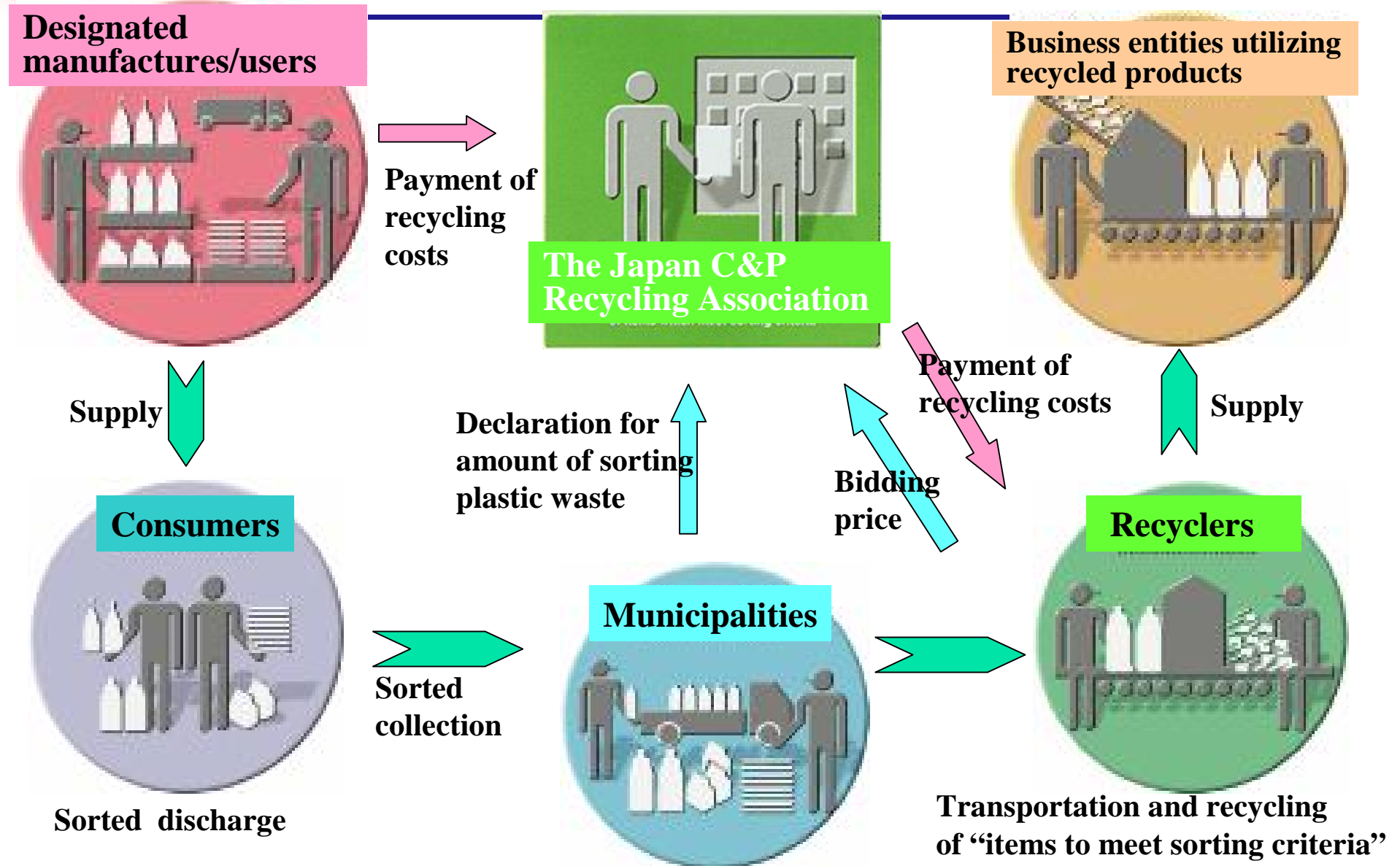


Containers and Packaging Recycling Law

- June 1995 Promulgation
 - April 1997 Partial Enforcement (Glass bottles, PET bottles)
 - April 2000 Full Enforcement
(Glass bottles, PET bottles, Paper C&P, **Plastic C&P**)^ê
- (Driver: Concern about remaining space of disposal sites)

	1997	2000
Large sized company	Glass bottles, PET bottles	
		Paper C&P, Plastic C&P
Medium sized company		Glass bottles, PET bottles
		Paper C&P, Plastic C&P
Small sized company	Not applied	

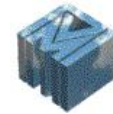
Containers and Package Recycling Law





Method of Plastics Recycling

Category	Method of recycling		Positioning under law
Mechanical recycling	Recycling to make - Plastic raw material - Plastic product		Prevail over chemical recycling
Chemical recycling (Feedstock recycling)	Degradation to monomer		
	Blast furnace (as reducing agent)		
	Coke oven		
	Gasification, Liquefaction	Chemical feedstock	
Energy recovery	Cement kiln		Not specified as recycling method. (Cement kiln and, RPF are included as an emergent and supplementary method in the amendment made recently.)
	Incineration with power generation		
	Solid Fuel (RPF, RDF)		

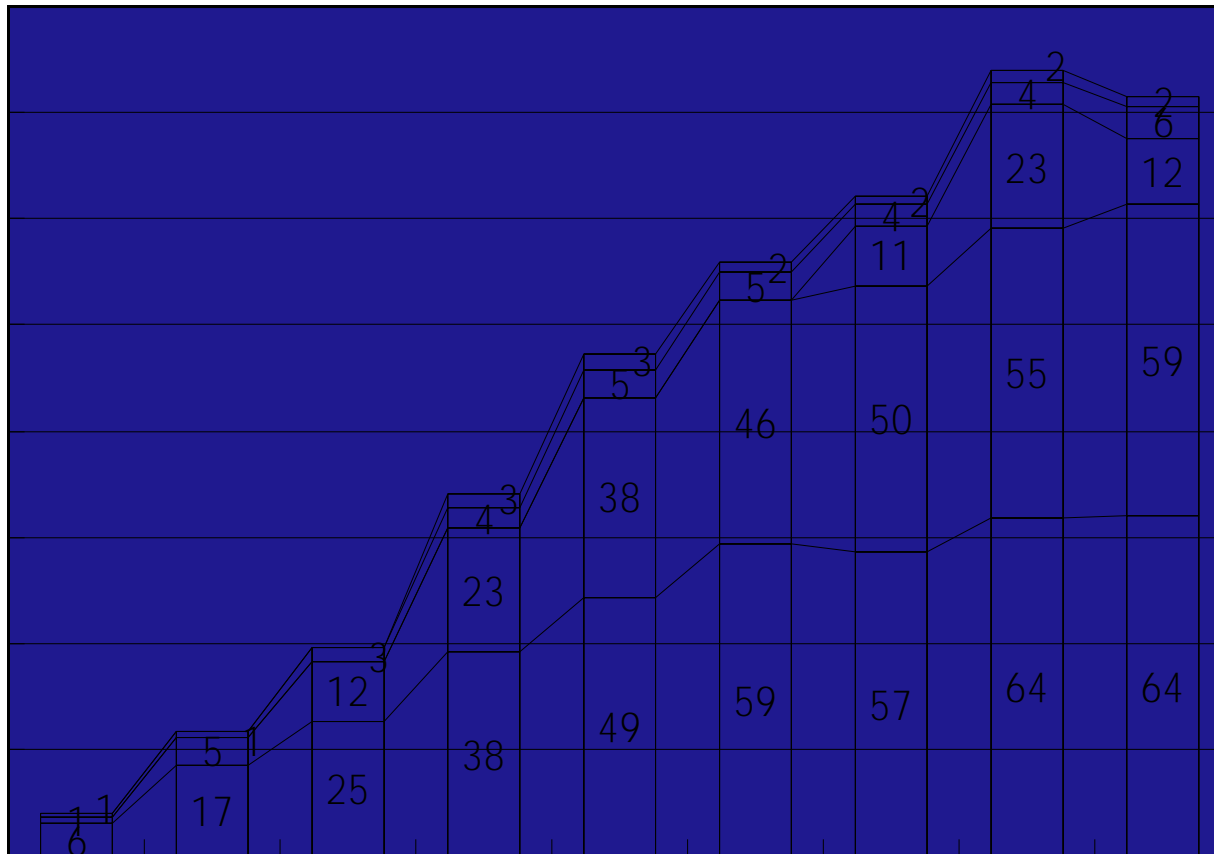


Recycling of PET Bottles

PET bottles are mostly recycled to make Fibers, Sheets, and recently PET bottles as well.

× 1000t

160
140
120
100
80
60
40
20
0

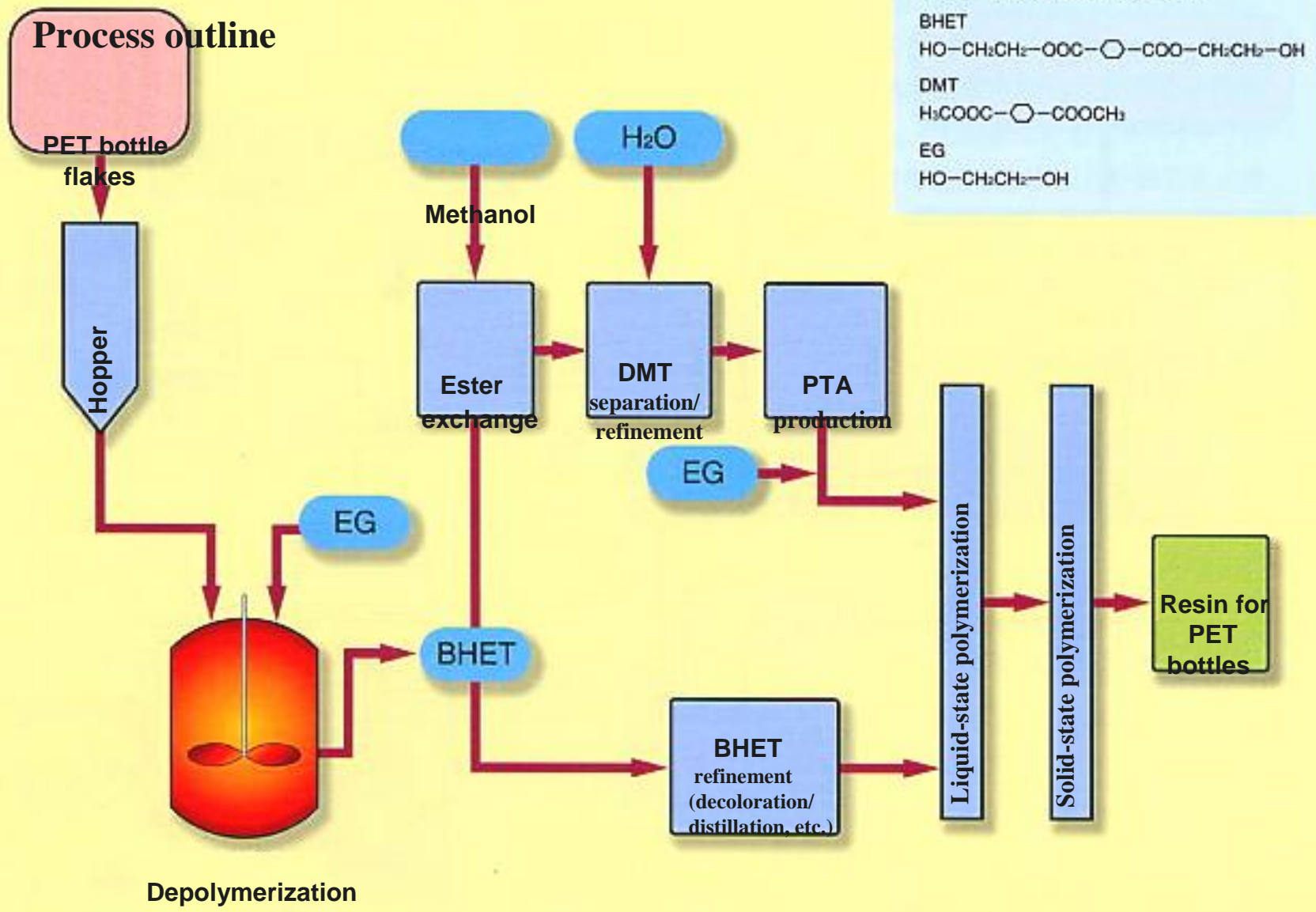


- Others
- Molded product
- Bottles
- Sheet
- Fiber

1997 1998 1999 2000 2001 2002 2003 2004 2005

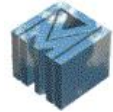
Source: Japan Containers and Packaging Recycling Association

Monomerization Process



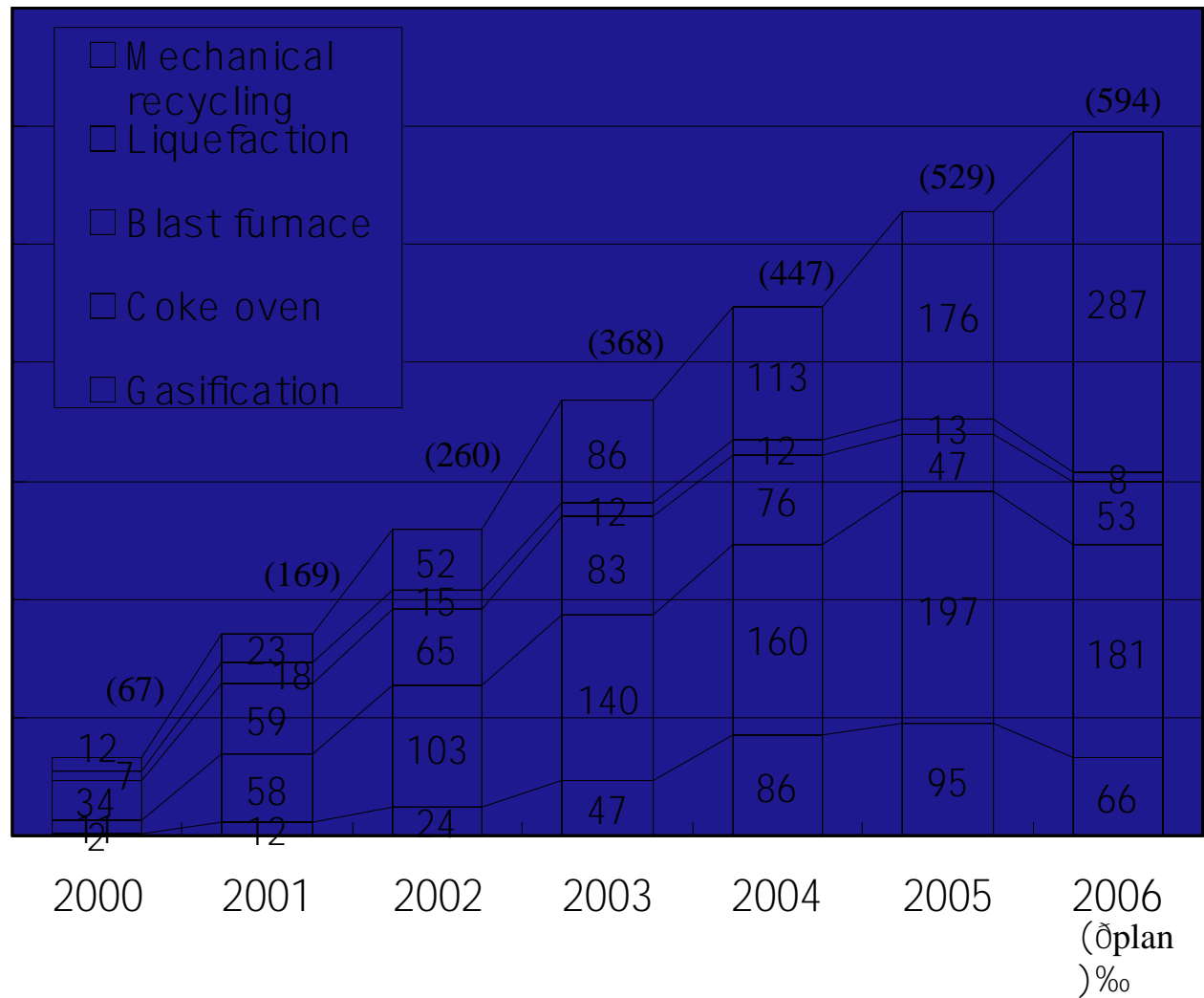
Reference: Teijin and Aies pamphlets

Recycling of Plastic C&P by Method



Currently mechanical recycling shows a big increase.
As a result, chemical recycling is being depressed.

Take back volume by JCPRA for Recycling (x1000t)



Source: Japan Containers and Packaging Recycling Association

Chemical Recycling



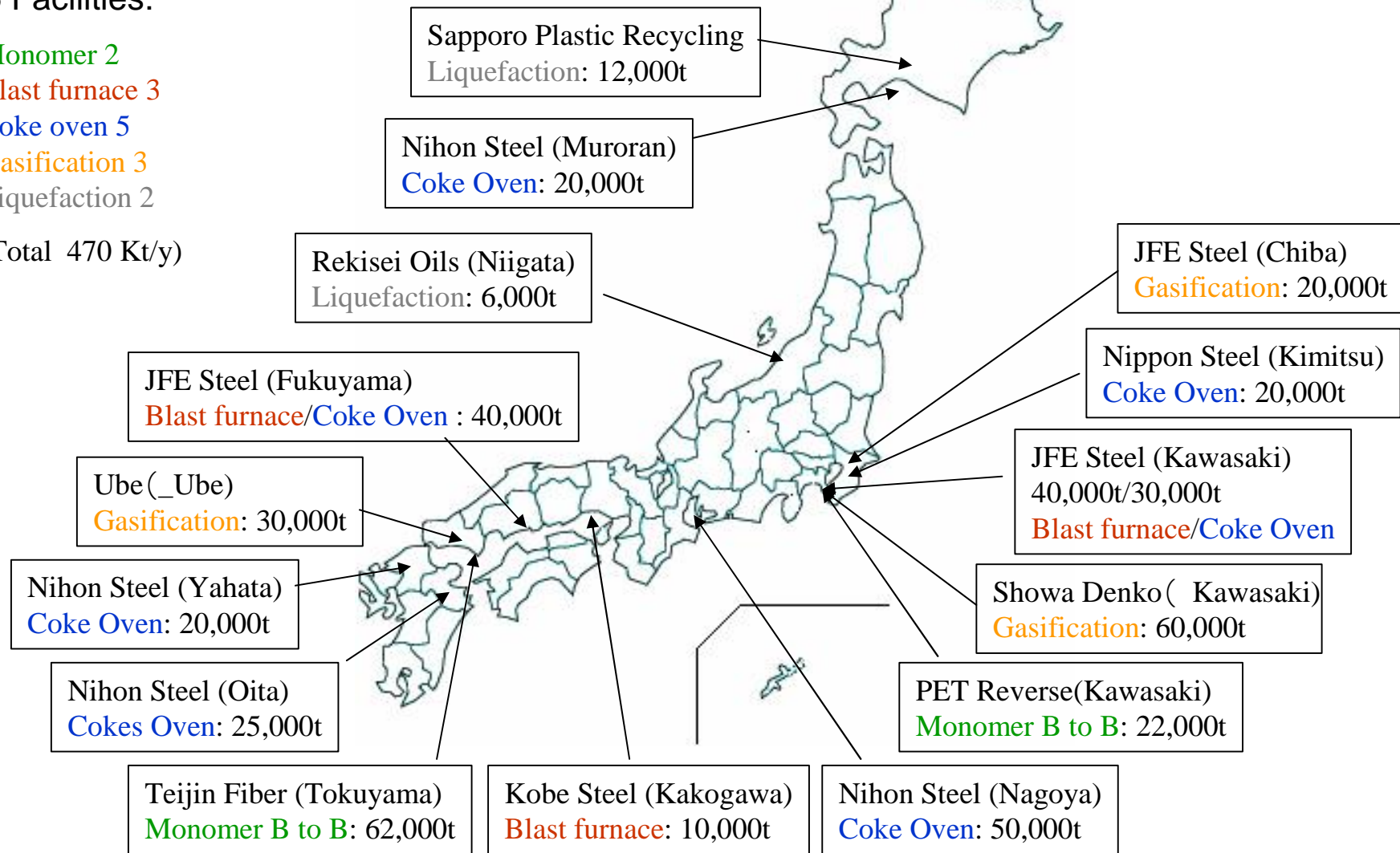
Large Scaled Chemical Recycling Facilities

(accomplished with C&P recycling law, 2005)

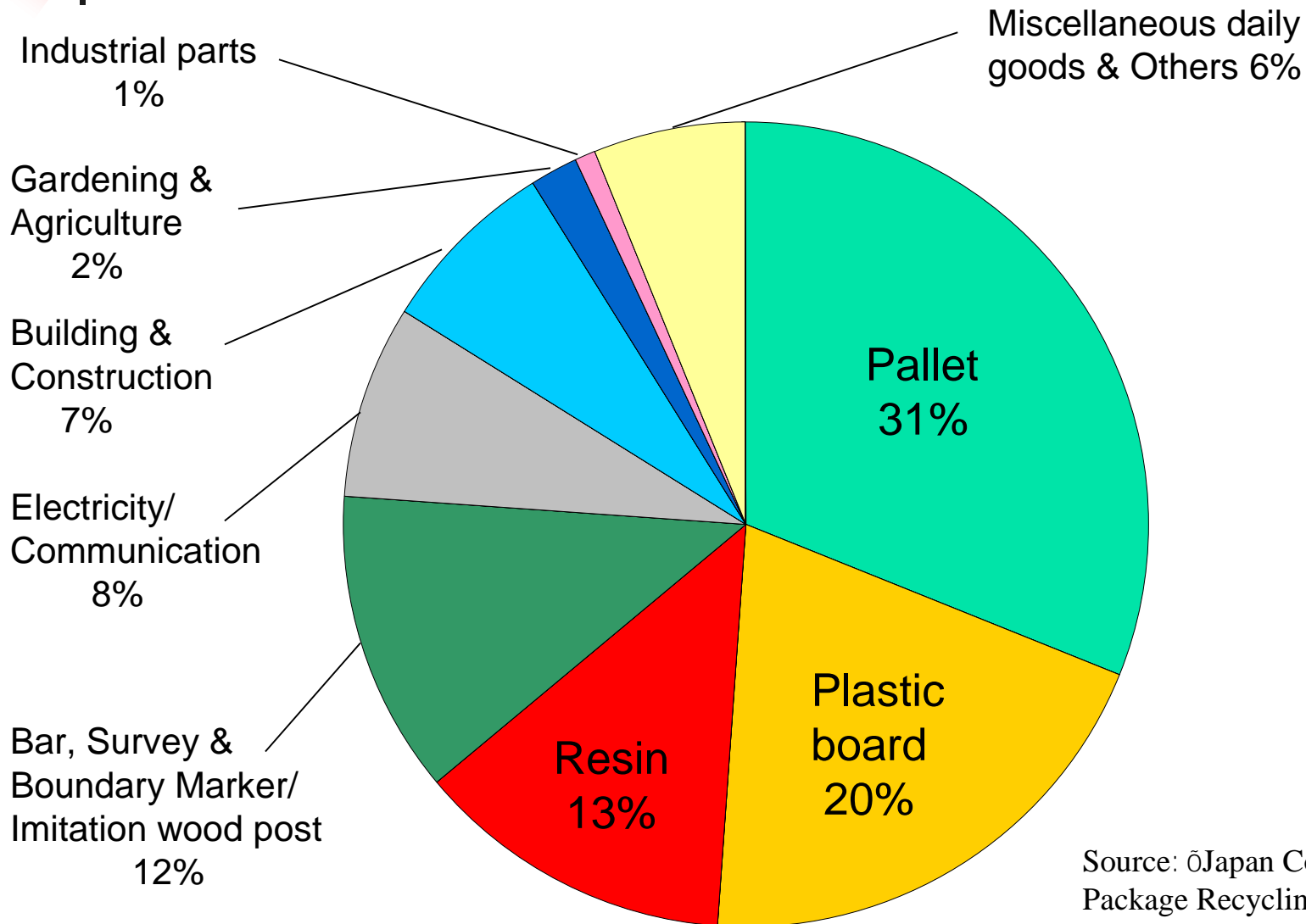
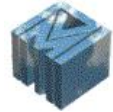
15 Facilities:

- Monomer 2
- Blast furnace 3
- Coke oven 5
- Gasification 3
- Liquefaction 2

(Total 470 Kt/y)



Breakdown of Usage of Recycled Product by Mechanical Recycling



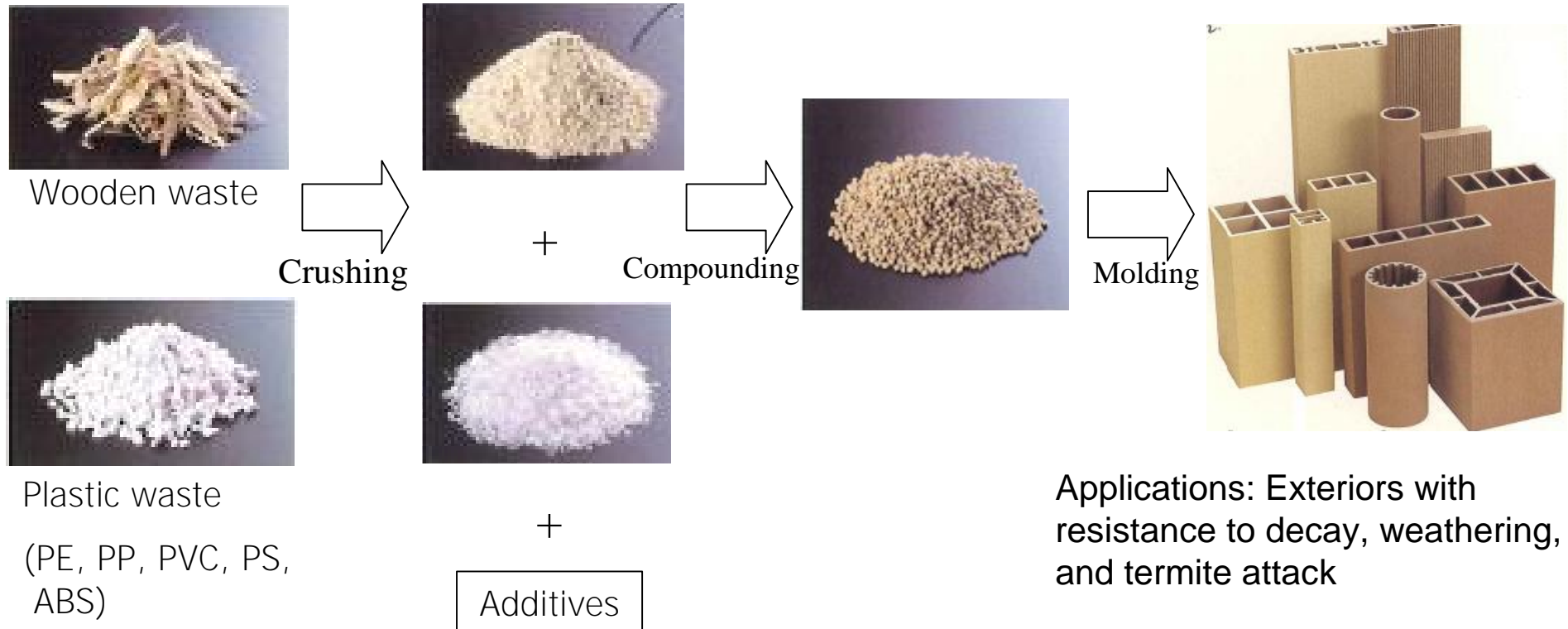
Source: Japan Container and Package Recycling Association



Wood Plastic Recycled Composites

JIS (Japanese Industrial Standards) for WPRC was set in April 2006 (JIS A5741:2006).

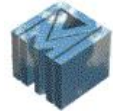
Accelerated growth of application/demand is expected.



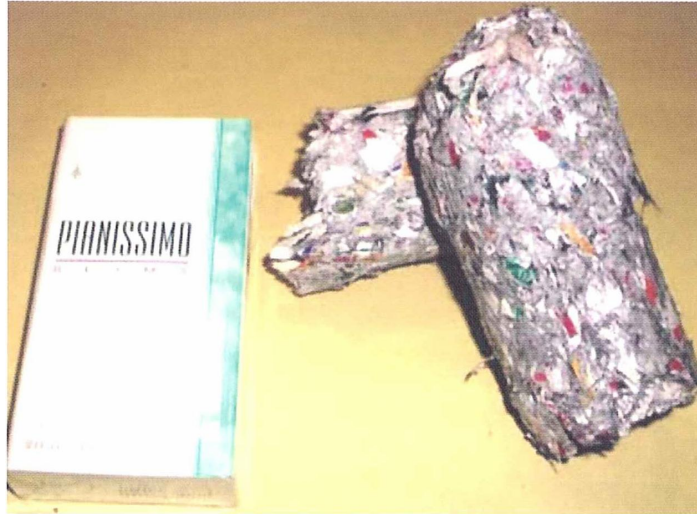
Source: HP of Ecowood Co., Ltd.

HP of Misawa Homes Co., Ltd.

(Refuse Paper & Plastic Fuel)



Appearance of RPF



RPF products (diameters of 40 mm)

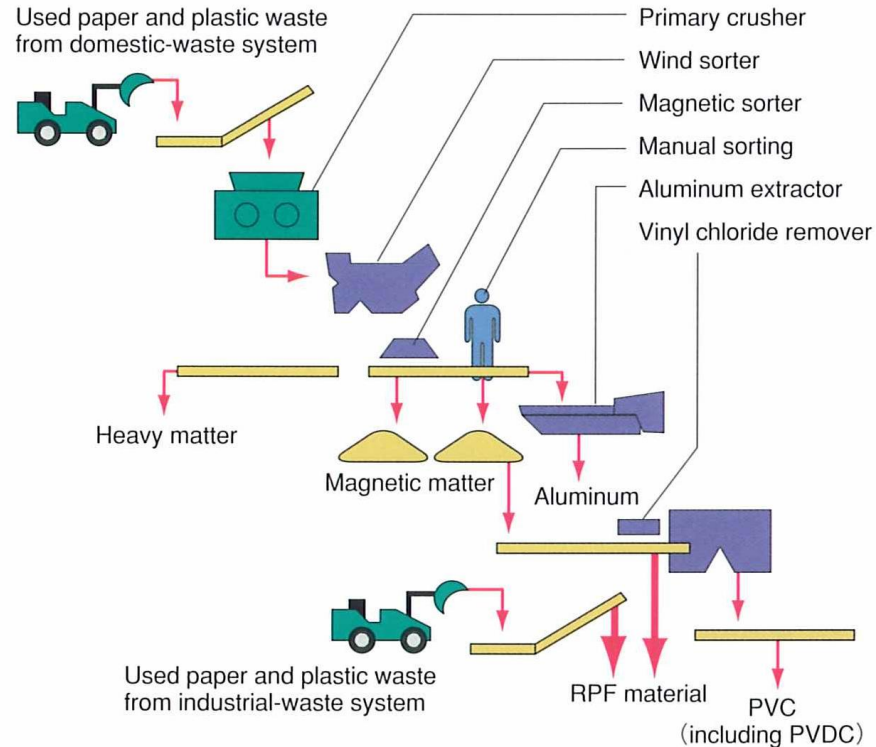
Diameter: 6 – 50 mm

Calorie: 5,000 – 10,000 kcal/kg
(Can be adjusted by varying paper content.)

Ash content: 7 % max.

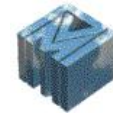
Application: Boiler fuel, RPF power generator, etc.

RPF Production process



Demand for RPF	2006	1,050 Kt
	2008	1,310 Kt
Production	2006	700 Kt

Source: Japan RPF Association,
The Recycling Economy Times

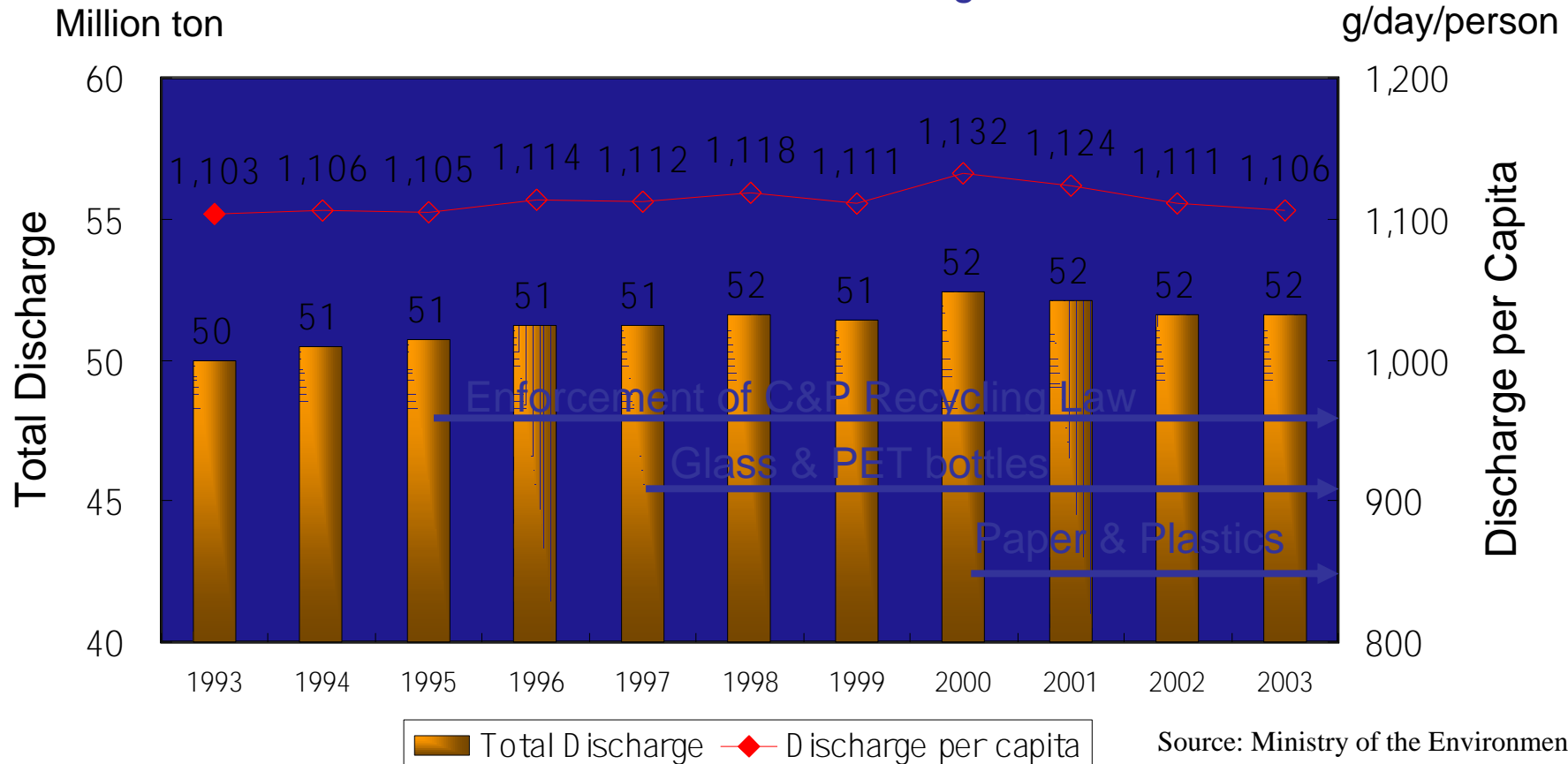


Reduction of Waste Discharge

Priority order: Reduction, Reuse, Recycling

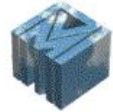
Waste discharge volume has not been decreasing.

The law is working for the promotion of recycling, but not working well for the reduction of waste discharge volume of citizens.

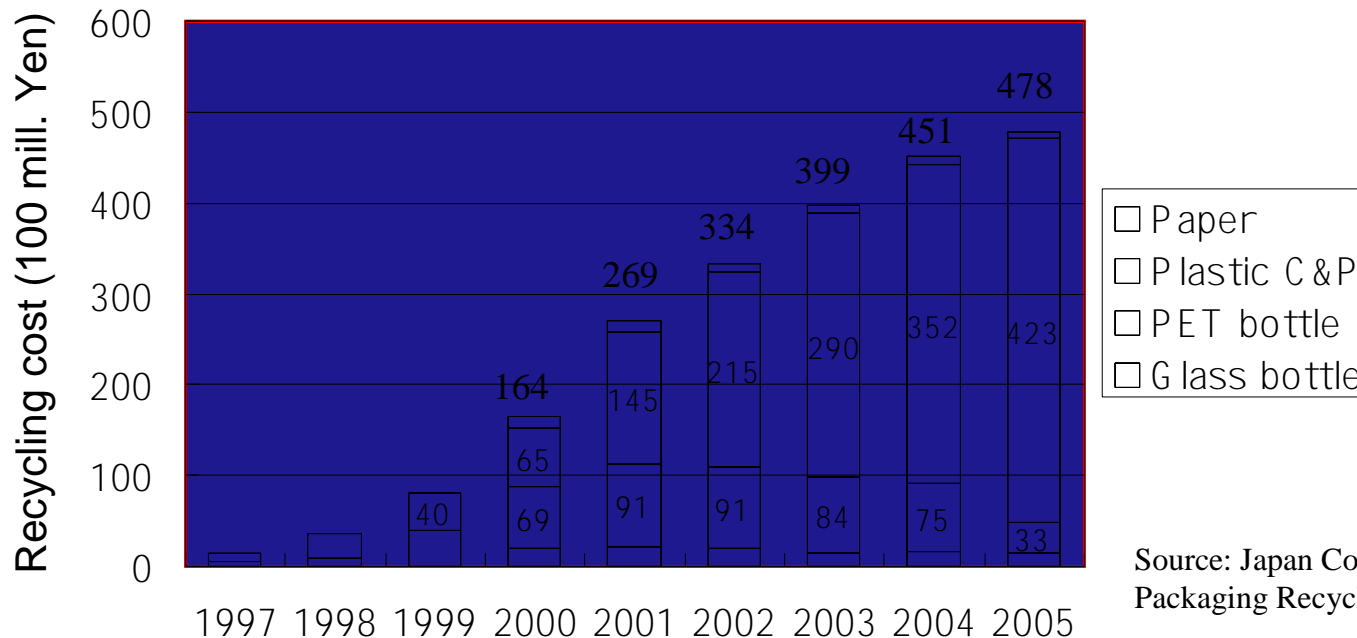


Source: Ministry of the Environment

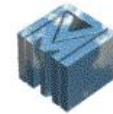
High Costs in Recycling and Sorted Collection



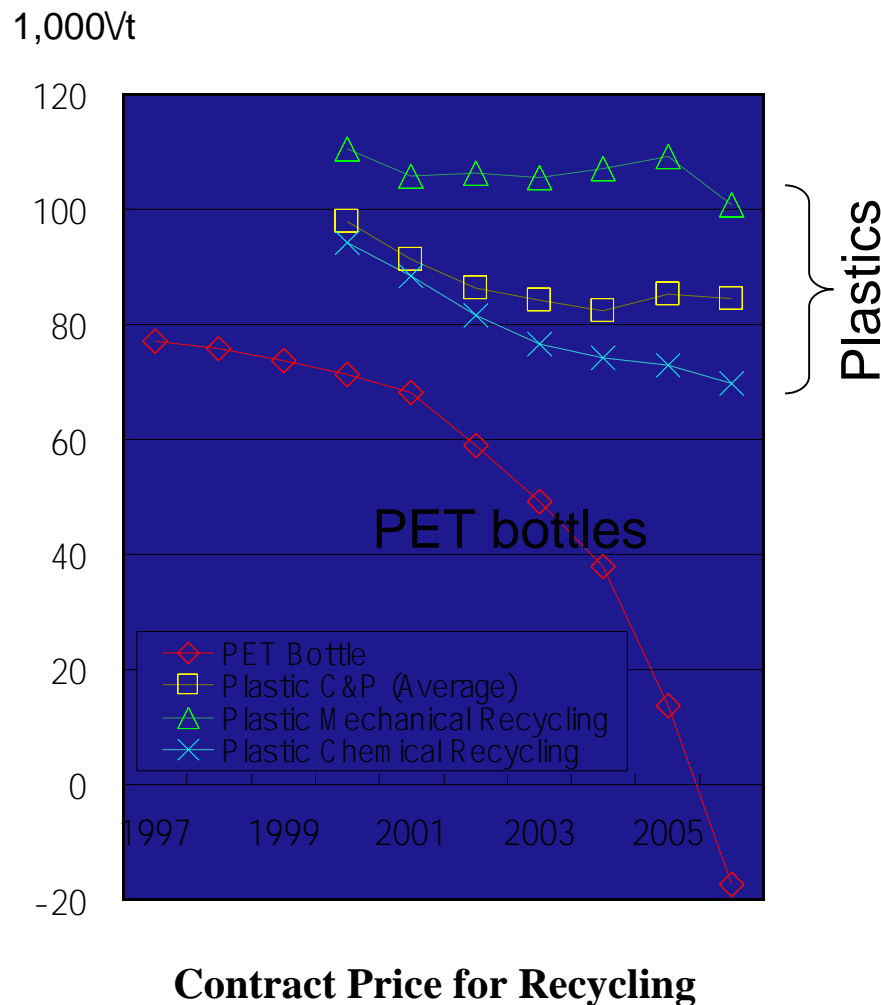
- Recycling costs borne by businesses continue to increase, due to the drastic increase of plastic C&P recycling cost.



- Additionally nominal cost borne by municipalities in sorted collection, rough selection & storage of C&P waste : I
ca. 300 Billion Yen (Estimated by Ministry of Environment)

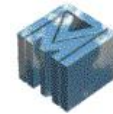


Reason of High Recycling Cost



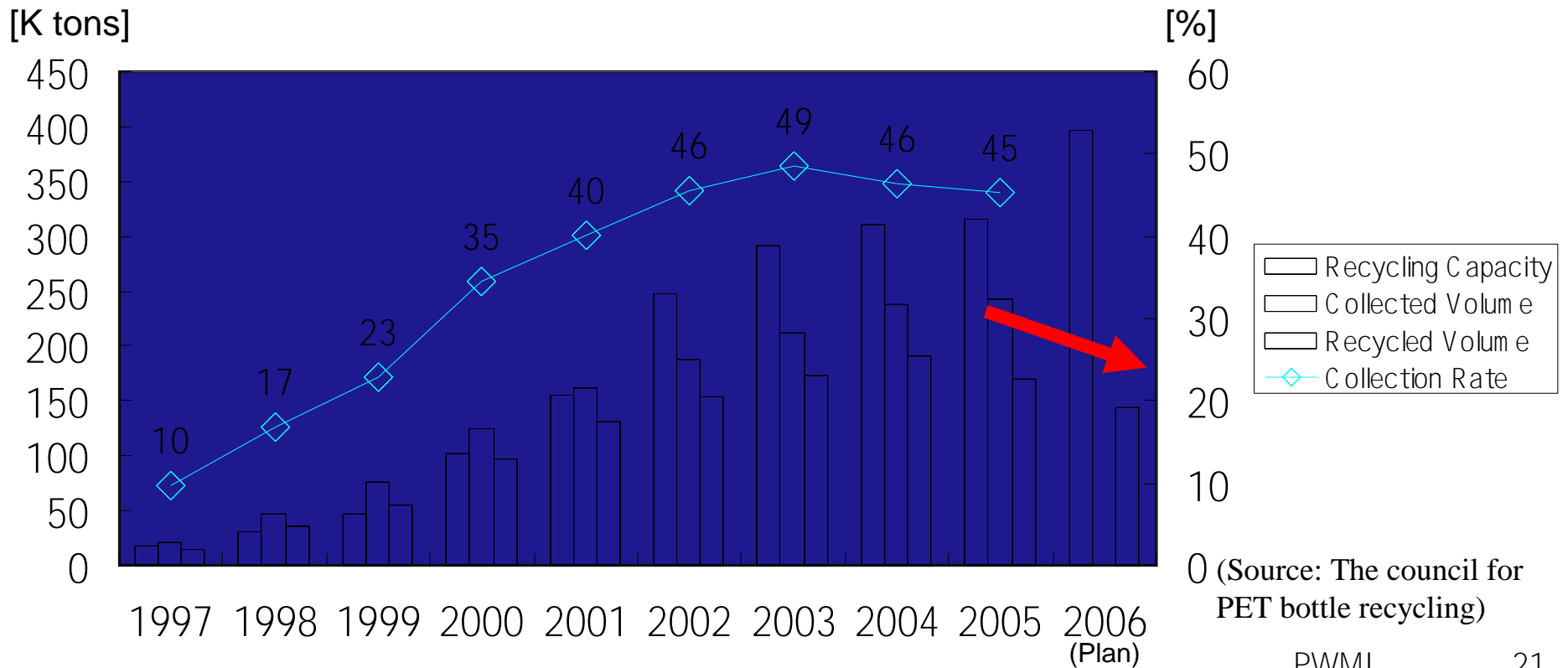
- Average contract recycling price of plastic C&P stays high, due to high price of mechanical recycling arising from its priority over other recycling methods.
- Increase of collection volume continues.
- Balance in recycling capacity / collection volume is tight.

Source: (Japan Container and Package Recycling Association



Export of collected PET Bottles

- Burden of collection cost on municipalities and strong demand for PET in China caused some municipalities' movement to export collected PET bottles in order to recover a cost in their sorted collection.
- Consequently the decrease of domestic recycling quantity is taking place.

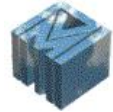


Amendment of C & P Recycling Law



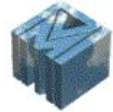
- Introduction of measures to reduce waste generation:
 - Measures to appoint 3R Meisters who promote nationwide minimization of waste generation.
 - Measures to promote voluntary reduction planned by businesses.
(Reduction of delivery of shopping bags at supermarkets is to be implemented under this voluntary reduction program.)
- Creation of a system in which designated businesses provide funds to municipalities. (Details under discussion)
- Introduction of measures to lead municipalities to stop export of their collected PET bottles, and to recycle them in accordance with the law.
- Addition of energy recover method to the recycling methods.
(Emergent and supplementary positioning)

Summary



- Legislative framework to form a sustainable development society has been built and has been being revised.
- Various recycling methods have been developed for recycling of plastics waste and have been being commercially operated under the C&P recycling law.
- However, the recycling under the C&P recycling law is facing challenges such as unchanged waste generation levels, high recycling costs of plastics and export of collected PET bottles.
- Accordingly, last year were made some amendments of the C&P recycling law, that put more stress on reduction of waste generation, in accordance with Basic Framework Law for Sustainable Development Society.

Introduction on Plastic Waste Management Institute, Japan



- Foundation: 1971
- Present Members: 18 corporations (resin manufactures), 3 organization, 4 supporting members
- Mission:
To research and develop systems for optimal processing of plastic waste and effective use of processed waste as a resource, and to promote the use of these systems.
- Examples of recent activities:
 - Development of recycling technologies for plastics waste.
 - * Recycling of PC resin of CDs (2004).
 - * Liquefaction by catalytic cracking using waste FCC catalyst (2005 ~).
 - * Recycling of agriculture PO films by dry washing process (2006).
 - LCA based study.
 - * Benefit of usage of plastic products (2003).
 - * Eco-efficiency of plastics recycling methods under the C&P recycling law (2004, 2006).