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# Management of E-waste Recycling System in Korea



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Eco-Assurance System



- Introduction to KAEE
- **E-waste Collection and Recycling Performance**



Introduction to Metropolitan Recycling Center
Recycling Process and Technologies



### I Legal System of E-waste in Korea

### Eco-Assurance System



# I. Legal System of E-waste in Korea

### **>>> Eco-Assurance System**

### **Background of the System**

Increase in amount of waste due to mass production and mass consumption in society





# I. Legal System of E-waste in Korea

### **>>> Eco-Assurance System**

Concept



# I. Legal System of E-waste in Korea

### **>>> Eco-Assurance System**

#### **Summary of Eco-Assurance System in Electronics**

#### **Related Laws**

'Act on the promotion of saving and recycling of resources' (2003.1, EPR)
 'Act on resource recycling of electric electronic equipment and vehicles' (2008)

#### Items

Refrigerator, Washing machine, Air-conditioner, TV, PC, Audio, Mobile phone, Printer, Copying machine, Facsimile, etc. (10 items)

#### Role and duty of different parties

✓ Eco-Assurance system is not for the producer to take entire responsibility but for the government administration, local autonomous entity, producer and consumer to play a role.





Introduction to KAEE

E-waste Collection and Recycling Performance



### >>>> Introduction to KAEE

Purpose of Establishment

History

✓ Established in September, 2000, for environmental preservation and materialization of a resources recirculation society through collection and recycling of waste electronic and electric products.

**V** 2000.6 : voluntary agreement on producer's recycling responsibilities.

✓ 2003.1 : Introduction and execution of EPR system. (law on saving resources and encouraging recycling)

**¥** 2003.6 : Constructed MRC(Metropolitan Recycling center).

20012.present : Establishment and operation of national recycling network.

Members **V** Regular members : 118 manufacturing and import companies including Samsung and LG Electronics

Associate members : 59 recycling companies including Narae R/C









### >>>> Introduction to KAEE

### Main Business



 $\checkmark$  Build and operate the national collection and recycling system.

 $\checkmark$  Mutual aid businesses in line with EPR system.

#### Investigation and research of Recycling statistics

✓ Establish systematic statistics for each category and item

 $\checkmark$  Investigate the actual collection and recycling levels

#### New technology development & International exchanges

 $\checkmark$  Expand development of new recycling technologies and supply to the nationwide

✓ Arrange the international environmental countermeasures such as FCCC

#### Main Business

#### Operation of recycling Field program

✓ Operate field programs for the government, NGOs, foreign relevant institutions and children at all times.

### >>>> Take-back and Recycling Flow in Korea



#### **Special Features**

✓ Main target of Eco-Assurance system is collecting enough quantity in items from producers and 232 local authorities in nationwide.

**V** About 10% of ' hidden flow' resources are gradually in reducing trend.

### >>>> Collection and Recycling Network

#### **Collection System**

100 logistics centers nationwide / 3,300 distributing agencies
 Additionally, e-wastes discharged are collected by 232 local autonomous authorities.

#### **Recycling System**

✓ Through advanced recycling centers in seven regions in nationwide and 59 recycling co-worker, that are encouraging environment-friendly recycling.

R	Region	Capacity(ton/yr)	Location
ec	Metropolitan	21,000	Yongin
У	Chungcheong	22,000	Asan
li	Yeongnam	20,000	Chilseo
au Bu	Honam	20,000	Jangseong
$\mathbf{\tilde{\mathbf{C}}}$	Jeju	2,000	Jocheon
e	Gyeongbuk	18,000	Yeongcheon
nte	North of Gyeonggi	14,000	Yangju
er	Total	117,000	7



### >>>> Collection and Recycling Performance

[Unit : thousand]

Part	2003	2004	2005	2006	2007	2008	2009	2010	2011	Avarage annual increse(%)
Ref.	401	492	521	666	745	767	784	970	960	13
W.M	394	395	548	463	492	453	511	520	511	4
ΤV	334	331	358	469	586	556	553	666	583	8
C.P	-	-	5,711	5,000	5,200	8,011	6,989	7,306	6,874	5
Etc.	-	-	312	665	533	765	603	964	897	27
Total	1,129	1,218	7,450	7,263	7,556	10,552	9,440	10,404	9,825	69

Notice) Air-conditioners come under refrigerators / C.P : Main body including batteries



### >>>> Recycling Performance per Year

### **>>>** Performance to Contribute for Green Growth (2000~2009)





**Resource recovery** 

- Fe : 404,000 ton
- Non-Fe : 37,000 ton
- Plastics : 180,000 ton
- Etc. : 92,694 ton

#### Total 720,000 ton



### Reduction of CO<sub>2</sub>

- Ref. : 256,000 ton-CO<sub>2</sub>
- W.M : 196,000 ton-CO<sub>2</sub>
- TV : 100,000 ton-CO<sub>2</sub>
- A.C : 16,000 ton-CO<sub>2</sub>

Total 620,000 ton



#### Energy saving & job creation

- · Energy saving
- : 118,111 TOE
- Job creation over
  100 people per year





Introduction to Metropolitan Recycling Center
Recycling Process and Technologies



### >>>> Introduction to MRC (Metropolitan Recycling Center)

Outline of MRC

Part	Contents
Item	Refrigerator, Washing machine, Air conditioner, etc.
Capacity	21,000 ton/yr
Site	Area : 25,000m <sup>2</sup> Building : 5,540m <sup>2</sup>
Reproduced Materials	Fe, Cu, Al, Plastic, etc.
Main equipment	Shredder, Separator, Urethane separator, CFC treatment, etc.

Area and Collecting Routes



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#### **Recycling Status of Collected Items (MRC, 2011 as a standard)**

[Unit : thousand]				
Refrigerator	Washing machine	Etc.	Total	
159	75	43	277	

### >>>> Introduction to MRC (Metropolitan Recycling Center)

Composition of Main Items Collected



### **>>>** Recycling Process & Technologies



### **>>>** Recycling Process & Technologies

### Photographs of main equipments



Shredder



**Compressor of Urethane** 







**Gravitation separator** 



**Pneumatic separator** 

### >>>> Recycling Process & Technologies

**CFC(Chlorofluorocarbon) Recycling Process** 



### PCBs(printed circuit board) Recycling Process



#### [Separation of PCBs ]



#### [Shredding of PCBs ]



[Melting - smelter]



[Extraction of valuable metals]

Valuable metals(Au, Ag, etc.) are included PCBs

<sup>6</sup> But, PCBs have to be in special management because of hazardous materials such as Pb.

### >>>> Main Products with Purity in MRC

**Collection of Valued Reusable Materials** 

					[Unit : ton/yr	:]
I.			E	Tetel		
re	AI	Plastic	Non-Fe	Etc	1 otal	
7,190	201	4,668	577	2,460	15,096	

### **Degree of Purity**



# Thank you~

**EC** Korea Association of Electronics Environment