

Case study for OECD project on extended producer responsibility Republic of Korea

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1. Introduction

Since the Korean Extended Producer Responsibility (EPR) System was introduced in 2003 the target items have expanded. As of 2014, the items covered by the scheme include twenty-seven electronic products defined by Article 14 of the presidential decree of the “Act on Resource Recirculation of Electrical and Electronic Waste and End of Life Vehicles”, as well as tires, lubricant, batteries, and fluorescent lamps, Styrofoam float, and packaging materials defined by Article 18 of the presidential decree of the “Act on the Promotion of Saving and Recycling of Resources”. A mandatory recycling ratio for each EPR product category is announced every year by the Ministry of Environment.

| EPR scheme | Legal basis | Target item | |
|----------------------------------|---|---|---|
| Take-back with recycling targets | Act on the Promotion of Saving and Recycling of Resources | Package (4) | Packages(metal can, glass bottle, carton pack, synthetic resin packaging material) that are used to pack food and beverages, agricultural products, marine products, livestock products, cleansers, medicines and cosmetics, etc. |
| | | Product (11) | Batteries(Mercury, Silver oxide, Lithium, Nickel-cadmium, Manganese, Nickel-hydrogen), Tire, Lubricant, Fluorescent lamp, Styrofoam float |
| | Act on Resource Recirculation of Electrical and Electronic Waste and End of Life Vehicles | Product(27) Television, Refrigerator, Washing machine, Air conditioner, Computer, Audio, Mobile phone, Copier, Fax machine, Printer, Automatic dispenser, Electric water purifier, Electric oven, Microwave, Food waste disposer, Dish washing machine, Bidet, Air purifier, Electric stove, Electric cooker, Water softener, Humidifier, Iron, Fan, Blender, Vacuum machine, Video cassette Recorder. | |

Although the legal obligations of waste recycling lies with producers, the Korean EPR system requires shared duties between all societal stakeholders (e.g. consumers, local governments and the state government).

2. Legal Aspects

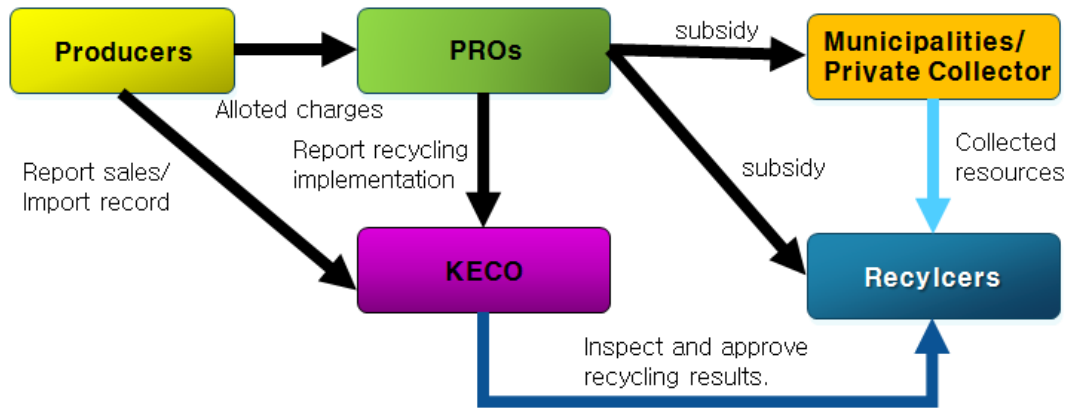
The “Act on Resource Recirculation of Electrical and Electronic Waste and End of Life Vehicles (Hereinafter referred to as the ‘Eco-Assurance Act)’” states the producers’ and importers’ duties and responsibilities of the ten items listed above. These include restricting the use of hazardous substances in their products, collecting end of life products, and recycling them. For the product sellers, the Act also imposes the collection duty.

The “Act on the Promotion of saving and Recycling of Resources (Hereinafter referred to as the ‘Recycling Act)’” states the duties of producers and importers of EPR items other than the products that fall under the Eco-Assurance Act, including to collect and recycle the end of life products. The producers may establish a waste collection facilitating center (Producer Responsibility Organization, PRO), which should compensate for the cost of waste collection borne by the local governments.

- Roles and respective obligations of stakeholders

The state shall devise policies to facilitate the recycling, development and distribution of the specified technologies, the restriction of the use of hazardous substances, and the facilitation of recycling electric and electronic waste and end of life vehicles. Local governments shall improve curb side collection and recycling of electrical and electronic waste in accordance with the national policies.

Producers and importers of EPR items shall collect and recycle the end of life products or packaging materials, or pay the allotted share of charges to the PROs. Also, producers or importers shall endeavor to facilitate recycling by; developing recycling technology, resource efficient designing, restricting use of hazardous substances, and producing or importing easier-to-recycle products. Producers or importers may establish a PRO for recycling to carry out the obligatory recycling responsibility.



- Mandatory recycling rate or amount, Sanctions in case of non-compliance

The Minister of Environment shall publish the yearly recycling rate of EPR items. The rate is multiplied by the yearly output or imported quantity of EPR items in the year, and the result becomes the mandatory recycling quantity. For electrical and electronic EPR items, the Environment Minister shall publish a per capita recycling target on an annual basis. This decision should take into account the quantity of goods and packaging materials produced, the quantity previously recycled, and the capacity of the recycling facilities.

Formula for calculating the recycling rate

Previous year's recycling rate + (Long term recycling rate – Recycling rate of the previous year)*Reflection coefficient + Adjustment coefficient

- Reflection coefficient gradually increases from 20% in the first year of the inclusion of a new product under the umbrella of the EPR system to 100% in the fifth year and after.
- Ministry of Environment decides the coefficients through consultation with stakeholders and expert meetings.
- Adjustment coefficient takes into account the capacity of recycling facilities, development of recycling technology, life cycle of products and so on.

< Increasing trend of recycling target rate >

| Items | Long-term Target | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|-------------------------|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Carton pack | 0.360 | 0.278 | 0.266 | 0.280 | 0.291 | 0.305 | 0.327 | 0.327 | 0.341 | 0.341 | 0.346 |
| Glass bottle | 0.793 | 0.672 | 0.684 | 0.708 | 0.726 | 0.737 | 0.751 | 0.757 | 0.778 | 0.760 | 0.760 |
| Iron can | 0.831 | 0.700 | 0.710 | 0.720 | 0.730 | 0.740 | 0.756 | 0.771 | 0.786 | 0.786 | 0.797 |
| Aluminum can | 0.816 | 0.700 | 0.712 | 0.717 | 0.730 | 0.740 | 0.756 | 0.771 | 0.786 | 0.786 | 0.791 |
| PET bottle | 0.830 | 0.695 | 0.704 | 0.717 | 0.737 | 0.749 | 0.764 | 0.783 | 0.806 | 0.806 | 0.812 |
| EPS | 0.805 | 0.613 | 0.629 | 0.690 | 0.748 | 0.748 | 0.760 | 0.772 | 0.781 | 0.781 | 0.790 |
| PSP | 0.423 | 0.249 | 0.280 | 0.317 | 0.339 | 0.339 | 0.367 | 0.400 | 0.423 | 0.423 | 0.423 |
| PVC | 0.733 | 0.480 | 0.484 | 0.556 | 0.583 | 0.598 | 0.600 | 0.622 | 0.664 | 0.644 | 0.690 |
| Plastic container tray | 0.845 | 0.502 | 0.528 | 0.585 | 0.628 | 0.653 | 0.702 | 0.757 | 0.800 | 0.800 | 0.806 |
| Plastic film and sheet | 0.675 | 0.368 | 0.387 | 0.414 | 0.433 | 0.476 | 0.517 | 0.562 | 0.600 | 0.600 | 0.603 |
| Lubricant container | 0.790 | | | | | | | 0.790 | 0.790 | 0.795 | 0.794 |
| Lubricant | 0.730 | 0.687 | 0.687 | 0.676 | 0.677 | 0.677 | 0.692 | 0.708 | 0.722 | 0.725 | 0.726 |
| Tire | 0.770 | 0.718 | 0.720 | 0.737 | 0.748 | 0.748 | 0.754 | 0.758 | 0.762 | 0.762 | 0.765 |
| Fluorescent lamp | 0.394 | 0.189 | 0.207 | 0.225 | 0.231 | 0.240 | 0.261 | 0.285 | 0.300 | 0.328 | 0.355 |
| Styrofoam float | 0.277 | | | | | | | 0.277 | 0.277 | 0.285 | 0.280 |
| Mercury battery | 0.600 | 0.250 | 0.293 | 0.380 | 0.490 | 0.490 | 0.600 | 0.600 | 0.600 | 0.600 | 0.600 |
| Silver oxide battery | 0.560 | 0.250 | 0.250 | 0.309 | 0.370 | 0.390 | 0.424 | 0.499 | 0.560 | 0.560 | 0.560 |
| Lithium battery | 0.650 | 0.249 | 0.293 | 0.380 | 0.490 | 0.520 | 0.577 | 0.582 | 0.650 | 0.650 | 0.650 |
| Nickel-cadmium battery | 0.400 | 0.246 | 0.246 | 0.257 | 0.291 | 0.310 | 0.333 | 0.383 | 0.400 | 0.400 | 0.400 |
| Manganese battery | 0.213 | | | | 0.200 | 0.205 | 0.236 | 0.192 | 0.216 | 0.216 | 0.216 |
| Nickel-hydrogen battery | 0.153 | | | | 0.250 | 0.250 | 0.289 | 0.136 | 0.203 | 0.203 | 0.203 |
| Television | 0.431 | 0.118 | 0.126 | 0.133 | 0.145 | 0.160 | 0.190 | 0.210 | 0.272 | 0.564 | |
| Refrigerator | 0.389 | 0.165 | 0.169 | 0.173 | 0.189 | 0.206 | 0.221 | 0.250 | 0.267 | 0.343 | |
| Washing machine | 0.392 | 0.228 | 0.234 | 0.242 | 0.253 | 0.261 | 0.274 | 0.285 | 0.317 | 0.330 | |
| A/C | 0.080 | 0.015 | 0.017 | 0.019 | 0.021 | 0.023 | 0.024 | 0.024 | 0.027 | 0.028 | |
| Computer | 0.260 | 0.085 | 0.094 | 0.098 | 0.103 | 0.111 | 0.123 | 0.140 | 0.153 | 0.158 | |
| Audio | 0.278 | 0.102 | 0.127 | 0.131 | 0.149 | 0.155 | 0.170 | 0.185 | 0.200 | 0.268 | |
| Mobile phone | 0.400 | 0.119 | 0.154 | 0.165 | 0.180 | 0.198 | 0.220 | 0.230 | 0.356 | 0.257 | |
| Copier | 0.280 | | 0.084 | 0.094 | 0.127 | 0.121 | 0.134 | 0.150 | 0.160 | 0.234 | |
| Fax | 0.250 | | 0.084 | 0.094 | 0.114 | 0.119 | 0.130 | 0.150 | 0.156 | 0.223 | |
| Printer | 0.243 | | 0.084 | 0.092 | 0.112 | 0.133 | 0.142 | 0.150 | 0.150 | 0.218 | |

* The recycling target of electronic products in 2014 is yet to be announced.

2012 Targets, Standard fees for recycling, Financial sanctions

Standard fees for recycling take into account the costs

| Items | Recycling Target Rate (2012) | Standard Fees (KRW) | Financial sanctions imposed (1,000 KRW) |
|---------------------------------------|------------------------------|---------------------|---|
| Carton pack | 0.341 | 185/kg | 30,042 |
| Glass bottle | 0.778 | 34/kg | 1,301,978 |
| Iron can | 0.786 | 87/kg | 154,186 |
| Aluminum can | 0.786 | 151/kg | 56,012 |
| PET bottle | 0.806 | 178/kg | 450,414 |
| Colored PET bottle | 0.806 | 235/kg | 7,465 |
| Mixed material PET bottle | 0.806 | 360/kg | 96,105 |
| EPS | 0.781 | 317/kg | 127,590 |
| PSP | 0.423 | 327/kg | 37,850 |
| PVC | 0.664 | 981/kg | 575,884 |
| Plastic container tray | 0.800 | 327/kg | 498,049 |
| Film and sheet type plastic materials | 0.600 | 467/kg | 1,095,986 |
| Lubricant container | 0.790 | 327/kg | 14,020 |
| Lubricant | 0.722 | 20/liter | 33,616 |
| Tire | 0.762 | 30/kg | 437,872 |
| Fluorescent lamp | 0.300 | 143/product | 719,909 |
| Styrofoam float | 0.277 | 627/kg | 1,303 |
| Mercury battery | 0.600 | 39.6/g | 2,639 |
| Silver oxide battery | 0.560 | 35.5/g | 68,264 |
| Lithium battery | 0.650 | 0.8/g | 124,063 |
| Nickel-cadmium battery | 0.400 | 0.78/g | 29,462 |
| Manganese battery | 0.216 | 0.35/g | 515,505 |
| Nickel-hydrogen battery | 0.203 | 0.16/g | 9,661 |
| Television | 0.272 | 196/ kg | 133,123 |
| Refrigerator | 0.267 | 197/ kg | 348,353 |
| Washing machine | 0.317 | 137/ kg | 5,154 |
| A/C | 0.027 | 98/ kg | 4,254 |
| Computer | 0.153 | 188/ kg | 167,436 |
| Audio | 0.200 | 225/ kg | 47,100 |
| Mobile phone | 0.356 | 2,649/ kg | 716,912 |
| Copier | 0.160 | 273/ kg | 29,074 |
| Fax | 0.156 | 403/ kg | 0 |
| Printer | 0.150 | 400/ kg | 32,127 |

When a producer with a recycling obligation fails to comply or a PRO fails to fulfill the obligation of member producers, the Environment Minister imposes the cost of recycling the unmet portion plus up to 30% surcharge. Producers of EPR items other than electrical and electronic equipment with a yearly output of less than one billion KRW or importers of imports less than three hundred million KRW are exempt.

Korea Environment Corporation (Hereinafter referred to as KECO), entrusted by the Ministry of Environment, checks and monitors the invoices and receipts of the producers and importers to ensure that targets are met.

KECO is a public entity established by the KECO Act, and ruled by the Ministry of Environment. Chairman of KECO shall be appointed by the President of Korea on the recommendation of the Minister of Environment.

- Advanced Disposal Fee (ADF)

The Advanced Disposal Fee (ADF) in Korea (referred to as waste charge) is imposed on producers and importers of goods and materials, and containers that are difficult to recycle or likely to cause problems in the waste management. The items include: pesticides, hazardous chemicals, anti-freeze solutions, chewing gum, disposable diapers, cigarettes, and plastic products not included in the EPR scheme such as PVC pipe, toys, and kitchenware and so on. The fees collected are often used for local government subsidies to establish waste treatment facilities.

Waste charge rate

- Pesticides, hazardous chemicals
 - For plastic container: 24.9KRW for a container less than or equal to 500ml and 30.7KRW for a container larger than 500ml.
 - For glass bottles: 56.2KRW for a bottle less than or equal to 500ml and 84.3KRW for a container larger than 500ml.
 - For metal cans: 53.9KRW for a can less than or equal to 500ml and 78.2KRW for a container larger than 500ml.
- Anti-freeze solution: 189.8KRW per liter
- Chewing gum: 1.8% of sale price
- Disposable diapers: 5.5KRW per diaper
- Cigarettes: 7KRW per pack
- Plastic goods: 75KRW/kg for construction plastics and 150KRW/kg for the other plastics

- Deposit/Refund system

The Recycling Act facilitates a take-back system by enabling the producers and importers to add bond money to the consumer prices to increase the collection of empty containers. The producers and importers shall refund the bond money when a consumer returns the empty containers. Producers of beverages are utilizing the system, and the level of bond money is about 40% of the cost for manufacturing a new bottle.

- Transparency measures

To ensure the implementation and transparency of the related procurement, KECO checks and monitors the producer compliance. Producers and importers, together with recycling businesses, are obliged to record on-line the recycling process – including the amount of waste collected and the methods of recycling - and KECO confirms the records through on-site inspections.

- Supporting schemes at national level

As complements to EPR, Korea has several economic policy tools in place. In particular, there is a pay as you throw unit pricing scheme, often referred to as a volume based waste fee system, separate collection, charging and recording system of bulky wastes.

According to the volume based waste fee system, non-recyclable garbage should be put in plastic bag purchased in advance, while the discharge of recyclable waste is free. That is, it makes discharger of non-recyclable garbage pay waste treatment cost in proportion to its amount.

Charging non-recyclable waste can act as a economic instrument to encourage separate discharge of recyclable waste.

Facilitating separate collection of recyclable waste is the first step for recycling, so it can surely help increase recycling.

Also, the state or local government subsidize or lend funds needed for the recycling businesses, and if necessary, arrange loans for them.

The Special Accounts for Environmental Improvement was set up in 1995 as a centralized account to fund investments in environmental protection, and the account is managed by the Korea Ministry of Environment. Major expenditures of the special accounts include support of recycling businesses, establishment of waste disposal facilities and purchase of recyclable materials.

Annual expenditure of the special accounts includes funding for Korea Environmental Industry and Technology Institute’s project to support entrepreneurs attempting to establish new recycling businesses to treat wastes or produce products using secondary resources.

KECO also provides financial assistance in the form of low-interest rate loans to small and medium sized recycling businesses seeking technical consulting to improve technological and product manufacturing capacity.

< KEITI’s Subsidy Funds and their Terms and Requirements >

| Subsidy Funds | Details | Lending Rates (variable) | Lending Period |
|-----------------------------------|--|--------------------------|---|
| Facility Fund | For establishing recycling devices | 2.92% (yearly) | Repayment in 7 years with a 3-year grace period (within 10 years) |
| Technological Development Fund | For supporting research & development with regard to resource recycling | | |
| Technology commercialization Fund | For facilitating commercialization of developed technology | | |
| Management Stability Fund | For enhancing competitiveness of recycling companies | | Repayment in 3 years with a 2-year grace period (within 5 years) |
| Retail & Sales Support Fund | For enhancing sales and distribution of recycled products and establishment of recycling centers | | |

3. Governance of the system

Producers or PROs should submit recycling implementation results to the KECO every April. Prior to reporting the result, documents proving the details of production and import should be submitted to provide basic data to calculate the volume of obligatory recycling for individual producers.

- Governmental oversight

KECO has the task of overseeing the EPR system. It employs 120 employees whose tasks include monitoring the PROs, confirming that obligations are fulfilled, communicating with the PROs and producers, and reporting to the Ministry of Environment.

The Ministry imposes financial sanctions to the producers and importers or the PROs, if the analysis report drafted by KECO reports any incompliance - referred to as recycling charges. The recycling charges are differentiated according to the unmet portion, and

the charges range from 115% to 130% of the recycling fees. In case of default, 5% of additional charges are imposed.

To ensure a level playing field and fair competition, KECO endeavors to prevent the problem of free rider and evasion of duties by carefully screening the list of producers and importers and assigning responsibility for take-back and recycling to them.

PROs should be accredited by the Environment Ministry and the criteria for accreditation include financial stability, potential contribution to the development of recycling industries, and overall business objectives of the organization.

Fee/contribution levels are not subject to the approval by public authorities, but decided by individual PROs. However, the government still publishes the standard recycling fees for each and every EPR item, which the PROs take into consideration when deciding the level of funds to be collected.

To decide the standard recycling fees, the Ministry commit specialized agency to calculate these fees by estimating expenses of each recycling step including collection, transportation and treatment.

- Stakeholder analysis of the EPR environment

The Ministry of Environment enacts and revises related Acts and regulations, decides the mandated recycling rate of EPR items, permits the establishment of PROs, supports and manages local governments and KECO, and coordinates and settles conflicts between other stakeholders.

Related Acts and regulations include Act on the Promotion of Saving and Recycling of Resources, Act on Resource Recirculation of Electrical and Electronic Waste and End of Life Vehicles, Guidelines on the implementation of recycling obligation, separate collection and processing of recyclable resources, separate discharge mark, implementation of collecting and recycling obligation of WEEE, and reporting of transportation of WEEE and ELV.

Producers and PROs fulfill the recycling obligations through transparent recycling contracts, monitoring the process of recycling, and labeling separate discharge marks (see below for further information) on packing materials.

Separate discharge mark system is initiated for promotion of collection and recycling of packages under EPR scheme. The packages should apply the identification mark which is specially designed to indicate the item's recyclability. This program is running in accordance with the Act on the Promotion of Saving and Recycling of Resources.

Consumers are responsible for separate discharge of recyclables.

Local governments separately collect the end of use EPR items, establish recycling systems to facilitate collection, reuse, and recycling.

KECO accepts and access the business plan, progress report of producers, verifies the result report, provides overall administrative management of EPR operation, monitors recycling industries. Although PROs are involved in management of recycling process, their duties are within the scope of the implementation of recycling obligation which was commissioned by producers.

- Transparency assurance

Data and information on the performance of the EPR system should be recorded on-line by producers and PROs at www.epr.or.kr or www.ecoas.or.kr

Data and information is not open to the public for the protection of private information of the industries, and accessible only by the on-line system administrator and information register.

Producer declarations about the products are made on the use of hazardous substances in vehicles, electrical and electronic products, and the use of recyclable components in manufacturing vehicles. KECO verifies this information through assessment of the documents submitted by the producers and on-site inspection. A fine is levied on the producers if the declaration is proved to be false.

4. Environmental/Cost effectiveness and benefits

The number of producers with recycling obligations and recycling businesses rose from 2,747 and 418 in 2003 to 4,567 and 627 in 2012 respectively. The number of producers per recycling business rose from 6.6 in 2003 to 7.3 in 2012.

| category \ year | 2003 | 2005 | 2007 | 2009 | 2010 | 2011 | 2012 |
|---|-------|-------|-------|-------|-------|-------|-------|
| number of producers with recycling obligation (A) | 2,747 | 5,222 | 4,368 | 4,343 | 4,368 | 4,667 | 4,567 |
| number of recycling businesses (B) | 418 | 499 | 590 | 560 | 590 | 643 | 627 |
| number of producers per recyclers(A/B) | 6.57 | 10.5 | 7.40 | 7.8 | 7.4 | 7.3 | 7.3 |

With EPR in effect since 2003, the quantity of recycled products and packaging materials gradually rose to 1,519 thousand tons in 2012 which is 62% more than the number in 2002.

As a result, savings on landfill expenses amount to 2,888 billion KRW and 3,055 billion KRW has been generated from selling recycled goods and materials. Also, it is estimated that up to 9,769 jobs were created over 10 years.

<EPR Economic Benefits >

| | A+B | Landfill/Incineration cost saved(A) (billion KRW) | Recycled Product's Economic Value(B) (billion KRW) | Employment Effect (Persons) |
|-------|-------|---|--|--------------------------------|
| Total | 5,943 | 2,888 | 3,055 | 9,769 |
| 2003 | 367 | 204 | 163 | 685 |
| 2004 | 414 | 229 | 185 | 776 |
| 2005 | 462 | 256 | 206 | 866 |
| 2006 | 479 | 263 | 215 | 904 |
| 2007 | 542 | 297 | 245 | 1,029 |
| 2008 | 672 | 300 | 372 | 1,005 |
| 2009 | 673 | 398 | 374 | 1,010 |
| 2010 | 738 | 330 | 408 | 1,102 |
| 2011 | 797 | 355 | 442 | 1,193 |
| 2012 | 799 | 355 | 444 | 1,199 |

< Landfill/Incineration cost saved>

| | | Amount recycled (thousand ton) | Disposal cost (thousand KRW/ton) | | | | Disposal Cost saved(million KRW) 2012 (A*B) | |
|------------------|-----------------|-----------------------------------|-------------------------------------|------------------|-------------------------------|----------|---|--------------|
| | | | 2012 (A) | Sub total (B) | collection and transportation | landfill | | incineration |
| Total | | 1,519 | | | | | 355,600 | |
| Package | Subtotal | 979 | | | | | 261,476 | |
| | Carton pack | 23 | 140 | 112 | 28 | - | 3,220 | |
| | Glass bottle | 311 | 140 | 112 | 28 | - | 43,540 | |
| | Metal can | 133 | 140 | 112 | 28 | - | 18,620 | |
| | Synthetic resin | Subtotal | 512 | | | | | 196,096 |
| | | PET | 168 | 383 | 195 | - | 188 | 64,344 |
| | | EPS | 19 | 383 | 195 | - | 188 | 7,277 |
| | | Others | 325 | 383 | 195 | - | 188 | 124,475 |
| Products | Subtotal | 540 | | | | | 94,124 | |
| | Tire | 220 | 140 | 112 | 28 | - | 30,800 | |
| | Lubricant oil | 173 | 244 | 38 | - | 206 | 42,212 | |
| | Battery | Subtotal | 2.390 | | | | | 488 |
| | | Silver oxide | 0.001 | 204 | 112 | 92 | - | - |
| | | Lithium | 0.218 | 204 | 112 | 92 | - | 44 |
| | | Nickel Cadmium | 0.251 | 204 | 112 | 92 | - | 51 |
| | | Mercury | 0 | 204 | 112 | 92 | - | - |
| | | Nickel-hydrogen | 0.023 | 204 | 112 | 92 | - | 5 |
| | | Manganese | 1.897 | 204 | 112 | 92 | - | 387 |
| | WEEE | Subtotal | 138.7 | | | | | 19,418 |
| | | TV | 35 | 140 | 112 | 28 | - | 4,900 |
| | | Refrigerator | 59 | 140 | 112 | 28 | - | 8,260 |
| | | Washing Machine | 30 | 140 | 112 | 28 | - | 4,200 |
| | | A/C | 3 | 140 | 112 | 28 | - | 420 |
| | | PC | 7 | 140 | 112 | 28 | - | 980 |
| Audio | | 0.8 | 140 | 112 | 28 | - | 112 | |
| Mobile phone | | 0.7 | 140 | 112 | 28 | - | 98 | |
| Copier | | 1.2 | 140 | 112 | 28 | - | 168 | |
| Fax | | 0 | 140 | 112 | 28 | - | - | |
| Printer | | 2.0 | 140 | 112 | 28 | - | 280 | |
| Fluorescent lamp | | 6 | 201 | 112 | 0 | 89 | 1,206 | |

Box2: Quantitative information for 2012 EPR Performance

41% municipal solid waste generated in 2012 was recycled, and 27% of that amount was EPR items. Of the EPR items recycled in 2012, 1,371 thousand tons were recycled, 104 thousand tons were used as fuel in cement kiln, 39 thousand tons were reused, two thousand tons were incinerated with energy recovery, and three thousand tons were exported to be recycled.

| Items | Amount produced and imported(ton) | Target amount of recycling (ton) | Amount Recycled (ton) | Implementation Rate |
|---------------------------------------|-----------------------------------|----------------------------------|-----------------------|---------------------|
| TOTAL | 2,596,528 | 1,469,525 | 1,519,426 | 103% |
| Carton pack | 67,361 | 22,970 | 22,866 | 100% |
| Glass bottle | 430,086 | 334,607 | 310,909 | 93% |
| Iron can | 107,257 | 84,304 | 86,677 | 103% |
| Aluminum can | 56,539 | 44,439 | 46,293 | 104% |
| PET bottle | 122,687 | 98,885 | 100,395 | 102% |
| Colored PET bottle | 64,581 | 52,052 | 57,234 | 110% |
| Mixed material PET bottle | 11,622 | 9,367 | 10,801 | 115% |
| EPS | 25,555 | 18,951 | 18,806 | 99% |
| PSP | 8,774 | 3,711 | 6,073 | 164% |
| PVC | 3,116 | 2,069 | 1,761 | 85% |
| Plastic container tray | 175,997 | 140,726 | 153,035 | 109% |
| Plastic film and sheet type materials | 204,627 | 122,775 | 164,086 | 134% |
| Lubricant | 338,891 | 171,276 | 173,259 | 101% |
| Tire | 353,683 | 229,080 | 220,489 | 96% |
| Fluorescent lamp | 19,943 | 5,983 | 5,735 | 96% |
| Silver oxide battery | 4 | 2 | 1 | 50% |
| Lithium battery | 414 | 269 | 218 | 81% |
| Nickel-cadmium battery | 647 | 259 | 251 | 97% |
| Manganese battery | 12,860 | 2,778 | 1,897 | 68% |
| Nickel-hydrogen battery | 287 | 58 | 23 | 40% |
| Television | 81,541 | 22,179 | 35,188 | 159% |
| Refrigerator | 214,503 | 57,272 | 58,529 | 102% |
| Washing machine | 95,689 | 30,333 | 30,304 | 100% |
| A/C | 126,600 | 3,418 | 3,385 | 99% |
| Computer | 47,067 | 7,201 | 6,517 | 91% |
| Audio | 3,384 | 677 | 802 | 118% |
| Mobile phone | 3,202 | 879 | 662 | 75% |
| Copier | 6,136 | 982 | 1,183 | 120% |
| Fax | 210 | 33 | 39 | 118% |
| Printer | 13,265 | 1,990 | 2,008 | 101% |

- Revenues and use of the funds collected

Producers or importers obligated to recycle shall pay a recycling fee to a PRO, so that the organization can collect and recycle the used products or packaging materials. The allotments are distributed among the member producers of the PRO according to the mandatory recycling quantity assigned to each producer, and the PRO collects and manages the recycling fee.

Six PROs are currently operating in Korea and the use of funds and main revenues are different among PROs. Usually, 70-90% of funds collected are spent to support recycling businesses, and 1-5% is allocated for information and public awareness. The coverage of the fund expenditure varies according to the items and the recipient recycling businesses. Generally, the fund is used to cover treatment cost but not sorting and collection costs.

A large share of the funds is contributed by food manufacturers, retailers, and producers of cosmetics, and the plastic packaging industry makes up the highest proportion.

- Overhead costs and the system's financial sustainability

Overhead costs include R&D, public awareness, surveying how and where the waste is put out and transported, and PRO administration. PROs collect funds on a quarterly basis, and the administrative cost is fully covered by the producers' contributions. The cost of running KECO is not accounted for; the KECO running cost is covered by the special accounts for environmental improvement.

Financial sustainability of the system is legally ensured, because each producer has to pay for their PRO's expense - unless the producer submitted an implementation plan in advance and proved to have carried out the responsibility on its own or through a private contract with recycling businesses. If this obligation is not met, recycling charges will apply.

- Overall economic costs and benefits of the EPR scheme

External costs of the EPR system are related to the increasing number of recycling businesses that are viewed as NIMBY facilities. Expanding the recycling market, for this reason, brings about conflict in local communities, which induces a social cost that can be viewed as an externality of the EPR policy.

On the other hand, the benefits include lower waste disposal costs by diverting waste from landfills and incineration and sales of recycled products.

Box3: Quantitative information about cost effectiveness and benefits of the EPR scheme

- Cost per kilogram collection and recycling is stated in Box 1, standard fees for recycling.
- Cost per capita: 4,680KRW annually (please provide this information per EPR or product)
- Cost per household: 13,249KRW annually (please provide this information per EPR or product)
- Cost recovery rate from fees: Almost 100% of the cost for collecting, sorting and recycling waste is covered by the fees contributed by the producers, but for waste collection from single houses, the cost is covered by local governments
- Social benefit per ton collected and recycled: 526 thousand KRW
- Overhead cost has not been calculated.

5. Coverage and quality of waste collection and treatment

- Separate waste collection schemes

To promote separate waste collection, a separate discharge labeling system was initiated. Producers include the identification mark on the packaging, indicating the item's recyclability.



Local governments are responsible for separate collection of waste, and local authorities investigate and publish the quantity of recyclable resources generated and collected each year. Also, taking into account the storage and recycling capacity of the region, municipalities should implement necessary measures for separate waste collection. These measures include provision of curbside collection or establishing drop-off centers within easy reach. According to the amount of waste generated, the frequency of waste collection services vary - it could be on a weekly basis or every two days.

Despite local authorities' responsibility to collect waste, private collectors often make a waste collection contract with multi storage buildings or apartments, so that they can sell the recyclables collected at relatively low operational costs to the recycling businesses.

KECO monitors whether waste is treated in appropriate facilities and the amount recycled in unauthorized facilities is not counted as producer responsibility fulfillment.

- Coverage of EPR system and the quality of operations

The entire Korean territory is covered by the EPR system according to the Recycling Act and the Eco-Assurance Act, and the quality of waste collection, sorting and recycling depends on the capacity of the recycling businesses.

Nonetheless, recycling methods and standards are set out in the enforcement regulation of the Recycling Act and the Eco-Assurance Act.

- Removal and treatment of hazardous substances

As is addressed in Box 4, producers' responsibility to remove and safely treat hazardous substances in the process of recycling is prescribed in the enforcement regulation of both the Recycling and the Eco-Assurance Acts. KECO monitors the proper treatment of hazardous substances.

- Assessment of the proportion of waste products that are exported

Export of waste products as a way of recycling is restricted to less than 20% for PET bottles. This restriction only applies to PET bottles. For battery, lubricant, fluorescent lamp, and electronics, waste export is not listed as a method of recycling. However, the proportion of waste being exported is only about 0.1%.

Box4: Recycling methods and standards for EPR items

| EPR items other than electronics | Recycling methods | |
|----------------------------------|--|-------------------------------------|
| Carton pack | Make toilet paper, buffer material, paper box, recycled paper or cardboard Export destined for recycling | |
| Glass bottle | Reuse after rinsing, Make construction material, glass products, powdered glass, Export destined for recycling | |
| Iron, Aluminum can | Press or shred to make recycled raw material Export destined for recycling | |
| PET bottle | Make recycled raw material Make recycled products Export destined for recycling, but the amount should be less than 20% of the total amount of PET bottle recycled | |
| EPS | Make recycled raw material Make recycled products Make refractory ware or fiber coated products Export destined for recycling | |
| Plastic packaging material | Make recycled raw material Make recycled products Convert back to oil Make RDF which contains more than 60% of used plastics or recover energy, but the RDF manufacturing and energy recovery should be less than 70% of the total amount of plastic packing materials recycled Export destined for recycling Gasification | |
| Battery | Take out metal material used for the chemical reaction of batteries, and safely dispose | |
| Lubricant | Convert back to oil | |
| Tire | Make simple processed products Make recycled raw material(ex. Rubber powder) Convert back to oil Make methanol Recover energy Treat in the cement rotary klin or make RDF, but the amount should be less than 70% of the total amount of tire recycled Use for liner and cover material in the landfill Export destined for recycling | |
| Fluorescent lamp | Make base material(ex. glass powder) for glass products, and take out contained mercury in the form of metallic mercury or mercuric compound | |
| Electronics | Recycling method | Reuse or recycling rate per product |
| Television | Reuse components after intermediate processing such as dismantling, compressing, breaking down Or Recycle after sorting by materials | 65% |
| Refrigerator | | 80% |
| Washing machine | | 80% |
| A/C | For refrigerator, refrigerants should be safely taken out. | 80% |
| Computer | Computers and mobile phones should be safely recycled with metal collection from the PCBs. | 65% |
| Audio | | 70% |
| Mobile phone | | 70% |
| Copier | | 75% |
| Fax | | 75% |
| Printer | 75% | |

6. Competition and market barriers

- Competition within the EPR and between the EPR schemes

EPR policy in Korea promotes competition in the recycling market to increase price competitiveness of the recycling businesses, and large scale businesses, by exploiting cost advantages, creating better networks between waste collectors and consumers of recycled goods and materials - who tend to benefit more from the EPR scheme through contracts with several PROs to provide the recycling performance results and data.

However, as there is only one PRO that is authorized per EPR item no competition exists between PROs. Each PRO decides how and to whom to distribute the EPR funds.

Even though PROs are private non-profit organizations, they are considered public, because they work for the public good and contribute to establishing a collection system and developing recycling businesses.

| PROs | Target item |
|--|--|
| Korea Packaging Recycling Cooperative | Metal can, Carton pack, Glass bottles, PET bottles, Plastic packages |
| Korea Lubricant Oil Industrial Association | Lubricant oil |
| Korea Battery Recycling Association | Battery |
| Korea Lamp Recycling Association | Florescent lamp |
| Korea Tire Manufacturer's Association | Waste tire |
| Korea Vessel Recycling Assosication | Glass bottle targeted for empty container deposit |
| Korea Association of Electronics Environment | WEEE |

- State of the domestic recycling industry

The capacity of recycling facilities in Korea is large enough to process all EPR targets. The capacity of recycling was 4,325 thousand tons per year in 2010, but the total target of goods to be recycled stayed at 1,465 thousand tons - only 33% of the capacity level.

7. The way forward

During the first decade of the 21st century, recycling rate in Korea increased almost by 103%, while landfill decreased by 31%. It is estimated that the introduction of the EPR system has contributed to this increase of recycling rate.

Still, Korea needs to enhance its EPR system to establish stability in supply chain of recyclable products and materials to the recycling businesses and increase added value of recycled products and materials.

Thus, Korea plans to facilitate an online market that provides demand and supply information of nationwide recyclable and recycled products and materials. Also, the Ministry of Environment has integrated six different packaging PROs into one 'Korea package recycling association' to reduce the administrative costs for operating several similar PROs. ('13.12)

For electrical and electronic equipments, Korea is going to set both long-term and year-by-year recycling targets. From 2014, annual recycling target of 3.9kg per capita will be implemented. Until 2016, Korea plans to expand the WEEE products covered by the EPR scheme up to fifty items to include small sized electrical and electronic equipments.

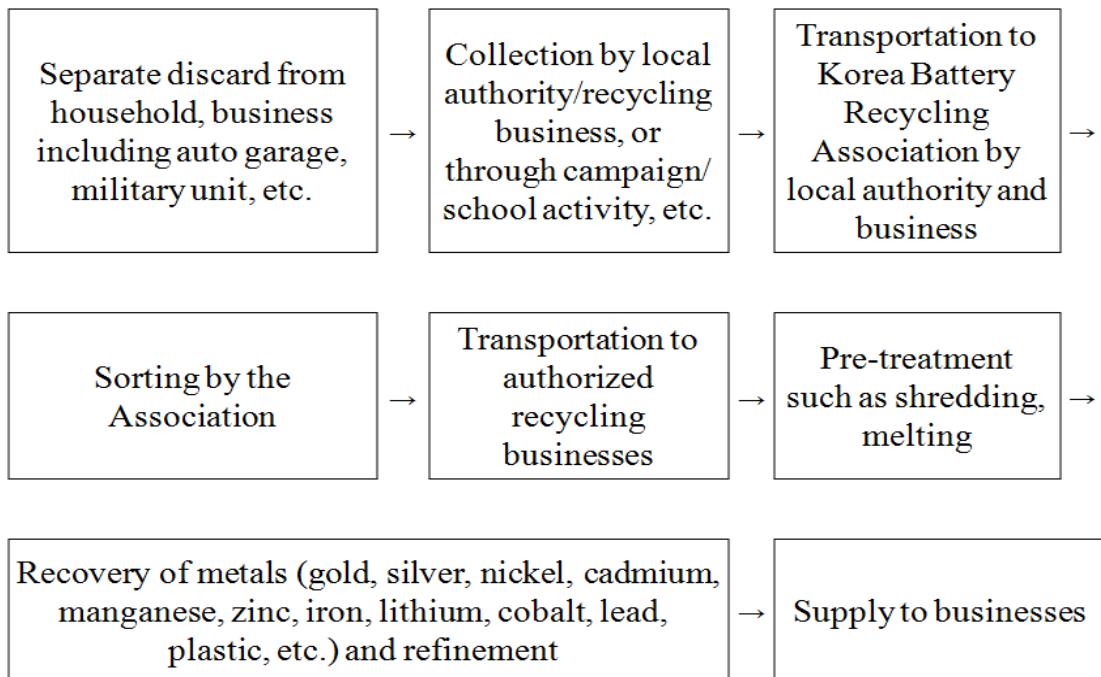
For end-of-life vehicles, recycling obligation will be newly imposed on car manufacturers and importers from 2015.

ANNEX

Battery Recycling in Korea

- 41 battery manufacturers are the members of Korea Battery Recycling Association, a PRO for battery recycling.
- In 2011, four battery recyclers recycled 2,068 tons of waste batteries, and recovered 20 million USD worth of material.

<Flow chart of battery recycling>



collection box



gathered batteries



sorting