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# WEEE Management in Southeast Asia: Current Practices, Challenges and Measures

## 東南アジア等における電気・電子 廃棄物の現状・課題・対策

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# Current Practices

# E-waste Buyer on Street



- Waste collector on street also buy e-waste from household or others. They bring e-waste to Junk shop.

Computer, Monitor, Color TV, Printer, Refrigerator, Washing machine, Air conditioner, Printed Circuit Board, Copy Machine, Toner, Note book, Fax machine

Waste buyer on a street in Beijing, May, 2006

# Why is regulation on e-waste needed?

- Different backgrounds of e-waste recycling regulation can be observed
  - Increase of treatment cost by local government or recycler
    - E-waste in Japan.
  - Pollution from recycling process
    - E-waste recycling in Taiwan and China.
  - Improper treatment of residues
    - CFC from air conditioner and refrigerator in Japan
  - Resource scarcity
    - Export ban on rare metals by China was a background of formulating acts on small home appliance recycling
- Regulations try to change responsibilities of stakeholders, cost sharing mechanism, and design of products, such as change of materials.

# Increase of treatment cost by local government

- As economic development, amount of waste generated increases, waste contents become more complex. Local governments in Japan were bothered by the increase of waste treatment cost.
  - In early 1970s in Japan, local governments tried to impose waste collection and treatment responsibility on difficult waste such as plastic packaging, home appliances and tire. Although it was not possible to impose new responsibility on producers at that time, industries started to study the recycling technology and conduct pilot collection program.
  - After various efforts to reduce waste were conducted by local government in 1980s and early 1990s in Japan, Extend Producer Responsibility (EPR) systems was applied to packaging and container waste and specific home appliances.

# Improper Treatment of Residues from Recycling Process

- In the illegal dumping of industrial waste in Teshima, the most notorious illegal dumping case in Japan, more than 600,000 tons of waste including shredder dust of End of Life Vehicle(ELV), e-waste and others was illegally dumped from 1970s to to early 1990. A part of it was burned without environmental control measures.
- Police crackdown in 1990 put a halt to the dumping. This case triggers the movement toward proper management of automobile recycling and big home appliances.

# Pollution from Recycling System

- The major problem in recycling in developing Asian countries is dirty recycling .
- Even if formal recyclers invested in advanced facilities, they may face lack of waste for recycling, in market base recycling. The alternative systems have been designed, based on EPR principles.



← Extracting metals from Printed Circuit Board, Guiyu, China, (Nov. 2004)



← Dirty lead recycling which contaminate soil in Vietnam, ( Dec. 2005)

# Copper Cable Recycling



Open burning of plastic-coated wire to extract copper. Vietnam, August 2009.

Nagget system to separate copper and plastics. (Dec, 2004)



Stripping Machine for Cable.(Dec. 2004)

# The necessity of cost sharing mechanism of new concerns



Treatment of air bag in a automobile recycling facility in Osaka, Japan, 2004.

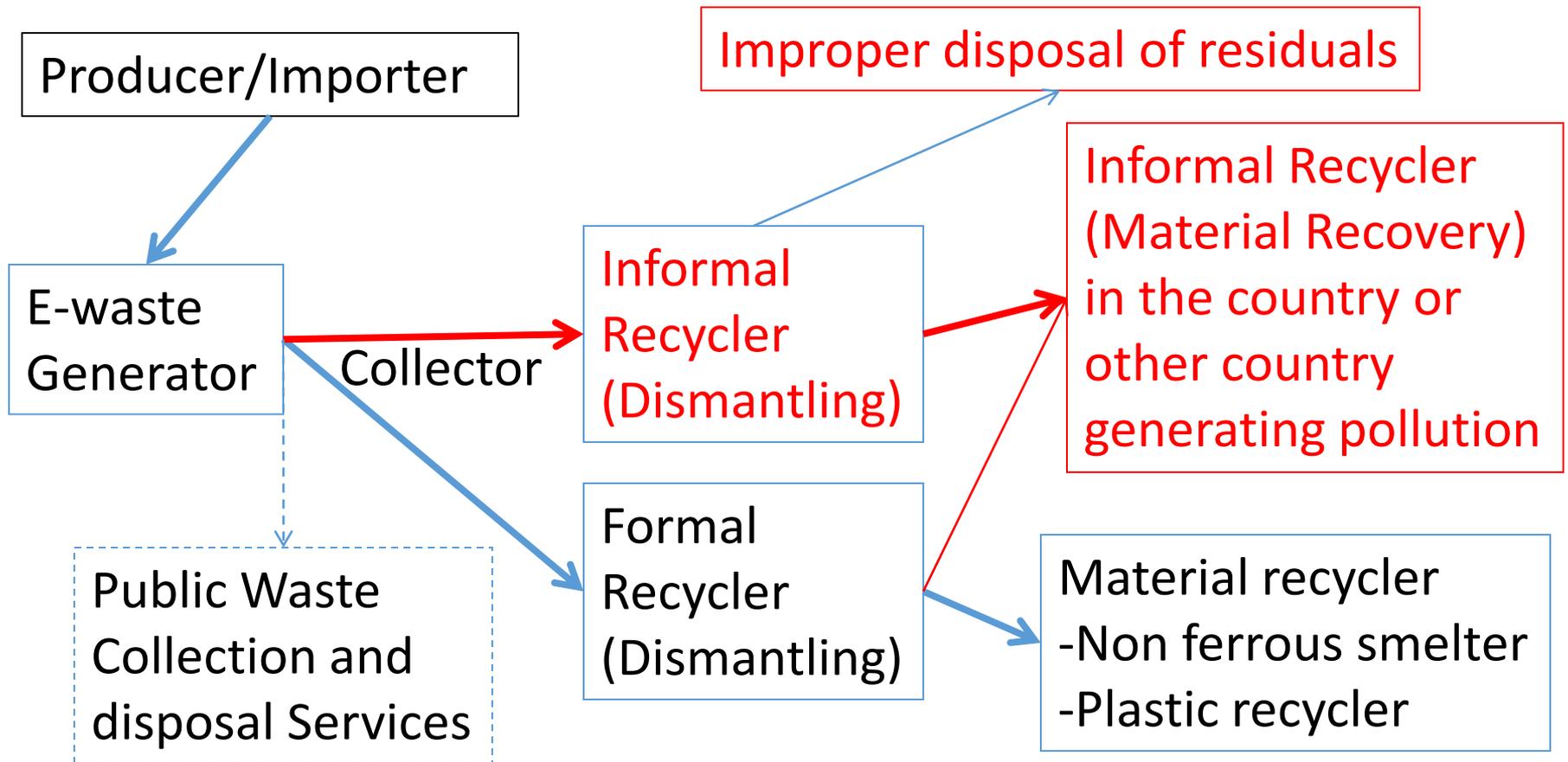
CFC collection from Air Conditioner, Akita, Japan, September 2009.



- As technology developed, new materials and parts are used. It is likely that new materials and parts are not recycled in market basis.
- Or new environmental concern may highlight necessity of proper treatment of specific materials.
- Cost sharing mechanism for additional cost may be needed, to prevent environmental and health hazard.

# Incentives to Pollution Control and Labor Safety

- Informal recyclers can buy e-waste in higher price than formal recyclers, because informal recyclers do not spend the money for pollution control and labor safety. In such situation, formal recyclers may not be able to collect e-waste to operate the facility.
- There are some counter measures.
  - Strict enforcement of pollution control and labor safety
  - Strengthening the responsibility of e-waste generator, such as government sector and big private companies.
  - Change financial mechanism, such as Deposit Refund, subsidy to formal recycler
  - Put responsibilities of collection and/or recycling on stakeholders including extended producer responsibility



One of major challenges for proper e-waste management is to change the flow of e-waste. E-waste should be sent to proper facility with pollution control measures.

# Policy by National Government

Extended Producer Responsibility (EPR)

# Regulation on Responsibilities of Stakeholders including EPR

Producer/Importer

E-waste  
Generator

Collector

Public Waste  
Collection and  
disposal Services

Informal  
Recycler  
(Dismantling)

Formal  
Recycler  
(Dismantling)

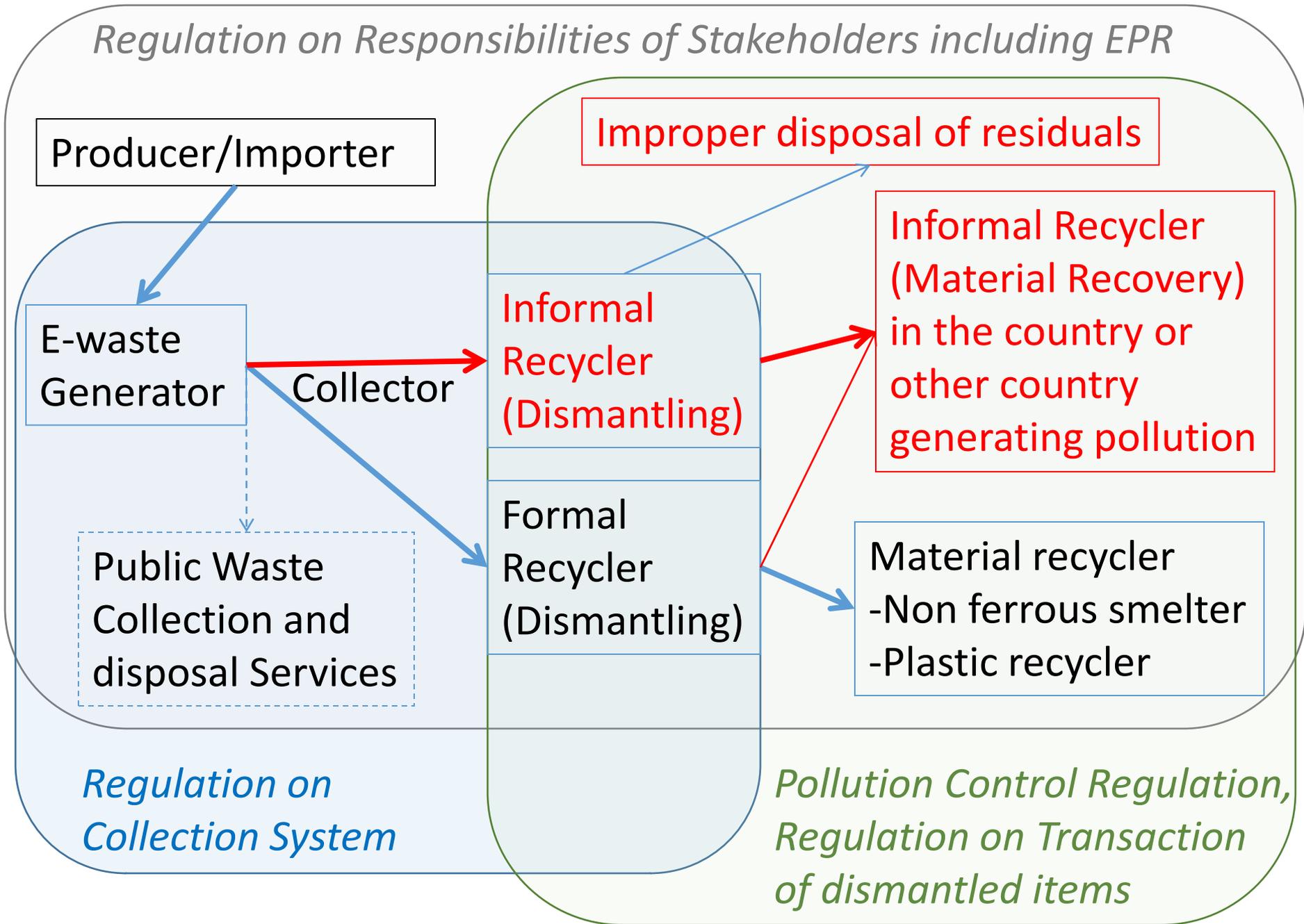
Improper disposal of residuals

Informal Recycler  
(Material Recovery)  
in the country or  
other country  
generating pollution

Material recycler  
-Non ferrous smelter  
-Plastic recycler

*Regulation on  
Collection System*

*Pollution Control Regulation,  
Regulation on Transaction  
of dismantled items*



# Applying Extended Producer Responsibility

China: Circular Economy Promotion Law (2008), e-waste (2011) **Mobile phone voluntary collection program**

Viet Nam; a specific article on take-back by producer in Environmental Protection Law (2006)

Thailand: e-waste(draft, 2005)

Malaysia : specific article on take-back and deposit refund in Solid Waste and Public Cleansing Management Act, (2007)  
Regulation on e-waste is being prepared with support of JICA

India: e-waste(2012), revised in 2016.

South Korea : Producer Responsibility: e-waste, packaging and container, automobile

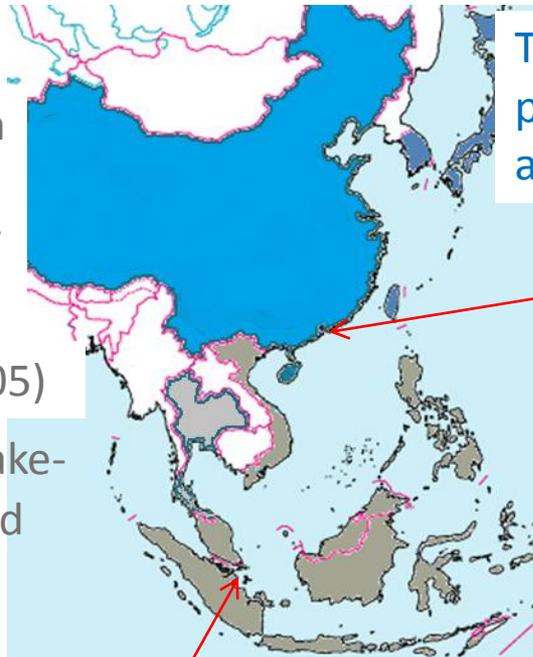
Japan : home appliances, computer, Packaging and container, automobile

Taiwan : Recycling Fund: e-waste, packaging and container, automobile,

Hong Kong: Government funded recycling facility which target non-valuable e-waste.

Philippine: ERP regulation was discussed by NSWMC  
Indonesia: specific article on packaging waste in Solid Waste Management Act(2008)  
map is being prepared.

**Singapore: voluntary agreement on collection of packaging and container, (2007)**



# Objectives of Regulation

- Regulation on collection system
  - If market-based collection system is not working well, especially if e-waste is transported to informal dismantler, regulation on collection system should be created.
- Pollution control on dismantler and material recycler : to treat e-waste with environmentally sound technology by dismantler and material recycler.
- Regulation on transaction of dismantled items : to prevent movement of dismantled items destined for informal recyclers and improper dumping of residuals.
- Regulation on cost sharing mechanism: to change the economic incentives of stakeholders

# Responsibilities

- Financial Responsibility
  - Who should pay recycling fee and when?
  - Who and how to manage collected recycling fee?
- Physical Responsibility
  - Collection target
  - Recycling target
  - Who give permit to dismantling facilities
- Information Responsibility
  - labeling of substances

# Types of Cost and Responsibility Sharing

- Regulation can define the primary responsibility of a stakeholder, such as local government or producer. The stakeholder with primary responsibility should arrange collection system, recyclers and others.
- Alternatively, regulation can defines responsibility of each stakeholders, including consumer, retailer, producer, dismantler and local government.

# Requirement to Dismantler and Material Recycler



Dust collection is installed in home appliance dismantling facility in Tokyo, Japan, 2007.

- Philippines and Malaysia : e-waste dismantler need permit for hazardous waste treatment.
- Special requirement to dismantler is imposed by government or producers: CFC collection and destruction

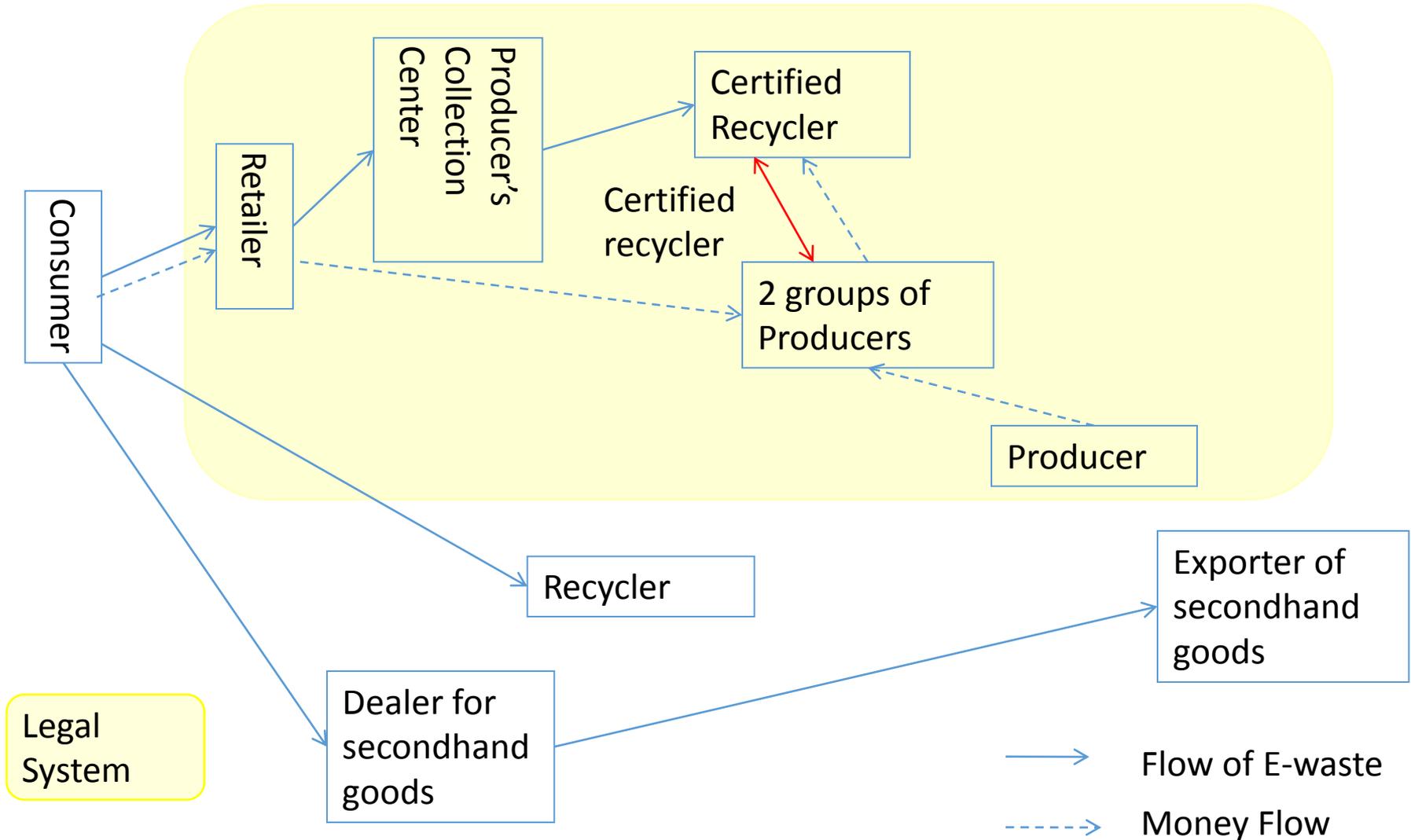
# Variety of Designing Recycling System (1)

	Japan: Automobile	Japan: Packaging and Container	Japan: Personal Computer
Major target stakeholder	Manufacturer	Producer and User of packaging and container	Manufacturer
Target product or waste	Automobile shredder dust, CFC, and air bag used in automobile	Packaging and container	Personal Computer including CPU, monitors and lap top PC.
Financial Responsibility	To collect recycling fees from consumer at purchasing and allocate the fund to recyclers	Generally producer and user of packaging and container pay recycling fee to designated organization.	To collect implicit advanced recycling fee at the time of selling PC for personal use. Industrial users should pay recycling fee when it was discharged.
Physical Responsibility	Proper treatment of Automobile shredder dust, CFC, and air bag used in automobile	Generally producer ask designated organization to arrange recycle waste. Collection is conducted by local government .	Major collection route is postal office. Producer arranges the recyclers .

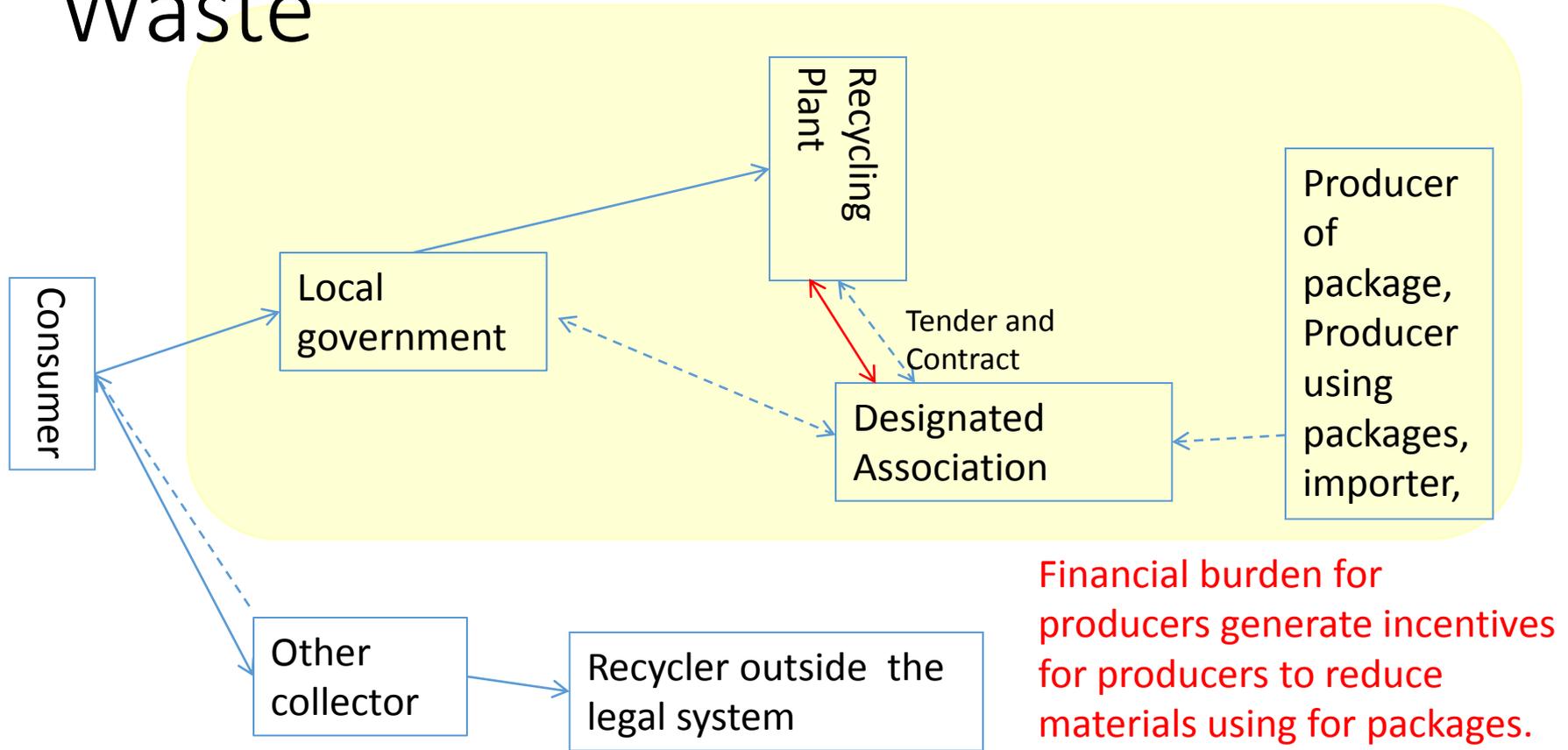
# Variety of Designing Recycling System ( 2 )

	Japan: Home Appliance	South Korea: Producer Responsibility	Taiwan: Recycling Fund Management Board
Major target stakeholder	Manufacturer, Retailer	Manufacturer	Manufacturer
Target product or waste	TV, Air Conditioner, Refrigerator, Washing Machine	Home appliances, IT products, automobile, Packaging and container	Home appliances, IT products, automobile, Packaging and container
Financial Responsibility	Collect recycling fees from consumer at discarding and allocate the fund	No collection of explicit recycling fee from consumer.	Manufacturer should pay recycling fee, based on the sales in the market
Physical Responsibility	Take back and dismantle waste home appliances. Satisfy minimum recycling rate. Retailer collect discarded appliances.	Satisfy minimum recycling rate which is calculated as collection rate multiplied by recycling rate.	No Physical Responsibility for producer.

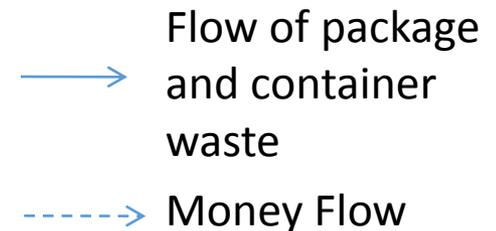
# JAPAN: Big Home Appliances(TV, Air Conditioner, Refrigerator, Washing Machine)



# Japan :Packaging and Container Waste



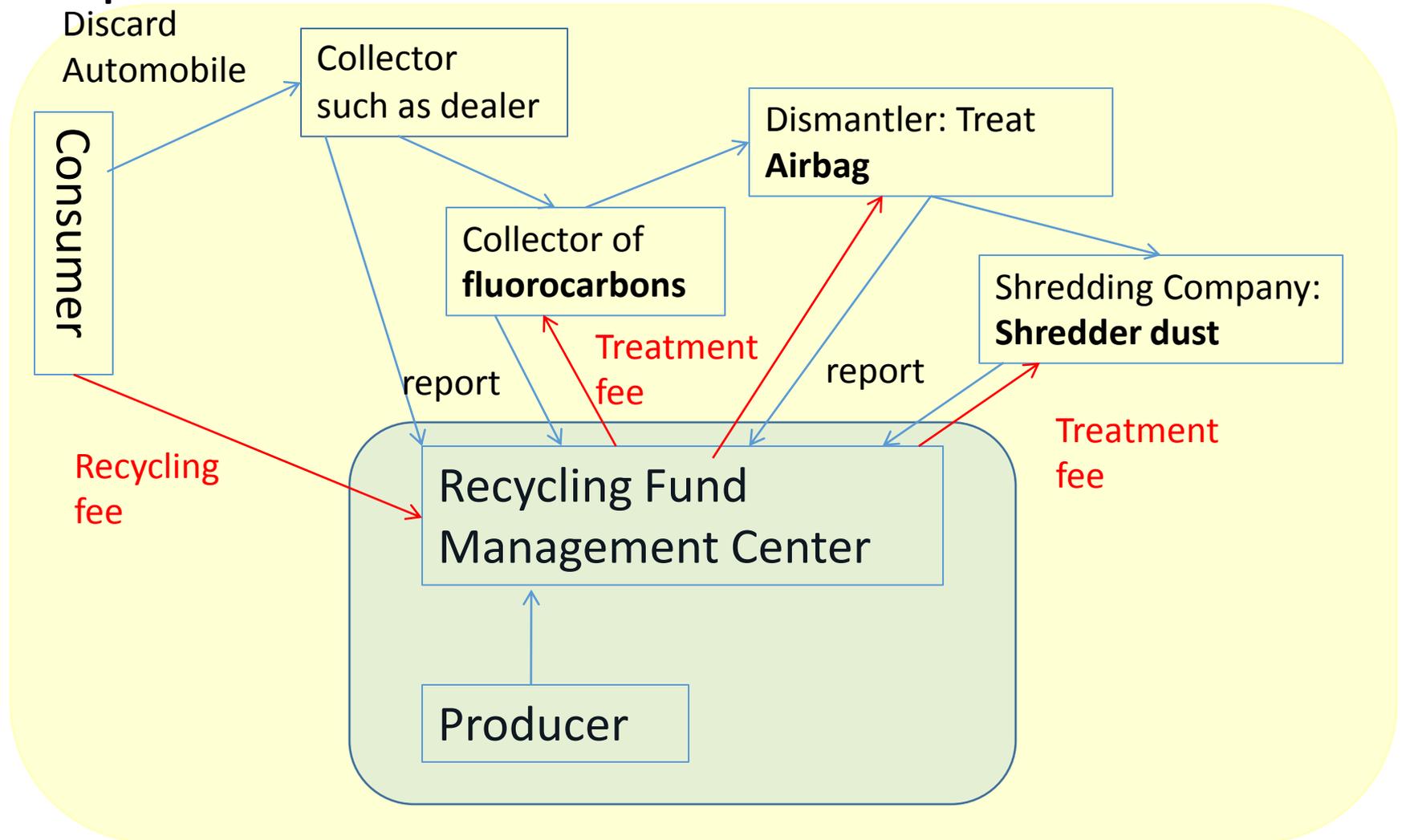
Financial burden for producers generate incentives for producers to reduce materials using for packages.



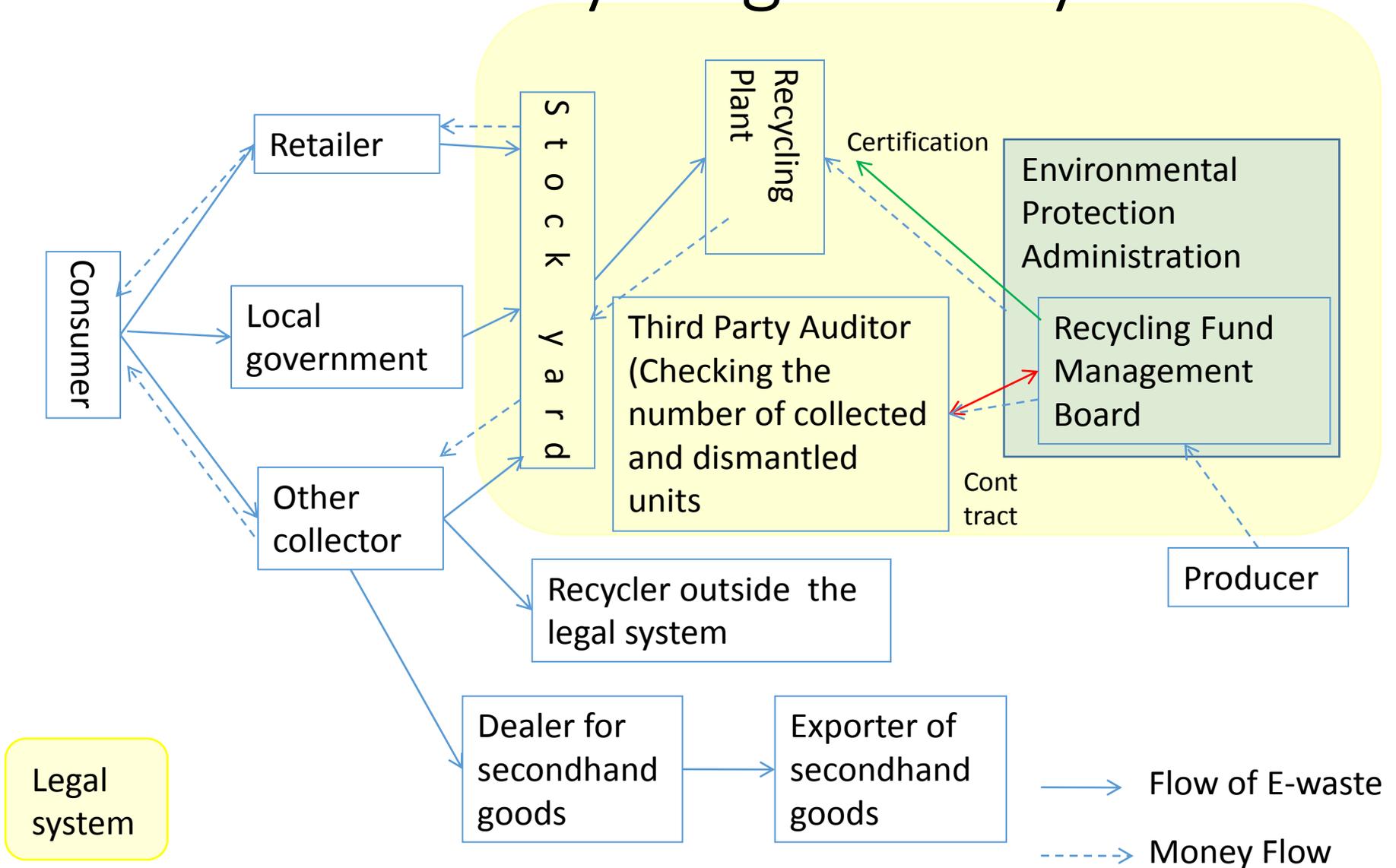
Legal system

Producer

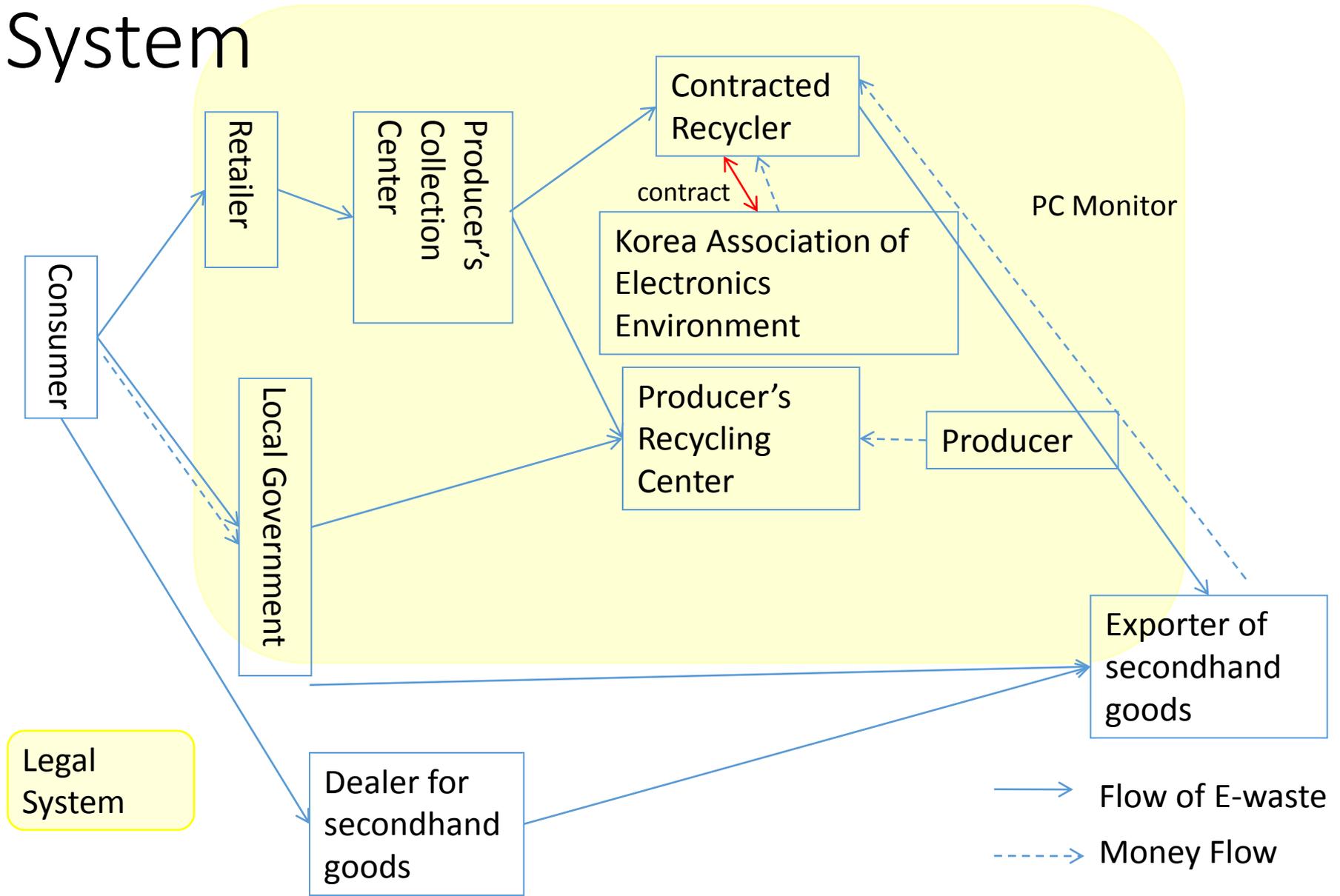
# Japan: Automobile



# Taiwan: Recycling Fund System



# South Korea: Producer Responsibility System



# How far regulation define the system? (1)

- Collection system
  - For example, Home Appliance Recycling Law in Japan defines the collection system. When retailers deliver the relatively big home appliances (TV, Air Conditioner, Washing Machine and dryer, refrigerator and freezer) to the customer, retailers should collect the discarded one. The system is based on the traditional business custom in Japan.
- Recycling fee, Financial Responsibility
  - advanced fee collection or post fee collection
  - implicit and explicit fee collection from consumer
  - Who decide the level of recycling fee? government or producers
  - Who manage the collected fee?

# How far regulation define the system? (2)

- Physical Responsibility
  - Who decide credited recyclers? Government or Producer
  - Mandatory target: collection rate and/or recycling rate(re-commercialized rate, including or not including energy recovery, material recycling rate)

# The differences among Japan, South Korea and Taiwan (1)

- Item wise or unified system
  - Japan: Item-wise approach. Different types of producer responsibilities are applying to packaging and containers, specific home appliances(TV, Air Conditioner, Washing Machine and dryer, refrigerator and freezer), automobile, computer, mobile phone battery.
  - South Korea: Unified system. EPR regulation emphasizes the physical responsibility .
  - Taiwan: Unified System. Recycling Fund Management Board System emphasizes the financial responsibility.

# The differences among Japan, South Korea and Taiwan (2)

- Pro and Con of Item wise and unified system approach
  - Item-wise approach can take into account the differences of product characteristics such as distribution and collection channel, existing collection system and others. On the other hand, the responsibilities of producers in different recycling systems is different.
  - Unified system is more fair in terms of responsibility, but it is difficult to take into account the differences of goods.

# Role of Local Government

# Role of Local Governments

- Local governments may be able to contribute in e-waste management, by
  - instructing e-waste dismantler and material recovery facility to install proper pollution control measures.
  - instructing informal collector to handover collected e-waste to formal recycler, which have licenses.
  - organizing e-waste collection program, with formal recycler.
  - supporting informal and private sector to collect e-waste, and to treat e-waste properly.

# Instructing Junk Shops and Repair Shops

- Local governments can support the improvement of e-waste management by instructing junk shops to send collected e-waste should be sent to appropriate facility.
- Local governments can also instruct repair shops, who have e-waste which is the leftover of picking up re-usable parts, to send such leftover to appropriate facility.

# Recovering metals in a junk shop



July 2000, Metro  
Manila, Philippines.

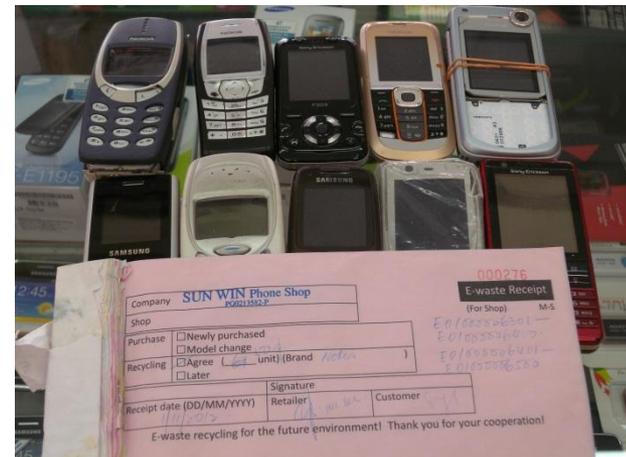


# Supporting Collection System

- Some local government in Japan support the private small home appliance collection, by posting information of collection point on the web site of local government and by organizing collection program in event such as a festival.
- Local governments in South Korea have contract with producers and central government to assist e-waste collection services by hosting free pick-up services and operating collection center on bulky home appliances.

# JICA Pilot Project on e-waste

- JICA support pilot collection program for e-waste in Penang in 2012 and 2013.
- The consultant ask shops to conduct trade in program. They try to find acceptable buying price of e-waste.



# Pilot collection program for cell phones in the Philippines



Metro Manila, 2007

- JICA, DTI and NSWMC in the Philippines conducted pilot collection program for mobile phone in 2007.
- They put drop box in malls and government office. The best place for collection was the Mall where tens of repair shop and secondhand shops are located.

# Buy Back Center by Markina City in the Philippines

- Markina City in Manila has Buy Back Center, which buy recyclables from citizens. Those who do not want to go junk shops, bring recyclable to Buy Back Center.



Metro Manila, 2005

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- CHUNG, Sungwoo and Michikazu Kojima “Design of E-waste Recycling Indicators in East Asia” in Kojima and Damanhuri (ed.) *3R Policy in Southeast and East Asia* vol. 2, a report submitted to ERIA.