

Section IV

EPR Policy and International Resource Circulation





8. Internationalization of Waste and Recycling Related Issues and Its Implications for EPR-based Recycling Policy²⁴



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Introduction

The original concept of EPR-based recycling policy aims for a shift in: i) financial responsibility of waste treatment from local governments to producers, and ii) physical responsibility of the products in the post-consumption stage, to generate incentives for producers to promote design for environment (DfE) and to reduce costs for environmentally sound management of post-consumer products.

Based on the principle of Extended Producers Responsibility (EPR), Japan has made a strenuous effort to develop a national recycling system over the past decade in order to realize its vision of implementing a sound material-cycle society. This is a policy concept that describes the basic direction of Japan's waste management and recycling policy since 2000 and promoted by the Japanese government, business and local government. It is defined as;
"a society where the consumption of natural resources is minimized and the environmental load is reduced as much as possible, by

keeping products, ... from becoming wastes, ..., promoting appropriate recycling of products, ... when they have become recyclable resources, and securing appropriate disposal of the recyclable resources not recycled, which means the disposal as wastes."

(extracted from Fundamental Law for Establishing a Sound Material Cycle Society effective since 2000)

Other countries in Asia have also come to realize the importance of improving the efficiency of resource utilization and have begun to develop their own recycling systems and policies. These changes have come in the face of escalating demand for resources and waste disposal, in conjunction with rapid economic growth. However, it has become apparent that domestic recycling systems around the region, especially those in developed countries, are being

²⁴ This chapter is based on the following conference paper: Hotta, Elder and Mori (2007), "International Material Flow of Recyclable Materials and the Prospects for Asian Regional Recycling Network", presented at The 3rd International Society for Industrial Ecology, June 2007, in Toronto, Canada. The views and arguments presented here do not necessarily reflect IGES's organizational position.

undermined by increased international circulation of resources, including secondary materials and goods.²⁵

This chapter discusses the expanding outflow of post-consumer materials and goods (hereby referred to as “secondary materials”) and the internationalization of waste- and recycling-related issues in developed countries. The chapter argues that international resource circulation poses challenges to nation-based recycling systems. It also discusses the possibility of developing an institutional mechanism to adjust and harmonize the gap in recycling-related management capacities (both in terms of technical and institutional aspects) between countries.

Internationalization of waste and recycling issues

In the 1990s, developed countries such as Japan and those in the EU promoted policy concepts such as Junkan-gata shakai (sound material cycle society), the 3Rs (reduce, reuse and recycle), sustainable resource management, cleaner production, industrial ecology, and eco-efficiency. These concepts convey a similar claim – by increasing efficiency, industrialization can be harmonized with environmental conservation without harming economic benefits. Further, the thrust of this trend is not only to re-engineer industrial production processes, but also to

²⁵ Secondary materials and goods refer to materials and goods that are recovered for secondary use after production and consumption or have been manufactured and used at least once and are to be used again. It is a similar notion to recyclable materials or recyclable resources.

restructure political and economic life (Dryzek 1997:147), including the lifestyle of citizens living in developed countries.

Following this trend, the effort to solve environmental problems is prompted by the drive for more efficient production and services. Introducing the idea of eco-efficiency (or energy and resource efficiency) and voluntary action into central environmental policies is supported by Japan’s experience with energy saving in 1970s, which contributed to more efficient production and environmental improvement.

Along these lines, there has been a shift in thinking about how best to manage waste, from simply collecting and disposing waste to saving resources, improving resource efficiency and extending the life of landfills. Resource efficiency is increasingly considered a key for improving economic competitiveness, as well as for environmental protection.

Japan’s product-specific recycling policies, implemented under the Fundamental Law and Fundamental Plan for Establishing a Sound Material Cycle Society, offer a good example of recent trends in developed countries. Throughout the 1990s and early 2000s, Japan implemented a series of product-oriented recycling laws and promoted recycling industries and facilities.

In 2001, a national recycling policy framework – the Fundamental Law for Establishing Sound Material Cycle Society – was established. In this Fundamental Law, EPR principles are referred to as “Responsibility of Businesses” in Article 11. The Law states that “businesses are responsible for taking necessary measures to prevent or reduce

the incidence of raw materials, ... becoming wastes, ... businesses are responsible for undertaking proper cyclical use of such resources through self-initiated actions, or for taking necessary measures to enable proper cyclical use to take place ... businesses are responsible for undertaking proper disposal on their own responsibility" and "the businesses undertaking the manufacture, sale, ... of these products, containers, ... are themselves responsible for collecting or delivering, or undertaking the proper cyclical use of, these products, containers, ..."²⁶.

Under this framework, a number of product-specific recycling laws were passed. The laws include the following:

- Law for Promotion of Effective Utilization of Resources in 2001;
- Container and Packing Recycling Law in 2000;
- Home Appliances Recycling Law in 2001²⁷;
- Construction Materials Recycling Law in 2002;
- Food Wastes Recycling Law in 2001; and
- End-of-Life Vehicles Recycling Law in 2005)

The product-specific recycling policies established by these laws aim to: 1) promote the recycling of end-of-life products; 2) promote DfE to reduce waste generation by generating price signals for waste treatment to producers; 3) make waste flows of end-of-life products more

visible and controllable; and 4) promote the treatment of hazardous substances in the end-of-life products (Hosoda 2008). In so doing, the Japanese Government successfully developed a nationwide recycling system that covers several local administrations.

As a result of these considerable efforts, the national recycling rate increased from 12.1% in 1998 to 19.0% in 2004. In 2005, the country was able to send 70% less waste to its landfills compared to 1990.

At the same time, Japan's exports of secondary materials and goods to developing countries have increased since 1990. This is part of a general trend of increased flows of secondary materials for recycling purposes from developed countries to developing countries. It is also a consequence of increasing formalized recovery of secondary materials and goods, as part of a recent shift towards EPR-based recycling mechanisms in developed countries.

The increasing transboundary flow of secondary materials is an example of the structural changes that are taking place in economic relations between developed and developing countries due to rapid economic development and integration. Developed countries have experienced a rapid increase in the collection of secondary materials due to successful implementation of EPR-based legislation, as well as zero-landfill industrial strategies. At the same time, markets for secondary materials are shifting due in part to the movement of manufacturing industries from developed countries into rapidly industrializing countries.

²⁶ English translation of Fundamental Law for Establishing Sound Material Cycle Society available from home page of Ministry of the Environment of Japan: <http://www.env.go.jp/en/laws/recycle/12.pdf>

²⁷ Chapter -- by Kojima et.al. describes the implementation of EPR principles in the Home Appliance Recycling Law in Japan in more detail.

The corresponding increase in demand for recyclables in developing countries parallels the improvements in their export-oriented economies. This has led to increased international flows of secondary materials and negative environmental impacts from inappropriate recycling processes in recipient countries. In recipient countries such as China²⁸ and India, there are increasing concerns about environmental pollution and health effects caused by the improper treatment and recycling. These include open burning and dumping, shortage of landfill space, and environmentally-unsound practices for recovering metal from e-waste (e.g. open burring of plastic parts and acid treatment).²⁹ Thus, waste management and recycling issues that were previously considered as urban and national problems have now internationalized.

Therefore, for developed countries, the establishment of environmentally-sound downstream material flows is difficult to realise without taking into consideration the international flow of recyclable resources. There is now a need for policy measures that address the globalization of downstream material flows and integration between downstream and upstream policy concerns through design for environment (DfE), sustainable production, and

other measures. While Japan and other countries have well developed domestic mechanisms for waste management, recycling and pollution prevention, there is an increasing possibility that the development of international trade and distribution of products and materials will expand a “loophole” for such mechanisms. This loophole is “hidden flows” of secondary materials that are labelled as recyclables or second-hand goods and then sold outside of Japan without first going through the formal domestic recycling route established by legislation.

Limitation of EPR-based national recycling mechanism: A case of Japan

Figure 8-1 below presents a causality analysis of the effects of economic globalization on the recycling and waste management sector in Japan. The chart summarizes three main effects of economic integration based on current economic and market conditions.

The first is an increased outflow of recyclable resource from Japan to developing Asia due to declining demand for low-quality recyclables and high costs for recovery, transportation and processing for recycling.

The second is an expansion of foreign markets for second-hand goods due to economic integration and economic development in developing Asia. Thus, the export of second-hand goods can work as a loophole in Japan’s EPR-based recycling systems.

²⁸ Waste and Resources Project of Institute for Global Environmental Strategies conducted a field visit to one of such recycling village in New Delhi in 2008.

²⁹ For the detailed information on improper recycling activities in the case of South Asia, see; ADB, IGES, & UNEP. (2006). Promoting Reduce, Reuse, and Recycle in South Asia: Synthesis Report of 3R South Asia Expert Workshop, Kathmandu, Nepal, 30 August-1 September 2006. Manila: ADB. Also, for an example of research and survey on environmental and health impact of improper recycling activities, see: M.H. Wong, “Sources, Fates and Environmental and Health Effects of Persistent Toxic Substances from E-waste Recycling”, South Asia 3R Expert Workshop in Katmandu, Nepal, August, 2006.

³⁰ These include NIES (Terazono et. al. 2004), IDE-JETRO (Kojima ed. 2005) and METI’s commissioned research (See NTT Data Institute of Management Consulting 2006, Re-tem 2006, and E&E Solutions 2006)

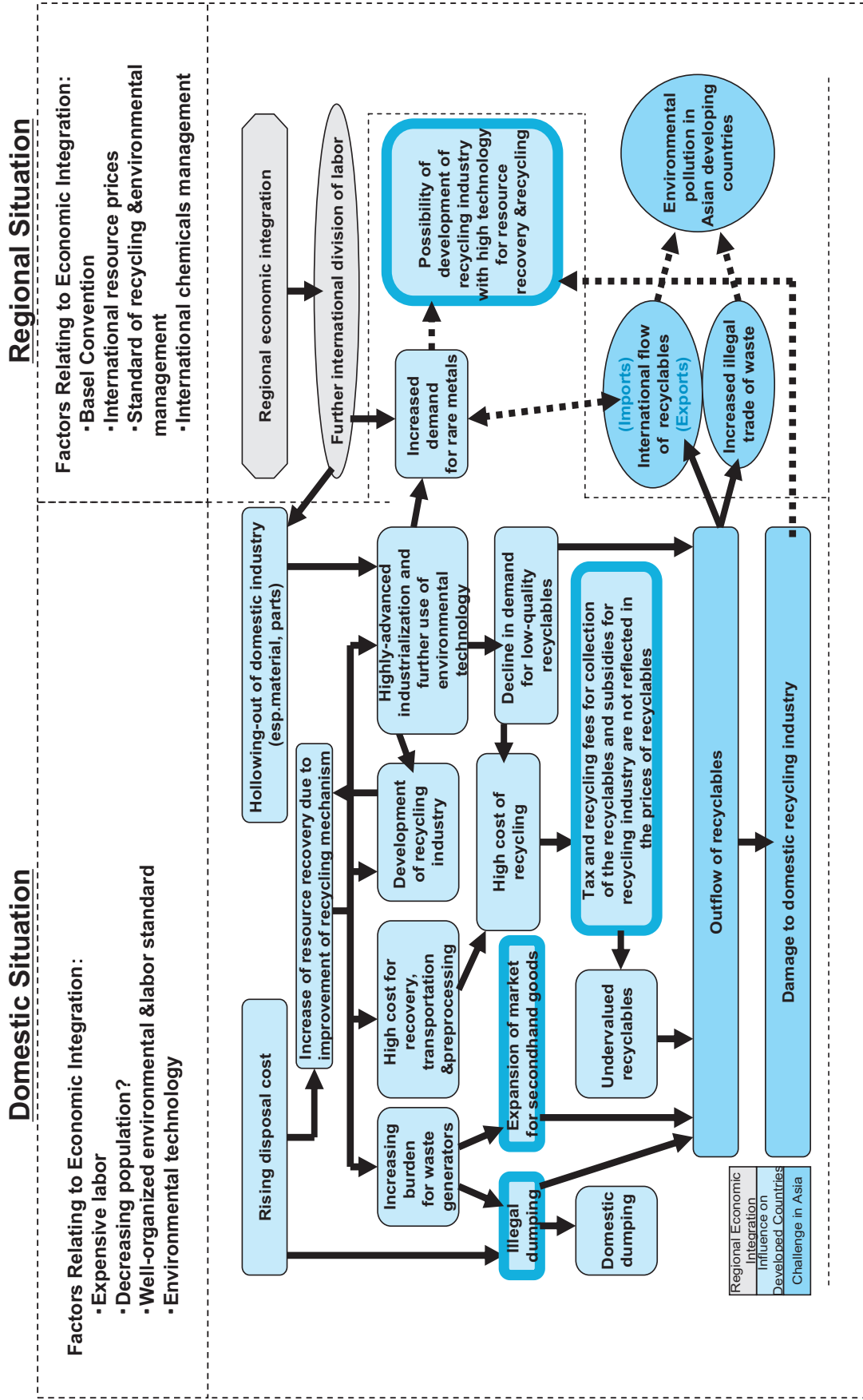


Figure 8-1: Causality Analysis of the effect of economic globalization EPR-based recycling mechanism

The third is increased demand in Japan for rare/precious recyclables and lower demand for low-quality secondary materials due to further international division of labour. Therefore, there is a possible damage and decline of the domestic recycling industry that deals with relatively low-quality recyclable resources. Also, there is a chance for Japan's recycling industry with high technology for recovering and recycling rare/precious resources.

Phenomenon 1: Further Outflow of Recyclable Resources

Within the past few years, the Japanese government has started to realize the huge impact of Asia's economic integration on Japan's

sound material cycle society policy. The Japanese government (both METI and MOEJ) established working groups to discuss possible policy responses to the increasing transboundary movement of recyclables.

Indeed, from 1990 to 2004, the export of recyclable resources has increased 7-fold for scrap iron, 8.3-fold for scrap copper, 8.3-fold for scrap aluminium, 38.7-fold for waste paper/cardboard, and 9.2 fold for waste plastic (Terazono 2005). These exports are mainly going to other countries in East Asia. Figures 8-2 and 8-4 show that more than 90% of scrap plastic and scrap copper exports go to China and Hong Kong. Figure 8-3 shows that more than 90% of scrap ferrous metal exports go to China, Korea and Taiwan.

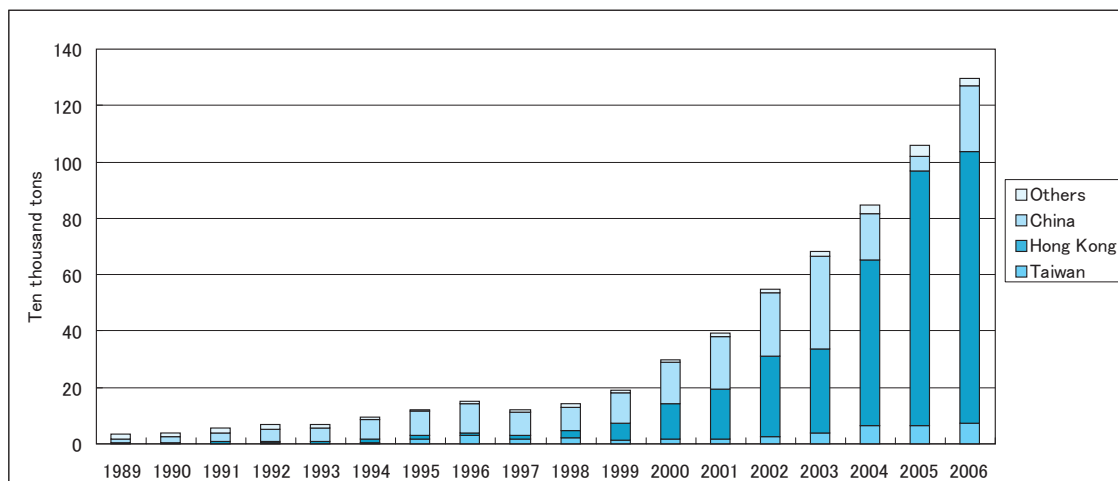


Figure 8-2: Export of scrap plastics from Japan

Note: For Scrap Plastics, this chart is based on trade statistics of HS Code (3915).

Source: Calculated from Trade Statistics of Japan (<http://www.customs.go.jp/toukei/info/index.htm>)

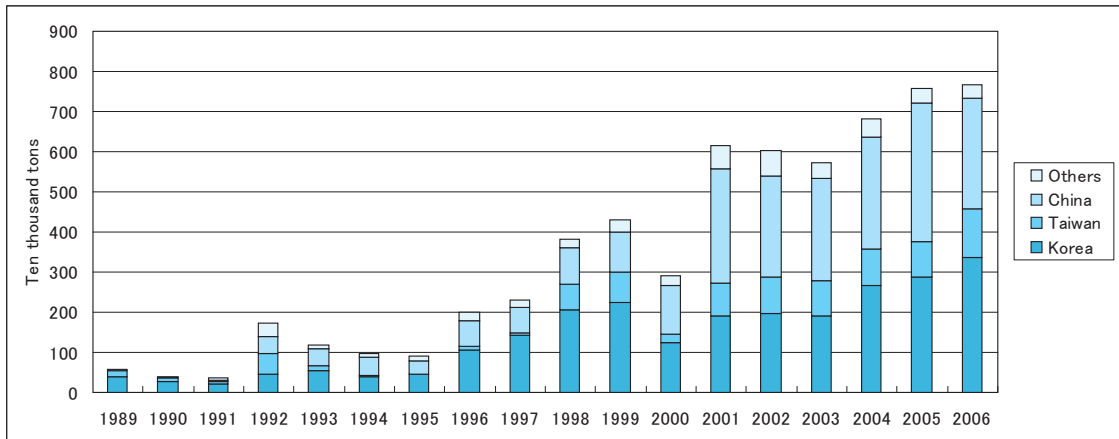


Figure 8-3: Export of Ferrous metal from Japan

Note: For Scrap Ferrous Metal, the chart is based on trade statistics of HS Code (7204).

Source: Calculated from Trade Statistics of Japan (<http://www.customs.go.jp/toukei/info/index.htm>)

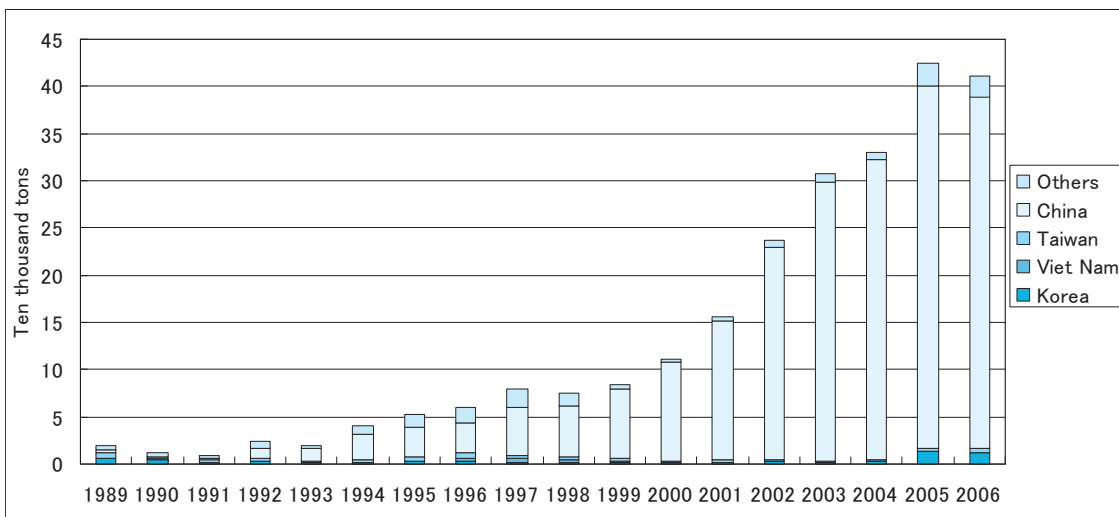


Figure 8-4: Export of scrap copper from Japan

Note: For Scrap Copper, the chart is based on HS Code (7404).

Source: Calculated from Trade Statistics of Japan (<http://www.customs.go.jp/toukei/info/index.htm>)

Although Japan has established domestic recycling capacity, both through EPR-based legislation and recycling industries, this phenomenon has been followed by a number of concerns, including the loss of domestic recyclable materials, the decline of domestic recycling industry/ capacity, and the possibility of exporting pollution to developing countries.

The outflow of secondary materials and goods can be explained by three major incentives;

- 1) cheap labour and low environmental standards in developing countries,
- 2) increasing demand for resources outside of Japan, and
- 3) improper price reflection for collected and sorted secondary materials and goods under Japan's EPR-based collection mechanism.

Japan's collection and recycling mechanisms for secondary materials and goods in the late 1990s was only concerned with how to perfect domestic waste management and recycling. Thus, international trade or transboundary movement of secondary materials and goods from Japan to other countries was not taken as a serious policy issue until recently. Therefore, incentive mechanisms for collecting post-consumption goods have only considered the domestic market.

There is an economic incentive to export these goods because the material value of the collected secondary materials and goods are relatively higher in developing countries, where there is cheap and abundant labour and relatively low environmental standards. This enables recycling sectors in developing countries to generally put

a higher price on valuable recyclable materials than developed countries. Also, heavily subsidized domestic collection and recycling mechanisms contribute to the recovery of valuable resources for foreign buyers. A study in 2004 conducted by the National Institute of Environmental Science, Japan (NIES), United Nations University/ Institute of Advanced Studies (UNU/IAS) and University of Tokyo (Terazono et. al. 2004) suggest that mixed low quality material that cannot be recycled in an economically-feasible manner tends to be shipped to developing countries.

Therefore, for example, such incentives lead scrap dealers to export low quality recyclable resources, which cannot be economically recycled in Japan. Also, there is an incentive for using the export of secondary goods as a way to get easy cash by avoiding formal and costly EPR-based recycling systems in Japan. Figure 8-5 indicates the recycling status of home appliances in 2001, immediately after the introduction of the Home Appliance Recycling Law, and in 2005. According to this figure, the diversion rate of end-of-life home appliances did not change between 2001 and 2005, staying at around one-third of the total.

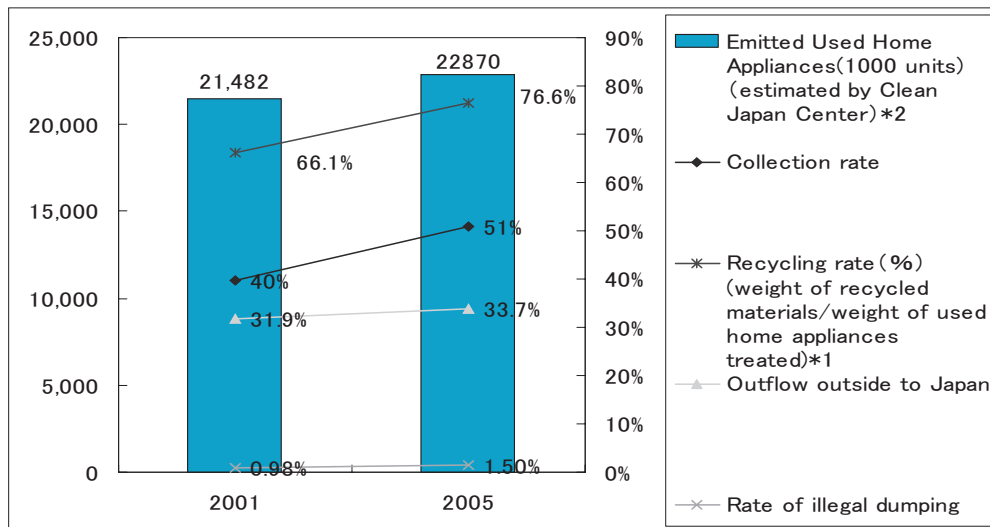


Figure 8-5: Emission, collection rate, recycling rate, outflow rate, rate of illegal dumping of used home appliances in Japan in 2001 and 2005

Source: Compiled by IGES based on: Ministry of the Environment statistics, Webpage of Clean Japan Center, Materials from the joint meeting of working group for electronics and electrics recycling of Industrial Structural Council Japan, and the small committee for evaluation of home appliance recycling mechanism at Central Environmental Council Japan.

Such trends have raised domestic policy concerns that are directly linked to issues of international policy cooperation. For example, the recent negotiations of Free Trade Agreements (FTAs) with the Philippines and Thailand included agreements on zero tariffs for some wastes that are seen by some as conflicting with the intentions of the Basel Convention.

The Basel Convention and the FTA may affect trade of secondary materials and goods differently. The Basel Convention requires a Prior-Informed-Consent procedure for hazardous wastes, which applies no matter what is written in the FTAs. However, if the tariffs are reduced through the FTAs, this means that there will be stronger economic incentives to trade secondary materials and goods which may contain hazardous substances.

This poses a risk for Japan that it can be criticized by NGOs, the media and politicians for exporting materials that are unsafe for recipient countries. It is clear that economic globalization has contributed to the expanding interdependence of societies and economies across borders.

Phenomenon 2: Further Expansion of Foreign Market of Second-Hand Goods

As explained already, a recent estimate³¹ by MOEJ shows that a great many used appliances are shipped outside of Japan. For reuse purposes,

³¹ "A survey result of flow of special kinds of home appliances in emission, take-back and process" a material for 5th Joint meeting of working group for recycling of electronics and electric products, METI's Industrial Structure Council and MOEJ's Central Environmental Council, December 11, 2006. Materials and Minutes of the Working Group is available in Japanese at; <http://www.env.go.jp/council/03haiki/yoshi03-11.html>

5.94 million units (or around 26%) of the total estimated discards have been shipped outside of Japan since the introduction of the home appliance recycling law. Economic modelling analysis conducted by Hotta and Kojima 2008 suggests that, along with expected further economic integration in Asia, there will be increased incentives to trade secondary goods, including new products (Hotta and Kojima 2008). Without a regional policy response to control trade of secondary goods, this trend can facilitate disguised trade in these goods. Further discussion on second-hand goods will be presented in Chapter 9.

Concerns over disguised trade continue for several reasons. In general, there is no difference in the harmonized system (HS) codes for new products and second-hand goods for home appliances and electronic and electric goods³². This makes it very difficult to distinguish between disguised waste and proper second-hand-goods in the trade of e-waste. In Asia, several countries, such as China, Thailand or Viet Nam, have introduced either bans or import controls of second-hand goods that are over a certain age (or a certain number of lasting years to be assured) to prevent disguised trade and/or imports of products that are near to the end of their lifespans. However, there is still a need to improve the capacity to distinguish this disguised trade, as well as to prevent corruption of customs authorities.

³² Japan introduced HS code for used home appliances since January 2008.

Phenomenon 3: Increased demand for rare/precious recyclable resources

The influence of economic globalization on Japan's recycling industry requires Japanese policymakers to pay attention to the relationship between domestic and international market conditions and prices for secondary materials and goods compared to primary materials.

In the long term, Japan's heavy industries, including the materials refining industry, has been decreasing as measured by the number of businesses, employees, annual shipments, and total value added. These trends are shown in Figure 8-6. In contrast, as seen in Figure 8-7, the production of steel and aluminum in China has been increasing in recent years, while production in Japan has been flat. This trend results from the economic activities of developing Asia to fulfill their demand under rapid economic growth.

Along with this trend, several of Japan's manufacturing industries, such as its automobile industry and electric and electronic industry, has increased investment in developing countries, which have cheap labour and material costs, and have integrated global production networks. For example, JFE steel previously owned as much land as the entire agricultural area of the city of Kawasaki, where it is based. In the 1980s and 1990s, the company gradually reduced all its steel furnaces across the city to only one today. Although the materials refining industry in Japan has recently observed some new investments in high quality products, which demand advanced technology, long-term trends show decreasing demands for comparatively low quality materials, such as recyclable resources.

Indeed, facing the decline of the materials refining industry, local governments that have relied heavily on chemical industries (e.g. Kawasaki and Kita-kyushu) have developed "Eco-town" projects. These are subsidized by the central government to develop a group of recycling and environmental industries by utilizing the existing infrastructure of heavy industries, such as JFE steel in Kawasaki and Nippon Steel in Kita-kyushu. These Eco-town projects are supposed to function as recycling centers near large cities to support the country's national recycling mechanism.

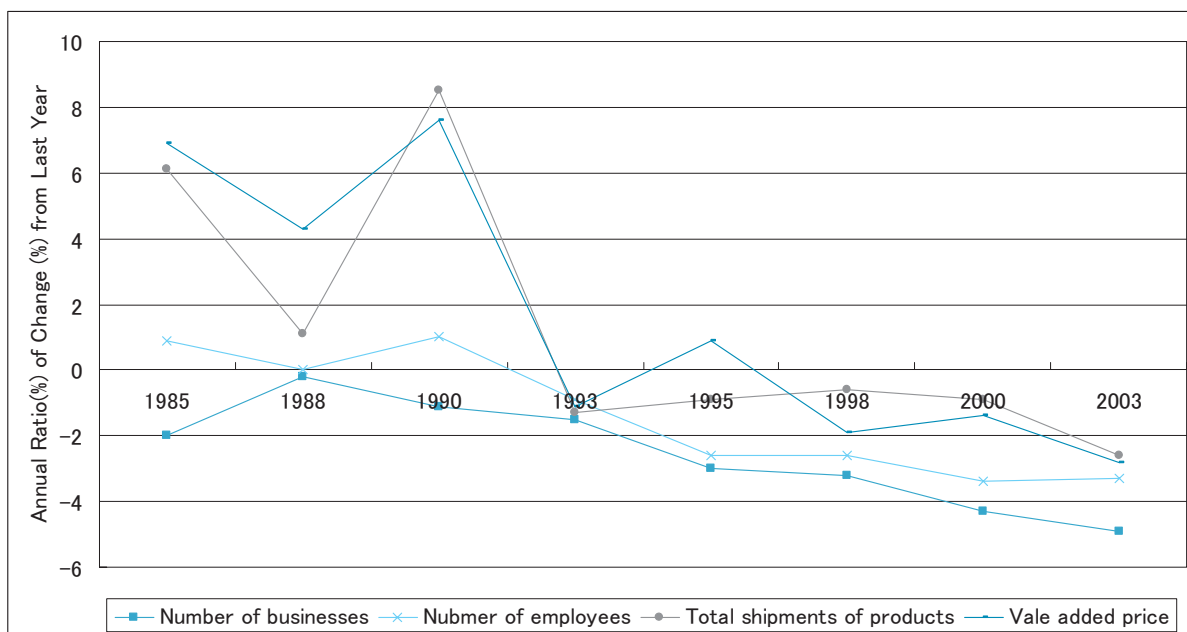


Figure 8-6: Changes in annual ratio of increase/decrease in number of businesses/ employees/ total shipments/ and total value added price in Japan's industrial sector

Source: METI (2006), 'Industrial Sector of Japan 2006'.
<http://www.meti.go.jp/statistics/kougyou/wk2006/1.pdf>

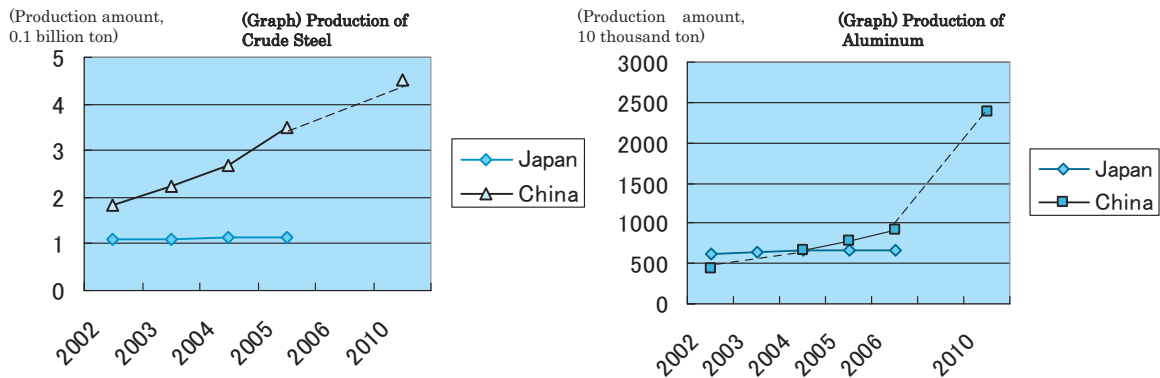


Figure 8-7: Production of crude steel and aluminum in Japan and China

Note: Production in 2010 of China is based on an estimate by Takeda (2006). See; Katsutoshi Takeda (2006), "Risk Management in Chinese Business", Mitsubishi Corp www.gsc-asianbusiness.jp/workshop/2006/asi_15_03.pdf

For crude steel production and aluminum production in China, the figures are based on JOGMEC (Japan Oil, Gas and Metals Corporation)'s database. http://www.jogmec.go.jp/mric_web/kogyojoho/2003-05/2003-05-01.pdf

As the region becomes more economically integrated, it is likely that this downward trend in Japan's domestic heavy industries will continue due to further international division of labour. This means demands for recyclable resources will likely increase in developing Asia.

In the 1990s to 2000s, facing market decline for materials due to a slump in industrial production (seen in Chart 6), the materials refining industries started to develop recycling businesses by utilizing their environmental and refining technologies. Examples include the following:

- In the steel industry, JFE steel in Kawasaki, which utilizes plastics as deoxidizing materials for the blast furnace, and Nippon steel in Kita-kyushu);
- In the cement industry, Taiheiyo's cement operation in Saitama or Chiba uses the cement facility for treating municipal and industrial waste; and
- In the non-ferrous refinery industry, DOWA recovers rare metals from used mobile

phones).

This increasing focus on recycling by materials refining industries can be explained by cost recovery through the provision of waste processing/treatment services for toxic substances for local governments and industrial waste emitters.

Since there is lessening demand for relatively low quality materials, these materials refining industries, with high capacity in both environmental technology and treatment capacity, shifted their business functions to include waste treatment and recycling from their original business of materials refining³³.

³³ The author conducted an interview to an executive of Taiheiyo Cement; the largest cement industry in Japan in 2000. The interview confirmed that expansion of the function of cement industry as materials industry into waste-treatment and recycling industry was a strategy to respond to the declining demand for construction materials. The executive used a key word to illustrate this "from manufacturing to eco-facturing". See Chapter 6 of Hotta (2004).

Therefore, these resource recycling businesses by heavy industries developed into primary waste treatment businesses rather than resource recovery businesses.

The only exception is the recovery of rare metals. If high-tech manufacturing industry remains in Japan, the domestic need for rare metals continues to exist. For example, some of used electronic and electric goods contain precious material at a relatively high rate. One ton of gold ore in general contains around 0.3-1.0 grams of gold. On the other hand, one ton of used mobile phones contains around 280 grams of gold (Taniguchi 2005). Thus, it is likely that Japan's domestic demands for high quality recyclable resources, such as rare (precious) metal or unmixed recyclable plastics from used electronic and electric goods depends a great deal on the high-tech manufacturing industry in Japan. In other words, for the recycling of secondary materials which contains such metals, Japan's recycling policy shall give more attention to resource management-related concerns.

The Prospects for Internationally Harmonized EPR Mechanism

There is a possibility that the effectiveness of domestic policies to promote environmental conscious design and to manage environmental and health risks of hazardous materials will be undermined if international trade considerations are not taken into account. The internationalization of waste- and recycling-related issues demands a policy response at a regional level in Asia.

Indeed, as discussed, the Japanese government is now proposing to create a Sound Material Cycle Society to cover all of Asia. Based on this position, in the Kobe 3R Action Plan endorsed at the G8 Environmental Ministers Meeting in May 2008, G8 countries agreed:

- ✓ To achieve sustainable resource circulation on a global scale, place high priority on the promotion of environmentally sound management of re-usable and recyclable resources within each country, in compliance with associated domestic regulations and applicable international agreements. In this context, encourage and support such environmentally sound management in developing countries.
- ✓ At the same time, work to prevent illegal transboundary movements of re-usable and recyclable resources (as wastes or non-wastes) and agree to respect the provisions of the Basel Convention.
- ✓ In cases where the above two safeguards are in place, facilitate the international trade of 3Rs-related goods, materials, products and services, including re-usable and recyclable resources and remanufactured products, which contribute to the reduction of environmental impacts and the effective use of resources without discouraging domestic efforts to improve re-use and recycling.
- ✓ As major world economies, support and collaborate with developing countries to establish an international sound material-cycle society.

To achieve sustainable resource circulation on a global scale, this Action Plan by G8 countries

places high priority on the promotion of environmentally-sound management of reusable and recyclable resources (or secondary materials and goods) within each country. Chapters 1-4 of this EPR report has shown that not only developed countries but some developing countries have started to establish domestic recycling mechanisms by introducing EPR principles.

However, as shown in this chapter, outflow of secondary materials and goods from developed countries can be a problem for sustaining a domestic recycling mechanism. To secure necessary resources for each country and to promote efficient resource use, it is necessary to have the right balance between international resource circulation and domestic resource circulation through the promotion of international collaboration. Important aspects of international resource circulation include the efficient distribution of goods and securing of materials needed for industrial development.

Other than the above four points, this Action Plan does not present a concrete scheme to create this balance. To realize such a vision, it may be necessary to construct an institutional mechanism to adjust and fill gaps in recycling-related institutions and management capacities between countries.

As discussed, realizing the vision via an EPR-based recycling mechanism (and especially third and forth principles mentioned above) must involve addressing the following issues: 1) cheap costs in resource recovery due to low labour and environmental standards in developing countries; 2) increasing demand from developing

countries in resources; and 3) improper price reflection for collected and sorted secondary materials and goods under EPR-based collection mechanism in the developed countries. The right balance should be achieved through international collaboration on environmentally-sound domestic waste management³⁴, securing necessary resources for industrial development, and trade of secondary materials to facilities with environmentally-sound capacity.

This will require international coordination regarding the coverage of producers' responsibility and domestic deposit scheme and the financial cooperation for capacity development in developing countries. For example, monetary transfers from exporting countries to importing countries of secondary materials and goods could be initially explored. Such transfers could involve producers and/or first buyers contributing to a fund and, after export of secondary materials and goods, these funds could be redistributed to the importing country³⁵. Admittedly, this will not be easy given the difficulty of tracing goods, smuggling, and disguised trade of wastes. For a further discussion about such a scheme, please see Hotta et. al. (2008). Also, on this point, the chapter by Greg Tyson discusses the lessons learned on this aspect.

³⁴ Including management of residues from secondary materials after resource recovery.

³⁵ International Workshop on EPR and International Material Flow, Manila, Philippines, February 14 2007.

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9. Trade of Second-Hand Electrical and Electronic Equipment from Japan to Developing Asia: Issues, Policies and its Implication for Extended Producer Responsibility

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Introduction

Growing demand for consumer goods in rapidly industrializing Asia is leading to increasing international trade in second-hand products, such as electrical and electronic equipment (EEE) and used automobiles. However, there are growing problems in relation to this trade, including smuggling, disguised waste trade, and health hazards and environmental pollution caused by improper waste treatment and recycling in the importing countries. Although in theory the use of second-hand products may contribute to resource conservation and environmental protection by extending the life of products³⁶, there are currently no effective international mechanisms in place to assure safe, beneficial and environmentally friendly reuse of second-hand products that are traded from developed countries to developing countries.

³⁶ For example, Streicher-Porte et al.(2005) argues that reuse could reduce uncontrolled increase in environmentally hazardous emissions in the recycling sector.



This chapter analyses the trade in EEE between Japan and developing countries in Asia and identifies areas where further policy development is needed in order to assure an environmentally sound and socially responsible second-hand trade. First, we identify the major issues related with this trade, including its impact on Japan's efforts to promote extended producer responsibility (EPR) and its environmental and social impacts in developing Asia. Second, we review existing policy responses and international policy discussions regarding second-hand trade. Third, based on the analysis of major issues and current policy responses, we discuss how more effective policies could be developed.

Major issues related with the international trade in second-hand electrical and electronic products

This section identifies the major problems that are occurring, both in exporting countries such as Japan and importing countries, which include many developing countries in Asia. To this end,

the authors reviewed a number of studies on the second-hand goods trade, focusing mainly on personal computers (PCs) and electrical and electronic home appliances (e.g. Kojima 2007, ADB and IGES 2008, Elder and Hotta 2006, Streicher-Porte et al. 2005, Hicks et al. 2005, Shinkuma and Huong. 2009). In addition, the authors conducted a number of field surveys in developing Asian countries, including Viet Nam and Cambodia as well as in Japan.

Current issues in Japan

It has been observed that second-hand trade might weaken the Japanese EPR-based recycling system and reduce business opportunities for the domestic recycling industry. This can happen for four reasons. First, through this trade, some stakeholders are escaping their responsibilities as regulated under the Japanese EPR system. Second, this trade can cause a reduction in the amount of discarded EEE available for recycling in Japan. Third, while many companies have conducted this trade legally, some informal actors involved in second-hand EEE have been committing smuggling and disguised trade from Japan, sometimes for the purpose of informal resource recovery and waste disposal. And fourth, it is difficult to adequately control illegal trade due to difficulties in distinguishing reusable from non-reusable second-hand goods and in checking the outflow of second-hand EEE. These four issues are causing serious challenges to Japan's existing recycling mechanism. Some observers view this shortcoming as a "loop-hole" in the regulatory system (Hotta et al. 2008).

Escaping responsibilities under the Japanese EPR system through second-hand EEE trade

Under the Home Appliances Recycling Law, which went into effect in 2001, producers of four types of home appliances – televisions, air conditioners, refrigerators and washing machines – must take responsibility for recycling.³⁷ This legislation is a key piece of Japan's EPR system.

This law provides incentives to export second-hand EEE. By exporting these products, actors can escape their responsibilities under the Japanese EPR system. The law covers only recycling and does not regulate transactions of second-hand products. When used appliances are reused domestically and finally recycled under this scheme, the three main actors – consumers, retailers, and producers – can carry out their respective responsibilities as intended. However, when the appliances are exported as second-hand goods, producers are not obliged to carry out their recycling responsibilities under the recycling law.

As shown in Figure 9-1, consumers, retailers and producers share responsibility for collecting and treating home appliances under the Japanese law. Consumers must pay a recycling fee when they discard the items. Home appliance retailers must collect used EEE from consumers and transport them to the designated take-back site.

Producers and importers are required to take back those used appliances that they originally manufactured or imported and to recycle those appliances.

³⁷ Producers of PCs have a similar recycling obligation.

Flow of Recycling of Used Home Appliances

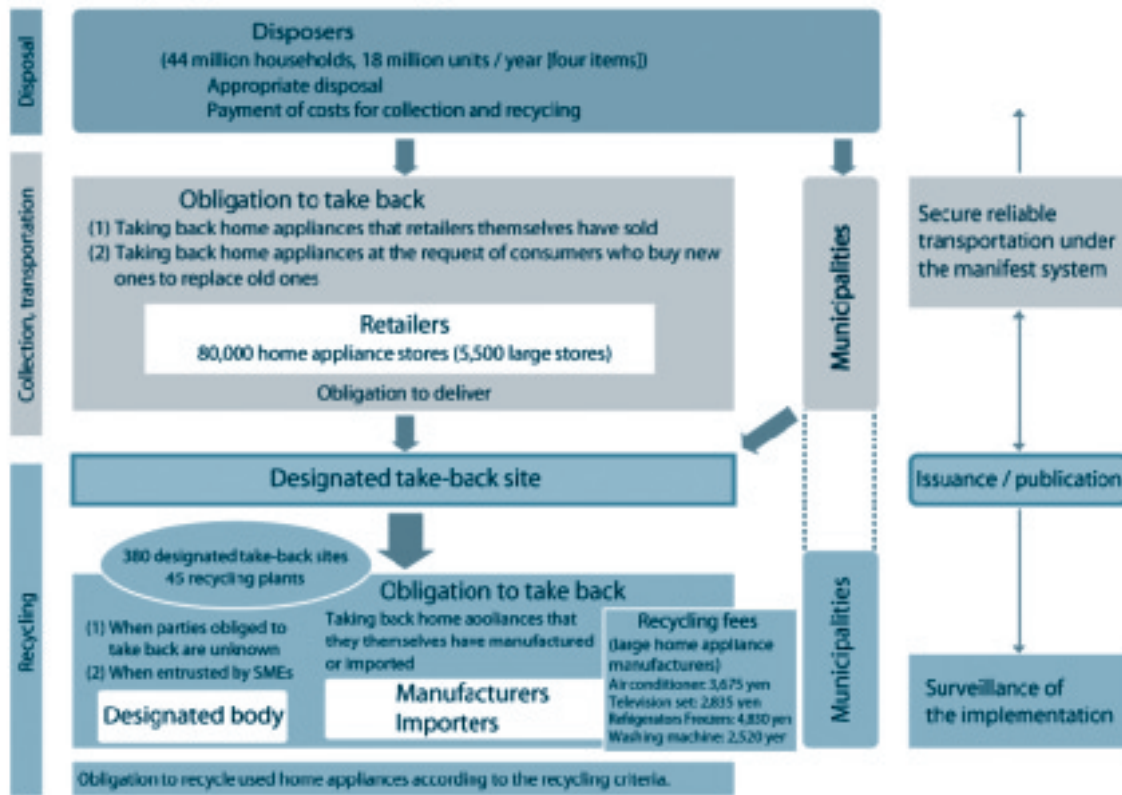


Figure 9-1: Roles and responsibilities of actors under the Japanese Home Appliances Recycling Law

Source: METI website

Under the recycling law, consumers have to pay a recycling fee for discarded EEE, but this rule does not apply when the used items are collected as second-hand goods. Naturally, this creates an incentive for consumers to sell their unwanted used appliances as second-hand goods to collectors (see section below) or to give them away for free, rather than paying to have them recycled. According to a recent survey, 37% of consumers select the most convenient disposal method, and 15% of them choose the cheapest option (Aisawa et al. 2008).

Likewise, when retailers receive used EEE classified as second-hand goods, consumers do

not have to pay any fee. Furthermore, retailers are not required to send these items to recycling companies but can resell them for re-use, either by themselves or through second-hand brokers. There is no system in place to track where these used items end up – whether they are reused domestically or shipped abroad. However, there have been illegal cases involving retailers. Some companies have collected used EEE as waste and received the recycling fee but then resold the items to brokers³⁸.

³⁸ See <http://www.env.go.jp/press/press.php?serial=8634> or <http://www.meti.go.jp/press/20081224009/20081224009.html> (in Japanese)

Reduction of discarded EEE going to formal recycling in Japan

Another problem is that the increasing flow of second-hand EEE to other countries is reducing the amount of discarded EEE available for recycling in Japan. As one of the largest consumer markets in the world, Japan discards huge amounts of EEE. Some of these used products have no practical value, but many of them are fully-functional items that can be used for several more years. There is a domestic market for second-hand goods in Japan, but due to consumers' high buying power and their

preference for new products, the size of this market is quite limited.

In contrast, most Asian developing countries have big and rapidly expanding markets for used EEE, which offer consumers relatively high functionality at affordable prices. Due to these differences in market conditions, there is a huge potential for exports from Japan to developing Asia. As shown in Figure 9-2, it has been estimated that about one third of Japan's discarded home appliances are exported³⁹.

³⁹ It is also estimated that about one third of Japan's discarded PCs are exported in 2004.

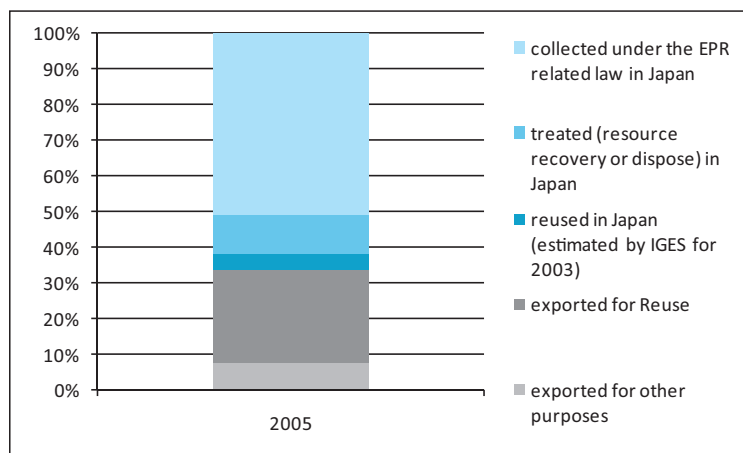


Figure 9-2: Fate of discarded home appliance (televisions, air conditioners, refrigerators and washing machines) in Japan (2005)

Source: Compiled by IGES based on METI/MOEJ (2008)

This outflow of discarded EEE has led to a decline in the domestic recycling industry, and many companies are now facing financial difficulties. With few regulations that limit the export of these products, it is hardly surprising that a large share of used EEE is exported given current market conditions, i.e. incentives for consumers to sell or give away their used items rather than pay for recycling, limited domestic market, and high and growing demand from abroad.

Existence of informal collectors and dealers and difficulties to control them in Japan

There are various types of collectors and dealers for used products in Japan, including actors who carry out their business operations illegally, either fully or partially. The structure of these collection networks and the second-hand EEE transactions is very complicated, and it is therefore difficult for public authorities to regulate and monitor all of these activities.

Some collectors and brokers have business licenses issued by local governments, but many players are unlicensed, despite the fact that collecting used EEE without a valid business license is illegal in Japan. Unlicensed players sometimes engage in illegal trade, such as smuggling or so-called “disguised trade”, where non-functioning used products are labeled and exported as second-hand products for the purpose of informal resource recovery and/or waste disposal.

The Japanese government has tried to strengthen the control of EEE collectors through measures such as on-site inspections of retailers and publicizing the names of retailers who have violated the law⁴⁰. However, such measures have not been enforced completely, so it is difficult for consumers to determine whether collectors are operating legally or not.

⁴⁰ <http://www.env.go.jp/press/press.php?serial=9135> (in Japanese)

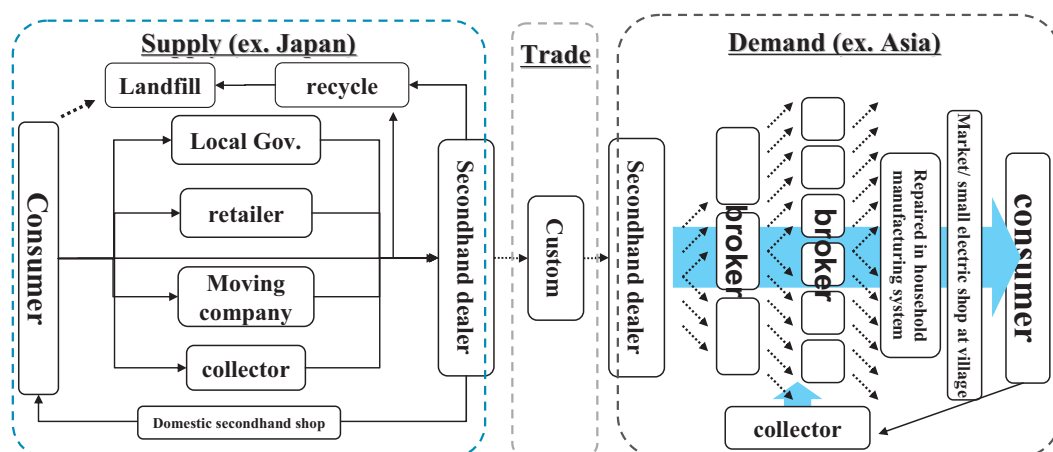


Figure 9-3: Actors involved in the trade of used EEE (simplified)

Source: Compiled by IGES base on /METI, MOEJ, 2007 and Yang. J et al., 2007

Difficulties in distinguishing between reusable and non-reusable items and checking the outflow of second-hand EEE from Japan

In addition to the problems encountered in trying to control unqualified collectors and brokers, there are many challenges in inspecting shipments of used EEE at customs. If used EEE are reused domestically and then handed over to the designated collection sites (as required by the Home Appliances Recycling Law), there is a good chance that they will be appropriately treated. However, when products are exported as second-hand goods, it is very difficult to know how these products are actually used and to assure that they are eventually treated properly at the end of their useful lives.

The Basel Convention is an international agreement that restricts international trade in hazardous waste. At customs, measures are taken to ensure that shipments of second-hand products contain functioning or easily repairable items and not waste products without practical use value. "Disguised trade", where waste is labeled as second-hand goods, is in violation of the Basel Convention (Kojima, 2007). However, unclear definitions of second-hand EEE and electronic waste complicate the efforts by customs officers to stop this trade (Basel convention, 2005). In many cases, it is difficult to decide whether traded products are usable or non-usable in an importing country, since this depends on the capacity of the importing country to repair used items. To guard against illegal shipments under the Basel Convention, the Japanese government requires traders to submit photos of the contents of containers to customs authorities, together with other

export application documents⁴¹. Authorities also conduct x-ray or open inspections of randomly selected containers.⁴²

To assess the negative impacts of transboundary second-hand trade and develop adequate policies to address illegal trade, it is also important to know the amount of second-hand products that are exported, along with their destinations. However, it is currently difficult to monitor the flow of second-hand products due to inadequate statistical systems (Basel convention, 2005). The harmonized commodity description and coding system (HS code) is an international method of classifying products used by customs officials to determine the duties, taxes and regulations that apply to each product. The HS code has been applied to second-hand electric appliances in Japan since January 2008⁴³. It is expected that improved information on the amounts exported and the countries of destination will make it easier to manage the second-hand trade, or at least the legal part of this trade. However, not all countries have applied the HS code for second-hand products.

⁴¹ Results from interview with Japanese traders of second hand EEE by IGES

⁴² Results from interview with Japanese customs and traders of second hand EEE by IGES

⁴³ Japan has applied the HS code for second hand EEE since Jan.2008. In precise, the HS code was applied to products other than new products. See at <http://www.customs.go.jp/kaisei/kokuji/H19kokuji/H19kokuji0422/index.htm> (in Japanese)

Table 9-1: Benefits and losses for Japanese actors when a used item is shipped abroad for reuse instead of being recycled domestically

	Benefits	Losses	Possible problems
<i>Consumers</i>	No obligation to pay recycling fee		To sell to illegal actor
<i>Retailers</i>	Profit from reselling		To resell to illegal actor
<i>Producers (Recyclers)</i>	No obligation to take back and recycle	Lost opportunity on recycle business	To be treated by environmental unfriendly way in importing country

Source: Compiled by IGES

Current issues in importing countries in developing Asia

In addition to the incentives for Japan to export second-hand products, there is a strong demand for second-hand EEE in developing countries. From a policy point of view, the second-hand market in developing Asia has the following three characteristics. First, it has contributed to the increase of availability of EEE for local people in developing countries, and many people are engaged in repairing these imported items. Second, counteracting these benefits, the import of second-hand products may lead to environmental and social problems if these are improperly treated and/or recycled by the informal and semi-formal actors. Third, most developing countries are lacking, legislation and enforcement capacity to solve problems related to this trade.

Contributions of second-hand EEE trade to social welfare in developing countries

Second-hand EEE markets are popular and common in developing countries. With sufficient attention given to the environmental, health, and safety impacts, the import of second-hand products to developing countries can be beneficial. In many developing countries, the

trade of used electrical and electronic appliances has increased the availability of EEE at affordable prices and created job opportunities to repair and sell second-hand EEE. To satisfy this demand, markets for used EEE are on the rise, including legal and illegal international trade (Streicher-Porte et al. 2005).

Large numbers of second-hand products are exported from Japan and repaired in developing countries. Air conditioners, personal computers, audio (not portable), land line phones, and televisions are especially popular⁴⁴. Due to economic development, the demand for these products is rapidly expanding (JEMA 2006).

Many people in developing countries make their livelihoods from this increasing trade, including brokers, sellers and repairers, who pick up the skills at technical schools. Repairing businesses are found in many places in developing countries. Repaired second-hand EEE can either be sold in the importing country or re-exported to other countries⁴⁵. Such re-exporting is believed to be substantial, but reliable data is lacking.

⁴⁴ Results of the site visit conducted by IGES in Viet Nam and Cambodia

⁴⁵ Results of the site visit conducted by IGES in Viet Nam and Cambodia

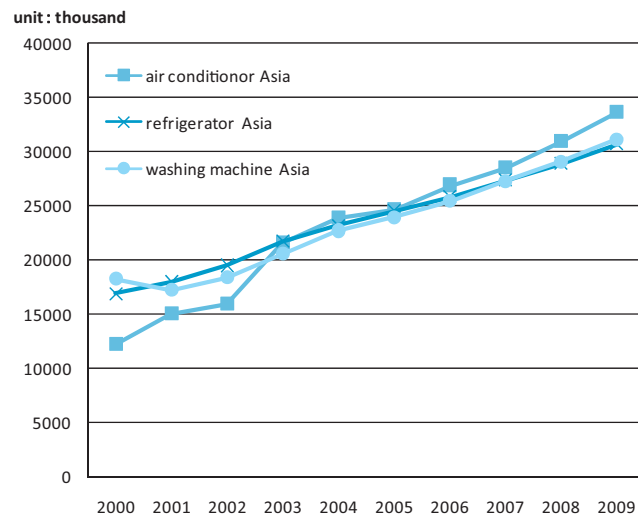


Figure 9-4: Estimation of demand for EEE in 14 Asian countries, not including Japan.

Source: compiled by IGES based on data provided by JEMA (2006)



Figures 9-5: Repairing business for second-hand EEE in Viet Nam

Photo by author

Environmental impacts of imported second-hand EEE and existence of informal and semi-formal actors

The existence of informal and semi-formal actors causes problems, such as environmental pollution and health hazards at several stages. Although imported second-hand EEE could improve local social welfare in developing countries, weakly regulated import of second-hand EEE can also lead to the inflow of e-waste

through illegal and disguised trade. This can also cause a proliferation of products with short remaining technical lifespans, as well as products that can be dangerous for users. In addition, the use of low quality second-hand products might lead to environmental impacts due to their high energy consumption compared to new products (Rodrigues et al., 2003). Furthermore, reports from China show that some second-hand products that enter the market after inappropriate refurbishment are unsafe to use (Yoshida 2007,

J. Yang et al. 2007). However, China has no authorized testing and certification organization to ensure that repaired products are usable and safe (J. Yang et al. 2007).

There are also environmental problems in recycling at the end-of-life stage of these products. The informal sector, which handles the majority of used EEE collection/recycle in

developing countries, operates at a lower cost than formal sectors and generally uses unsafe and environmentally polluting technologies. According to Zhangm (2007), many of the people involved in this recycling are not aware of environmental and health risks involved. And, even if they know of such risks, they might still continue because they need the income.

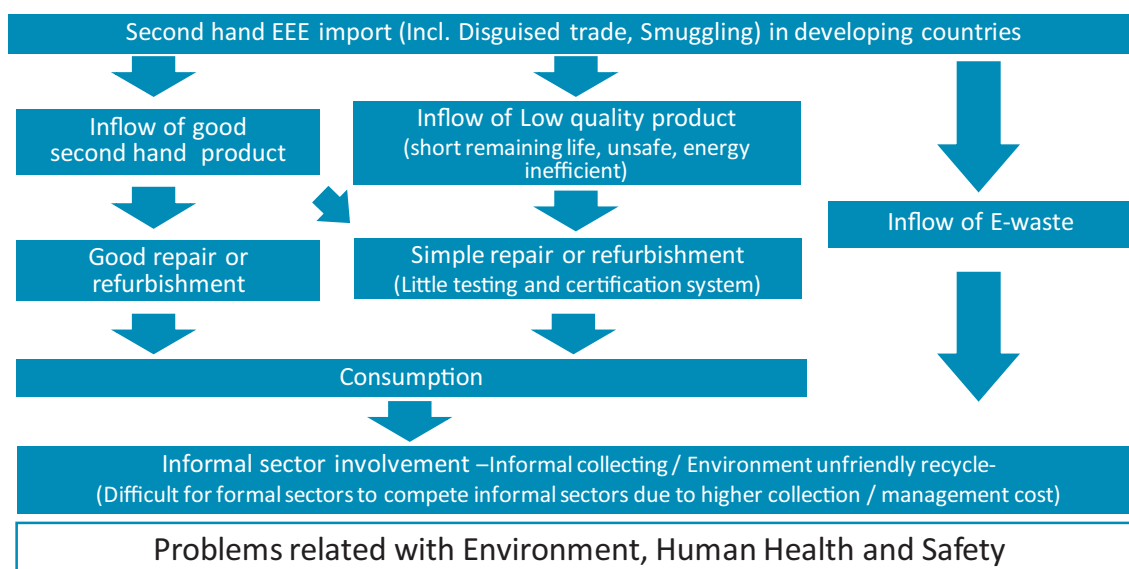


Figure 9-6: Problem dynamics of Second-hand EEE trade in importing countries

Source: compiled by IGES

Insufficient legal system and enforcement

The governments of many Asian countries officially recognize the importance of improving their recycling systems, as well as the management of second-hand goods. However, most developing countries in Asia have not yet established effective management systems for used EEE, including EPR. Customs controls at the borders are carried out in most countries to prevent illegal imports of second-hand goods and e-waste. However, the enforcement of

these regulations is usually weak due to low management capacity and corruption. For example, in second-hand markets in Viet Nam, which bans all import of used EEE, many products coming from the Japanese market can be found. Moreover, some Japanese manufactured PCs reach Viet Nam and Cambodia through China, even though China prohibits the import of all used EEE⁴⁶.

⁴⁶ Results from site visit in Viet Nam and Cambodia done by IGES

As shown in Table 9-2, some countries have introduced import regulations on second-hand products, which are typically based on a product's age or substances included. In addition to addressing environmental impacts, these regulations address concerns that the import of second-hand goods could undermine local industries since they are cheaper than locally produced products (Baden et al. 2005). The lack of regulation and weak enforcement results

in the generation of semi-formal and informal economies in several stages of the second-hand EEE market, where actors operate at a lower cost than actors in the formal market (J. Yang et al., 2007; Wenzhi et al., 2006). Recently, a few developing countries have developed measures to avoid the negative impact of the trade by promoting formal used EEE management, including applying EPR and formalizing the informal sector (discussed later).

Table 9-2: National regulations controlling the import of second-hand EEE for selected Asian countries

Country	Method	major products under control
Bangladesh	ban	CRTTV, AC, Refrigerator, washing machine, micro-wave, PC, Copier, LCDTV
China	main land	ban
	Hong Kong	permit
Canbodia	no-control	
Indonesia	permit	CRTTV, AC, Refrigerator, washing machine, micro-wave, PC, Copier, LCDTV, Printed Circuit Board, mobile phone (CRTTV, AC, Refrigerator, washing machine, micro wave and mobile phone is banned)
Malaysia	no-control	
Philippines	permit	CRTTV, AC, Refrigerator, washing machine, micro-wave, PC, Copier, LCDTV, Printed Circuit Board, mobile phone
Srilanka	permit	AC, Refrigerator,
Thailand	permit	CRTTV, AC, Refrigerator, washing machine, micro-wave, PC, Copier, LCDTV, Printed Circuit Board, mobile phone
Viet nam	ban	CRTTV, AC, Refrigerator, washing machine, micro-wave, PC, Copier, LCDTV, Printed Circuit Board, mobile phone

Source: Compiled by IGES based on METI/MOEJ(2007), <http://www.epd.gov.hk>, JETRO Website and material provided at workshop 2009 of the Asian Network for Prevention of Illegal Transboundary Movement of Hazardous Wastes

Current policy discussions on the trade of second-hand EEE in Japan, international policy process and Asian developing countries

International trade in used EEE is not a new issue. Several initiatives have already been taken to control this trade and additional measures are being discussed, both in national-level and international policy forums. This section reviews policy initiatives currently discussed in Japan

in international policy forums, and in Asian developing countries.

Japanese policy discussions on second-hand EEE trading

In the Basic Law for Establishing a Sound Material-Cycle Society, the Japanese government states that, as a general principle, reuse should be prioritized over recycling, since reusing products can be more effective in decreasing environmental loads. To support the

implementation of this general principle, the Japanese government has developed guidelines for domestic actors on how to distinguish between non-reusable used EEE and reusable second-hand EEE. It is also providing technical and financial support for the establishment of environmentally-sound recycling systems in developing countries in Asia. Finally, it is considering a number of measures to reduce illegal trade of used EEE.

The Japanese government, which has a legal framework for the disposal and recycling of used EEE in place, is proposing additional measures to ensure appropriate reuse (METI&MOEJ, 2008). Major points relating to second-hand EEE trading are:

- Actors who illegally collect, transport and dispose of used EEE should be harshly punished. To prevent smuggling and disguised trade, stricter checks and controls of unqualified collectors and traders at the local level, as well as strengthened inspections by customs, are needed.
- To avoid disguised waste trade (discussed above), it is necessary to
 - clarify national standards of exported second-hand products under laws related to the Basel Convention;
 - strengthen prior consultation between traders and related ministries;
 - promote collaboration between related ministries and customs; and
 - facilitate cooperation with importing countries.
- The customs statistics of second-hand products should be improved through installing new HS codes for second-

hand products, including TVs, washing machines, air conditioners and refrigerators (Japan has applied the HS code for used EEE since January 2008)⁴⁷.

- Regulations related to the second-hand trade should be harmonized with the country of destination.
- Involvement in international processes such as the Basel Convention is important, as is supporting capacity development for appropriate recycling and waste treatment in developing countries.

Related to the prevention of illegal collection, transport and disposal of used EEE, Japan has also discussed measures to motivate consumers to use appropriate collectors to discard their used EEE. The government recommends reducing the fees that consumers have to pay for collecting used EEE destined for recycling. Further improving the collection system by retailers is also recommended in order to make it easier for consumers to discard used EEE appropriately. In the improved system, retailers would be mandated to collect used EEE destined for reuse, in addition to recyclable items. In addition, although retailers are obliged only to collect the used EEE that they have sold, the government recommends that they collect all used EEE regardless of which company originally sold the item.

In addition to these proposed measures, the Government of Japan has formulated guidelines for retailers and consumers to distinguish between products suitable for recycling and

⁴⁷ See at <http://www.customs.go.jp/kaisei/kokuji/H19kokuji/H19kokuji0422/index.htm> (in Japanese)

products which can be beneficially reused. These guidelines just offer a recommendation and are therefore not mandatory for retailers and consumers. The guidelines reflect the quality of second-hand goods in demand in developing countries, based on the judgment of people in the second-hand trade business. Whether the discarded used EEE can be repaired or resold in developing countries is also considered.

The guidelines consist of two guidelines. Guideline A aims to ensure appropriate collection of used EEE for recycling under the Japanese Home Appliance Recycling Law. Guideline B aims to consider the environmental impact of reused products as well as to promote better reuse. Guidelines A and B use three sets of criteria

– manufacturing year, operation check, and appearance and performance check – to classify used EEE. The government recommends retailers to use Guideline A to decide which products can never be re-sold as second-hand in any market, including export markets, and which should therefore be recycled in Japan. Guideline B is developed to ensure a certain level of energy efficiency of reused products, as well as general product quality. Used products that meet these criteria are recommended to be reused rather than treated as waste. The two guidelines are summarized in Table 9-3⁴⁸.

⁴⁸ Some recommendations other than checking function of used EEE is included in the guideline such as explanation of prices and ensuring traceability.

Table 9-3: Brief summary of the Japanese guidelines for distinguishing between products to be recycled (guideline A) and products to be reused (guideline B)

	Criteria	Guideline A	Guideline B
TV	manufacturing year	Product that has passed more than 15 years since its manufacture should be recycled.	Product that has passed less than 7 years since its manufacture and that shows good energy-saving effects ⁴⁹ can be reused.
	operation	Product that does not pass energization test should be recycled. ⁵⁰	Reused product should pass a check for unusual odor, sounds, brightness, and contrast and be repaired ⁵¹ .
	appearance and performance	Product should be recycled when it has been recalled or it has a broken or critically damaged CRT.	Reused product should have all accessories and should be a product with high demand in reuse market
Washing machine	manufacturing year	Product that has passed more than 10 years since its manufacture should be recycled.	Products that has passed less than 7 years since its manufacture and that shows good energy-saving effect can be reused.
	operation	Product that does not pass energization test should be recycled.	Reused product should pass a check for unusual sounds, brake, washing and be repaired and guaranteed.
	appearance and performance	Product should be recycled when it is recalled or has damage (such as rust, broken/lost parts) covering more than 10% of the product and loss of its cover.	Reused product should have all accessories and should be a product with high demand in reuse market. Appropriate treatment of fluorocarbons is ensured when discarded.

Air conditioner	manufacturing year	Product that has passed more than 15 years since its manufacture should be recycled.	Products that has passed less than 7 years since its manufacture and that shows good energy-saving effect can be reused.
	operation	Product that does not pass energization test should be recycled.	Reused product should pass a check for unusual odor and sounds and be repaired.
	appearance and performance	Product should be recycled when it is recalled or it has rust more than 10% of its outdoor units, the indoor unit is broken, and either indoor or outdoor units are lack.	Reused product should have all accessories and should be a product with high demand in reuse market. Appropriate treatment of fluorocarbons is ensured when discarded.
Refrigerator	manufacturing year	Product that has passed more than 10 years since its manufacture should be recycled.	Product that has passed less than 7 years since its manufacture and that shows good energy-saving effect can be reused.
	operation	Product that does not pass energization test should be recycled.	Reused product should pass a check for unusual inside temperature, odor and sounds and be repaired.
	appearance and performance	Product should be recycled when it is recalled or it has damage/break more than 10% of the product and a loss of case and shelves.	Reused product should have all accessories and should be a product with high demand in reuse market. Little damage of appearance. Appropriate treatment of fluorocarbons is ensured when discarded.

Source: summarized by IGES based on METI&MOEJ (2008)

However, many used products fall in-between the criteria set in Guidelines A and B. The Japanese Government recommends collectors (retailers) to develop information systems to trace the fate of such products (e.g. if they are sold as second-hand items) to make sure that they are properly

reused and do not end up in hazardous recycling operations in developing countries.

⁴⁹ The products should pass the standards of Japanese Law concerning the Rational Use of Energy

⁵⁰ This guideline requires collectors (retailers) to conduct operation check and necessary repair if they want to sell it for reuse.

⁵¹ Products for reuse are should be repaired when necessary

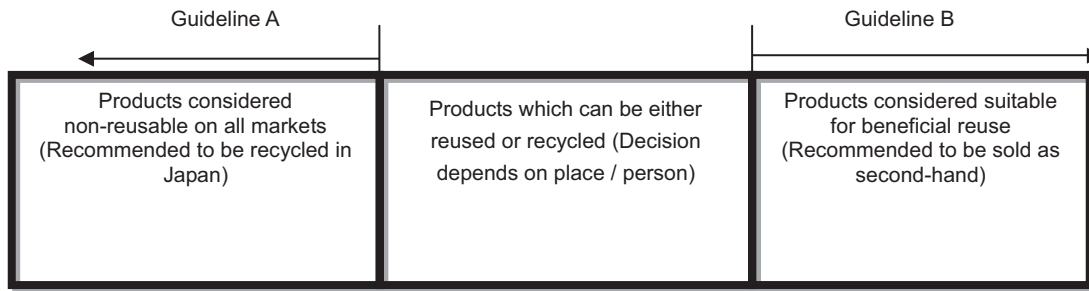


Figure 9-7: Structure of the Japanese guidelines on recycling and reuse

Source: developed by IGES based on METI&MOEJ (2008)

International policy forums and the Basel Convention

Governments and international organizations have discussed second-hand EEE as one of the issues related to e-waste. There is a shared recognition in the international policy community that illegal or disguised waste trade of used EEE has negative impacts. In response, the international community, mainly under the Basel Convention, has discussed internationally-acceptable standards/systems to help determine whether imported used EEE is usable or non-usable. Some notable examples of international initiatives and processes include the following:

- OECD has developed guidelines to help governments distinguish between waste and non-waste (OECD 1998).
- In the EU, the guidelines for Shipments of Waste Electrical and Electronic Equipment (WEEE) provide criteria to clearly distinguish between waste and non-waste, including second-hand products (EU 2007).
- The US has advocated expanding remanufacturing globally and liberalizing trade of remanufactured products (WTO

2007).

- United Nations University is hosting an initiative called StEP (Solving the E-waste Problems)⁵² initiated to facilitate approaches towards the sustainable handling of e-waste. One of task forces of this initiative is focusing on the development of a sustainable global reuse system, including the refurbishment and use of spare parts, to minimize environmental impacts.
- An emerging initiative by the International Organization for Standardization (ISO) proposes a standard for cross-border trade of second-hand goods. ISO⁵³ has argued that second-hand EEE presents many problems, especially in developing countries where unsafe products may be dumped.

The Basel Convention is the most relevant binding international regulatory framework

⁵² See the details at <http://www.step-initiative.org/>

⁵³ See http://www.iso.org/iso/resources/resources_consumers/areas_of_focus_for_consumers_within_standards/key_or_emerging_priorities/product_safety.htm

relating to second-hand EEE trading. Several initiatives under the Basel Convention⁵⁴ have discussed evaluation and/or testing and labeling to help determine the preferable destination of used products (reuse, material recovery, recycling or final disposal) as possible measures to be taken (Basel convention, 2006).

Also, as part of a cooperative effort between the Basel Convention and World Trade Organization (WTO), there have been discussions about introducing labeling and assessments of second-hand products to distinguish between waste, new or second-hand products.⁵⁵

The Japanese Government, in collaboration with the Basel Convention, has established the Asian Network for Prevention of Illegal Transboundary Movement of Hazardous Wastes⁵⁶. The aim of the

network includes “facilitating the exchange and dissemination of information on transboundary movements of hazardous wastes and selected used products among Northeast and Southeast Asian countries”. With this aim, the network has discussed the definition of second-hand EEE, as well as hazardous wastes in each country⁵⁷ and how to promote better e-waste collection systems with the involvement of producers in Asia⁵⁸.

⁵⁴ These include the Mobile Phone Partnership Initiative (MPPI), Partnership for Action on Computing Equipment (PACE), and Asia-Pacific Regional Inception Workshop on the Environmentally Sound Management of Electronic and Electrical Waste.

⁵⁵ In the context of “labeling requirements for environmental purposes” (Doha Declaration, paragraph 32(iii)) (Basel convention, 2005)

⁵⁶ See details at http://www.env.go.jp/en/recycle/asian_net/index.html

⁵⁷ <http://www.env.go.jp/press/press.php?serial=9298>

⁵⁸ <http://www.env.go.jp/press/press.php?serial=10684>

Table 9-4: On-going and planned measures in international policy process

	Related Actors	On-going/planned measures	Existing international mechanism
Export / Supply	Producers	EPR	
	Consumer	Guidelines, Labeling/Standards,	ISO*
	Used EEE processors	Guidelines, Standards, Testing, Certification	Basel convention
Import / Demand	Governments	Promoting reuse, Raising transparency of secondhand products flow (Trade statistics and etc.), Capacity building on customs	Basel convention, WTO, 3R initiatives
	Used EEE processors	Testing, certification,	Basel convention
	Consumer	Labeling/Standards	ISO*

Policy discussions in developing countries in Asia

Some developing countries in Asia have developed or started to develop legislation dealing with used EEE recycling and treatment

and the management of second-hand markets. For example, Thailand has developed a draft policy on recycling of used EEE based on EPR (Kojima, 2008). Malaysia is planning to establish a recycling factory for e-waste (Lee et al., 2009). In Viet Nam the Environmental Protection

Law defines producers' responsibility for collecting used EEE, and in the Philippines the government is discussing the responsibility of producers for managing used EEE (Kojima et al. 2007) Finally, China has just issued a new regulation for recycling of used EEE, which defines producers'/importers' responsibilities to pay for the recycling of their products⁵⁹. The EPR-based recycling system in China⁶⁰ and Thailand requires producers/importers to take financial responsibility for the recycling, rather than physical responsibility for collection and treatment (Kojima et al., 2007). Money collected from producers/importers is used to support formal recyclers under the framework of the regulation.

In developing countries such as China and Thailand, used EEE are usually sold as valuables. It does not matter if used EEE is reusable or non-reusable, consumers expect to receive payment from collectors. When products are reusable, they will be sold in the second-hand market, if needed after having been repaired and/or refurbished. If used EEE is non-reusable, it will be recycled. However, formal recyclers, which must invest in environmental protection equipment, have higher costs than informal actors and therefore have difficulty in competing, especially with those informal recyclers that have environmentally-harmful operations. Thus, to avoid used EEE being sold to informal recyclers at the expense of environmental and health conditions, governments must provide financial support for formal activities. This will help ensure that used end-of-life EEE, including imported second-hand EEE, are sold to formal recyclers and are properly recycled and disposed.

China offers a successful example of managing the second-hand market. China has tried to develop a policy approach to promote a legal second-hand market and management system involving many different actors. In new regulations for recycling used EEE, the Chinese Government has developed standards for second-hand appliances and defined responsible actors to manage second-hand appliances. In addition, the Ministry of Environmental Protection is preparing reuse assurance systems, which include technical checkups, classification, labeling and quality assurance of reused components (J. Yang et al. 2007). There is also a business association of second-hand products that has established a China Second-Hand website under the authorization of the National Development and Reform Commission (NDRC). This website disseminates information on products, second-hand firms and related policies, among other things⁶¹.

Approaches towards improved second-hand EEE trade and the possibility of applying EPR to traded second-hand EEE

As we have shown, many people are benefiting from the on-going international trade of second-hand EEE in Asia, both in exporting and importing countries. However, we have also discussed the many problems related with this trade and shown that the current policy response is insufficient

⁵⁹ See at http://www.gov.cn/zwgk/2009-03/04/content_1250419.htm

⁶⁰ See at http://www.gov.cn/zwgk/2009-03/04/content_1250419.htm

⁶¹ See at <http://www.crgta.org.cn/>

and cannot tackle these problems adequately. We believe that further policy development – in order to be effective – needs to be able to take both the benefits and the problems into account, including a careful consideration of who reaps the benefits and who bears the burdens.

Our analysis leads us to believe that the first step of the trade chain is very important. If households in developed countries hand over their used EEE to appropriate and responsible collectors, this will reduce the risk that these items will be improperly treated. To make this happen, it is important that households understand the hazards related to inappropriate recycling in developing countries, can easily identify appropriate collection routes, and have incentives to dispose of their used items through these routes. The last of these three points is perhaps the most important. However, the current collection system in Japan provides incentives for households to dispose of end-of-life EEE through inappropriate routes rather than returning these items to the producers for recycling. This counteracts the purpose of the EPR-based recycling law and increases the amount of end-of-life EEE handled by the informal sector.

In our view, the existence of informal actors in exporting countries is one of the biggest causes of the problems related with international trade in second-hand EEE. These collectors and traders are operating without any formal qualifications and in many cases outside of the law or in a legal grey-zone. They engage in smuggling and disguised waste trade related with profitable but hazardous recycling and waste disposal. In importing countries, informal collectors are also a cause of concern. Even if imported second-hand

EEE is traded legally, handled by responsible actors, and used beneficially by consumers, once such items reach their end-of-life, they are likely to be collected by informal actors and recycled improperly. This is because developing countries generally lack formal collection systems and appropriate recycling capacities.

Based on the discussions in this paper, we recommend the development of policies that encourage consumers not to hand over used EEE to informal collectors. Such policy development is needed in both developed and developing countries. To develop more complete policy frameworks to deal with the problems related to second-hand trade, we recommend the following: (i) strengthen the prevention of smuggling and disguised waste trade, (ii) establish formal recycling systems for end-of-life EEE in developing countries, (iii) step up efforts to stop the harmful activities of informal actors and, if possible, include these actors in formalized systems that generate minimum hazards, (iv) a lead role for governments in defining roles and responsibilities of different actors involved in the trade chains of used EEE and in providing appropriate incentives and tools for these actors to follow their respective roles, and (v) explore possibilities to extend the responsibilities of producers or other suitable actors to cover end-of-life treatment.

When taking these measures, we believe that the following two points need to be kept in mind: (a) governments in both developed and developing countries need to be involved in the development of workable solutions, but their capacity to implement appropriate measures differ and international collaboration is absolutely

necessary, and (b) the situation of those actors who are currently earning their livelihoods from the second-hand trade needs to be considered when new policies are developed and implemented.

Preventing smuggling and disguised waste trade in both developed and developing countries

Current policy responses focus on increased efforts to prevent smuggling and disguised trade, as well as stricter control of informal actors. To help promote further efforts in this area, there is a need to address the difficulty of distinguishing reusable items from non-reusable ones. Actors involved in the trade require clear guidelines to identify what items are non-reusable and should be recycled and what items could be beneficially reused. As described above, the need for clear standards on how to distinguish between reusable and non-reusable EEE is frequently discussed in international policy processes such as meetings related to the Basel Convention.

The Japanese Government has developed its own guidelines that consider both domestic market conditions and the situation abroad. However, these guidelines are mainly intended to help households and retailers decide whether an end-of-life item is suitable for reuse or for recycling. They have no legally binding status and are not intended to be used by customs inspectors. Currently, the role of Japanese customs inspectors is basically to assure that shipments of used EEE do not violate the rules of the Basel Convention, i.e. that the items shipped are not “waste”. This leaves room for the export of used EEE items with very short remaining technical lifespans or for which there is no demand, except

from the informal recycling sector.

Some importing countries have developed legally binding criteria regulating which second-hand EEE are allowed to be imported. However, lack of financial resources and skilled manpower makes it difficult for these countries to enforce such rules. The low salaries typically paid to public servants and lack of awareness and motivation makes the control system vulnerable to corruption.

Against this background, we recommend that each country should try to develop national standards on imported second-hand EEE, taking into consideration the economic and social situation in the respective country. However it would be beneficial if these efforts are coordinated at the international level so that a certain degree of harmonization can be achieved. To make the implementation of such standards possible, given the limited enforcement capacity of developing countries, we believe that there needs to be an internationally binding agreement which mandates exporting countries to respect the import restrictions of receiving countries. In the absence of such an agreement, we recommend that developed countries unilaterally introduce such systems. In practice, this would imply that instructions to customs officers need to be revised. Such measures have already been discussed among Japanese policymakers.

Promoting formal recycling systems for end-of-life EEE in developing countries

It is clear that developing countries need to develop appropriate recycling systems for end-of-life EEE, mainly to treat growing amounts of domestically generated e-waste, along with

imported second-hand EEE from developed countries. At the same time, improving recycling capacities will significantly reduce some of the negative impacts of second-hand trade and thereby also reduce the significance of some of the arguments against this trade.

However, establishing environmentally-sound recycling systems is a complex and challenging task. It will take a long time to develop appropriate systems to collect and treat e-waste and to create effective markets for the recovered materials. The existence of established informal collection and treatment systems, operating with very low costs, adds to the challenge. We believe that three different approaches should be taken in parallel: (i) facilitate the development of a formal recycling industry that complies with high environmental standards, (ii) increase efforts to reduce or eliminate unsafe and polluting recycling practices, and (iii) facilitate the transition of informal actors into the formal sector.

Various forms of governmental activities are necessary. For example, support for a recycling industry can take the form of subsidies, waste-collection campaigns, training, and support of joint ventures with foreign companies. Reduction of unsound recycling practices may require measures such as increased inspections, harder punishments for illegal activities and efforts to reduce the inflow of e-waste to regions with widespread informal recycling. Upgrading informal operations is likely to be a challenge and more research and practical experiments are needed to better understand how to provide incentives for these family businesses and small-scale entrepreneurs to change their practices. There is potential for such measures as building

clusters of small informal recycling businesses (J. Yang et al. 2007) and establishing microfinance schemes to make it easier for these actors to access proper technologies (Widmer et al. 2005). However, the illegal status of many of informal businesses makes it difficult for public authorities to engage them and work with them as partners.

Large investments are needed, not only in technical equipment but also in public awareness, human capital, regulatory systems and other institutions. Funding is a crucial issue since the governments of developing countries have very limited resources and huge needs in many other areas. Support from developed countries is therefore needed in order to achieve a rapid elimination of existing harmful recycling practices.

Developing policies that assign clear roles and responsibilities to all key actors handling used EEE in developing countries

Although increased efforts are being made to make improper transboundary shipments illegal and to enforce these regulations, and although the capacity for proper treatment of end-of-life electronics in developing countries is improved, there will still be a need to regulate the markets for used EEE. Effective regulation would clearly define the roles and responsibilities of key players involved in the trade and repair of these items. In addition, it would provide proper incentives for actors and tools for helping actors making appropriate decisions.

The following points give an idea about what roles and responsibilities different actors involved in trade and repair could have and examples of

what measures might be needed to make the second-hand market work as intended:

- ✓ Importers and brokers should be required to sell imported second-hand items only to proper repairers and retailers in the second-hand market. This would require a certification system that would make it possible to identify proper actors in the second-hand market.
- ✓ Repairers and retailers should provide good quality second-hand items that are safe to use and that have a reasonably long expected technical lifespan. This might require a labeling system for quality-approved second-hand products. Technical guidelines and training might contribute positively. Warranty schemes for repaired products could also be beneficial. In addition, a certification system for repairers and retailers is likely to have positive effects on product quality.
- ✓ Repair businesses should generate only very low environmental impacts, dispose their waste (including hazardous waste) through appropriate routes and in a way that is safe for repairers. Strict environmental and health standards should be required, but enforcement could be a problem. Training and awareness raising could have positive effects. Establishment of good waste collection systems in areas where repair shops are located would be needed.
- ✓ Consumers should be required to dispose of end-of-life second-hand EEE to good recycling and treatment facilities. To make customers take this responsibility, there might be a need for economic incentives, such as deposit-refund systems. A convenient collection system is also needed,

where consumers can easily get rid of their unwanted EEE. A system that makes it possible for consumers to identify reliable collectors, who in turn will pass the products to appropriate recycling companies, might also be needed.

Applying EPR to the trade of second-hand EEE

Dealing with all the problems related with the current trade in used EEE will be complicated and costly. It is therefore relevant to ask how the actors involved in the life-cycle of these products can contribute to solving these problems, as well as who will benefit from producing, selling, using or trading the products. EPR-based legislation currently requires producers to share the burden only of recycling and waste treatment of products discarded domestically, but the same principle could be used for second-hand products shipped abroad.

In the current EPR system in Japan, which has a loophole that allows used products to leave the country, producers do not have to carry the full financial cost of end-of-life treatment of their products. This has two serious consequences. First, producers relieve public authorities in Japan of the financial burden associated with end-of-life treatment, while they make no contribution towards supporting the treatment of their products in developing countries, where significant amounts of second-hand products end up and eventually become waste. Second, economic incentives for producers to redesign their products are seriously weakened. If producers would have to pay the full cost for treating all their products and not just a share of those products, the incentives to design for

easy recycling and materials recovery would be stronger.

In theory, extending producers' responsibility to also cover products that have been shipped abroad as second-hand thus makes sense, but it might be difficult to implement in practice. Under a system that promotes individual producer responsibility (where each producer is responsible for their own products), this could be especially problematic. One such problem is identifying the producer under such a scheme. In developing countries second-hand EEE are often repaired using parts from different makers. This makes it difficult to determine which company is actually the producer once a piece of equipment finally reaches its end-of-life. A related problem is the existence of counterfeit products.

In addition, if an importing country does not have any EPR system in place for electronic products in general, it would be difficult to introduce such a system only for those items that have been imported as second-hand goods. This is currently the case in most developing countries in Asia.

An alternative approach could be to establish a system based on collective responsibility, where an exporting country provides financial support for the appropriate management of used EEE in the importing countries. The financing could be based on fees from producers, which would be in line with the EPR principle. Under such a system, the fees to be paid by each producer could be based either on domestic market shares or on statistical samples of export shipments. This kind of collective cost-sharing system has been suggested before by, for example, Hotta et al. (2008). Yoshino (2008) proposed a similar

collective system, named Extended Exporter Responsibility, in which exporters would pay a special fee that would be used for improving the management of used EEE in importing countries. Under these two collective systems, the government of the exporting country would provide money to the importing countries based on trade statistics. Thus, a requirement for these systems is an improvement in internationally standardized trade statistics. Another challenge for such systems is the widespread practice of re-export from importing countries to third countries.

Conclusion

It is clear that the current export of second-hand electronics from Japan, and the associated disguised waste trade and smuggling, are causing a number of problems. It is also clear that the import of used electronic items can bring benefits to developing countries. Ideally, one would like to find a way to keep these benefits while eliminating the related problems. However, the discussion in this chapter has shown the complexity of this issue and made clear that there is no easy solution. Any attempt to develop solutions to second-hand trade needs to deal with trade-offs and conflicts over how those trade-offs should be settled.

We believe that the national governments of Japan and the importing countries need to take the lead in developing a better governance structure which can keep at least some of the benefits of the second-hand trade while reducing the negative impacts to a minimum. However, although we think that the governments have a major role to play in this process, a number

of other actors need to be involved. Moreover, the development of an improved regional governance structure needs to be transparent and inclusive so that it can build trust and ownership.

The chapter has shown that the current outflow of second-hand EEE reduces the effectiveness of the Japanese EPR system, since producers are not held responsible for the end-of-life treatment of all their products. As a result, the system provides weak incentives for product redesign and places the financial burden of assuring environmentally-sound end-of-life treatment on local governments in developing countries. We conclude that reforming this system is badly needed. In the final section of the chapter, we have outlined some key elements on which such a reform could be based.

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10. International Resource Recycling System to Manage E-waste in the Asia-Pacific Region: The Case of Fuji Xerox⁶²

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Summary

In the first part of the chapter, the authors briefly review progress of different research initiatives on electronic waste or “e-waste”. In the second part, they discuss a transboundary system for the 3R (Reduce, Reuse and Recycle) management of electronic waste. The authors maintain that there are several important factors that lead to the successful development of a transboundary system. The factors are economic, technological, and institutional. Based on the case of Fuji Xerox where a transboundary system was built to reuse and recycle used photocopy components, this chapter addresses some of the factors, as well as some of the major drivers and hindrances, in the development of the system.

Background

Research initiatives on electronic waste

Electronic waste, or “e-waste”, is increasingly recognized as a serious environmental issue. The growing use of electrical and electronic equipment, both in the developed and developing countries, has resulted in increased generation of discarded electric and electronic

⁶² This paper was presented at the IEEE International Symposium on Electronics & the Environment in San Francisco in May 2008 and Electronics Goes Green 2008+ conference in Berlin in September 2008. The authors made minor modifications based on the comments received from the Institute for Global Environmental Strategies (IGES). They submit this paper for publication to encourage further discussion on designing an efficient and effective e-waste management scheme in the Asia Pacific region, as well as the private sector involvement in this scheme.

equipment. Large volumes of e-waste are dumped in municipal landfills or simply in dump sites, together with industrial or household wastes. Some components of e-waste are highly hazardous and toxic. They can cause health problems among people living near landfills and localized environmental degradation. However, some components of e-waste are made of highly valuable material. Thus, recycling, both authorized and unauthorized, offers a good business opportunity in developed and developing countries.

As concerns about the negative aspects of e-waste have increased over the past years, interest in researching e-waste has also grown substantially. Several research initiatives have focused on specific countries, such as China (Hicks et al. 2005), Korea (Jae-chun Teak Lee et al. 2007), Nigeria (Osibanjo and Nnorom 2007) and India (Ramachandra et al. 2004). In addition, there are numerous studies demonstrating the hazardous and toxic aspects of e-waste. Among others is a study presented by two US-based NGOs – the Basel Action Network and the Silicon Valley Toxics Coalition. In the publication, titled “Exporting Harm: The High-Tech Trashing of Asia”, they discuss the serious human health impacts of waste generated from the electronics industry (Basel Action Network 2002). In the same year,

Zada Lipman published an article on the negative consequences of e-waste trading in the Harvard International Review, titled “A dirty dilemma: the hazardous waste trade” (Lipman 2002).

Other research has involved analyzing e-waste issues from a global perspective (Widmer et al. 2005) and conducting comparative analyses between countries. As an example of the latter, a research group at the University of St. Gallen in Switzerland presented a comparative analysis of e-waste disposal and recycling in India, South Africa and China (Widmer et al. 2005, Sinha-Khetriwal et al. 2005).⁶³

To bring even more international attention to e-waste issues, the United Nations University (UNU) supported a research program on e-waste called the StEP Initiative. The UN accommodated the secretariat of the program in its office in Bonn.⁶⁴ Further, the United Nations Environmental Program (UNEP), as the facilitator of the Basel Convention of the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, has been continuously instrumental in setting the agenda for how to address the e-waste issue in international negotiations (United Nations Environmental Program 2005).^{65 66}

⁶³ The research initiatives are facilitated and implemented by SECO (Swiss State Secretariat for Economic Affairs) and EMPA (Swiss Federation Laboratories for Materials Testing and Research).

⁶⁴ <http://www.step-initiative.org/>.

⁶⁵ The transboundary movement of e-waste is regulated under the Basel Convention of the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. The Convention was adopted in 1989. Some e-waste is considered to present risk to human health and the environment. They are classified as “hazardous waste” and contained in the List A of Annex VIII of the Convention as items of hazardous waste.

⁶⁶ Apart from the Basel Convention, there are regulatory initiatives to control the environmental as well as human health risks of e-waste, such as the European Union’s Directive on Waste Electrical and Electronic Equipment (2002/96/EC) and the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations (RoHS Regulations). This paper does not elaborate on these regulations since many papers have already discussed them.

Electronic waste and Extended Producer Responsibility (EPR)

The Organization of Economic and Development Co-operation (OECD) defines extended producer responsibility (EPR) as “an environmental policy approach in which a producer’s responsibility for a product is extended to the post consumer stage of the product’s life cycle, including its final disposal” (OECD 2001). Lindhqvist, who heeded special attention to the concept before others, articulated it more clearly by defining it as “an environmental protection strategy to reach an environmental objective of a decreased total impact from a product, by making the manufacturer of the product responsible for the entire life cycle of the product and especially for the take back, recycling and final disposal of the product” (Lindhqvist 2000).

As it applies to e-waste, EPR is a concept that acknowledges the responsibility of electrical and electronics companies in the disposal stage of their products. There are several cases where the concept of EPR is being applied to e-waste disposal. One of the first cases is the Swiss take-back and recycling system in Switzerland. Under this system, there are two producer responsibility organizations. One of these is the Swiss Association for Information, Communications and Organization Technology (SWICO), which is responsible for recycling office electronics, IT equipments and consumer electronics. The other is the Swiss Foundation for Waste Management (S.EN.S), which is responsible for household appliances and electrical and electronic toys. The Swiss system offers take-

back and recycling financed by advanced recycling fees paid by consumers when buying the products. Particularly noteworthy about the system is that it is product-based rather than brand-based (Hischier 2005, Sinha-Khetriwal et al. 2005). This approach is more effective since it ensures the collection of e-waste produced from different companies and secures a large volume of e-wastes necessary for the system to become economical and sustainable.

Another case is the Japanese Home Appliance Law passed in 2001. Under the law, Japanese consumers are required to pay a recycling fee when disposing of four appliances: 2,700 yen (US\$25) for a television, 4,600 yen (US\$42) for a refrigerator, 2,400 yen (US\$22) for a washing machine and 3,500 (US\$32) yen for an air-conditioner. There are some similarities with the Swiss system in that the take-back and recycling scheme is partly financed by recycling fees charged to consumers. Under the Japanese system, however, each producer is independently responsible for operating or outsourcing treatment of used electronic products to recycling facilities. In this regard, the Japanese system is not as holistic as the Swiss approach. However, such an approach helps to secure a high collection rate, as well as the necessary budget for end-of-life electronic products to be utilized for reuse and recycling.⁶⁷

⁶⁷ For the details of the system, see, for example, a document published by Ministry of Economy, Trade and Industry (METI) titled “Law for recycling of specific kinds of home appliance”. This document is available at http://www.meti.go.jp/policy/kaden_recycle/en_cha/pdf/english.pdf.

Transboundary collection of electronic waste for encouraging reuse and recycling

The above-mentioned country studies on India, China, South Africa and Nigeria illustrate some of the obstacles of taking an EPR approach for the disposal of used electronic products in developing countries. These studies indicate that there are many obstacles, including economic, technological or institutional. The institutional obstacles can be an absence of a regulatory culture or weak government policies/regulations concerning waste management and recycling. Another institutional obstacle might include a lack of societal value placed on recycling, which leads to little or no pressure on the public and private sectors to deal with e-waste issues. In many developing countries, these obstacles are intertwined. As a result, the vast majority of electronic waste is discarded in dump sites or collected by scavengers, both of which can be unsafe to human health and the environment.

One obstacle that requires special attention is the relatively small quantity of used electronic components that are disposed in developing countries. Apart from a few exceptions, such as China and India, there is simply not enough e-waste generated in most countries to make the introduction of a recycling facility economical. To develop a system similar to the above-mentioned Swiss or Japanese systems, it is essential to secure some volume of e-waste to allow a facility to be profitable. One realistic approach to overcome this obstacle is to collect electronic wastes from neighboring countries and cope with them jointly.

There are several empirical studies that support this approach. A study by Van Beukering and Van den Bergh on international recycling between developed and developing countries concludes that cross-boundary recycling is mainly driven by regional differences in the quantity and quality of factor endowments and the economic efficiency of recycling (Van Beukering and Van den Bergh 2006). This study maintains that international trade of recycling materials allows countries with different comparative advantages to bring about a more efficient allocation of resources. The result of another empirical study by Van Beukering indicates that countries that have actively participated in trade of recyclables have higher recycling rates than those with closed recycling systems (Van Beukering 2001). Some e-waste experts also stress this point. Kojima stated in the 3R South Asia Expert Workshop that a recycling facility requires a certain volume of e-waste and it is difficult to collect enough volume of e-waste in a small country (Kojima 2006).⁶⁸

Apart from the necessity of securing a large quantity of used electronic components, the fact that electronic products are often produced in one country and consumed in another adds a convincing argument for developing cross-boundary 3R operations. For example, electronic products produced in Malaysia are consumed in Australia and vice versa. Under such circumstances, a solution for dealing effectively

⁶⁸ In fact, this is one of the main reasons why OECD countries were hesitant to introduce a ban on trade in hazardous waste from OECD countries to non-OECD countries. According to Johnstone et. al., the OECD countries “felt that a ban on trade in recyclables, in particular, would be counter-productive”. In 1994, the Parties to the Basel Convention agreed to introduce such a ban, while the decision was not ratified yet as of February 2008 (Johnstone, N., 1998).

with e-waste requires close cooperation between countries and across borders.

Fuji Xerox's international resource recycling system (IRRS) offers a case where the collection of used electronic components, as well as the distribution of recycled components, takes place across borders. The following sections illustrate that cross-border solutions can be effective to handle e-waste in countries where proper disposal or recycling of electronic wastes is not possible due to existing economic, technological and institutional obstacles.

Fuji Xerox's International Resource Recycling System

Initiatives started first domestically in Japan

Fuji Xerox was established in 1962 as a joint venture of Xerox Corporation in the U.S. and

Fuji Photo Film in Japan, with the purpose of manufacturing printers and copiers for Japan and other markets in the Asia-Pacific region. In 2001, it was consolidated to Fuji Photo Film Group, with an equity ownership of 75% by Fuji Photo Film and 25% by Xerox Corporation. Despite high competition in the market, the company has continuously stressed that it will seek to improve not only financial performance, but also its social and environmental performance as demanded by society. Based on this idea, the company developed an integrated resource recycling system in Japan in 1995 to manage their end-of-life products and to encourage efficient use of resources. It positioned its 3R initiatives as part of an EPR system. Figure 10-1 offers a conceptual diagram of the system.

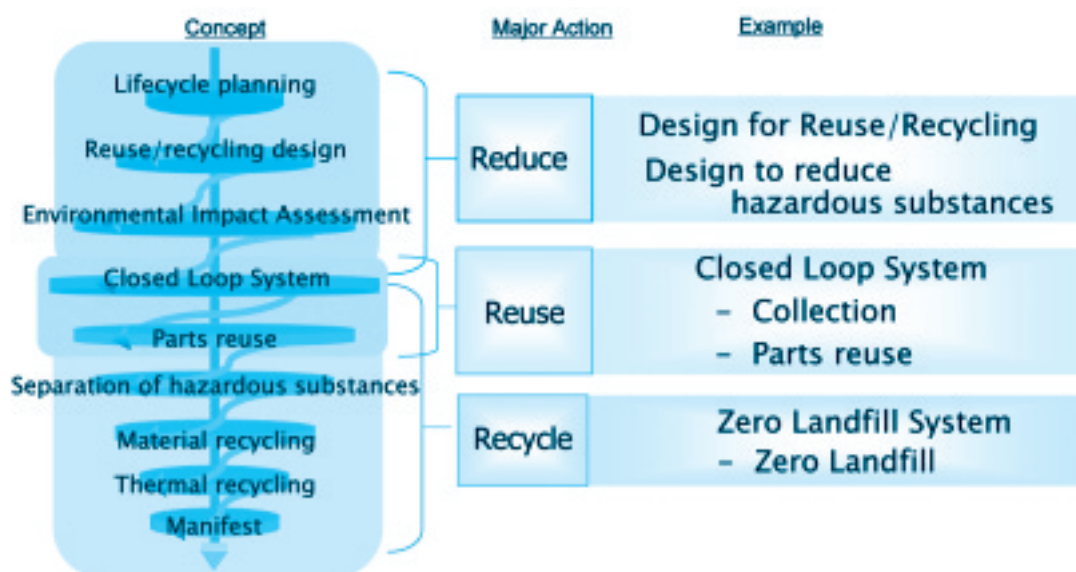


Figure 10-1: Conceptual diagram of Fuji Xerox's integrated resource recycling system

This system is grounded in a closed loop manufacturing system. The primary objective of the system is to restrict the input of fresh resources and reuse existing useable parts. At the heart of the closed loop supply chain at Fuji Xerox is “inverse manufacturing” and “zero waste”. The essence of inverse manufacturing is to develop design processes to reduce hazardous substances and to improve reuse/recycle effectiveness. Zero-waste is possible through processes that collect end-of-life products, separate used parts for reuse/recycling, inspect and recondition reused parts, supply parts to recycling partners, and perform manifests.

Based on such a system, Fuji Xerox has collected used products from the market to reuse or recycle the parts and components from these products. The collected products are disassembled, cleaned, and screened for reuse as parts of new products under the strict criteria of the company in Japan.⁶⁹ Through these efforts, the company has achieved “zero landfill”, meaning that all used materials are reused or recycled under the integrated resource recycling system in Japan.

After achieving this success in Japan, corporate managers at Fuji Xerox then turned to the next challenge – transferring this success to the rest of the Asia-Pacific region. As the markets grew in the region in the late 1990s, the company’s sales also increased substantially in the region. Subsequently, the company came to realize the necessity of expanding the application of their EPR system to include countries in the region.

However, from the beginning it did not seem feasible to develop a closed loop system in each country. Since the quantity of used electronic

products and components generated in each country was too small, it did not make economic sense. Instead, their approach was to build a cross-boundary network in nine countries in the region and establish a centralized recycling facility in Thailand. The company named this transboundary network the International Resource Recycling System (IRRS).

Initiatives expanded to the Asia-Pacific region

In 2004, Fuji Xerox established a centralized recycling facility in Thailand. The facility works with sixteen recycling companies in the Asia-Pacific region, including Japan. Thailand was chosen because of its advantageous location in the region, as well as the availability of recycling companies that could carry out most of the recycling apart from hazardous substances.

The used products and cartridges are shipped from Fuji Xerox’s sales companies in the region to the facility in Thailand. There, they are disassembled and classified into seventy categories, including iron, aluminum, lens, glass and copper, before being delivered to recycling companies in the region. The company introduced a tracking system to ensure no illegal dumping. By 2007, the company has recovered around 55,000 units of used products. Figure 10-2 illustrates the IRRS.

⁶⁹ The information about products and material during the process are collected in a central database and analyzed by a research and development division. Feedback is provided to a design team so that it can modify and improve products or components, making it easy for reuse and suitable for recycling –, the typical process in inverse manufacturing

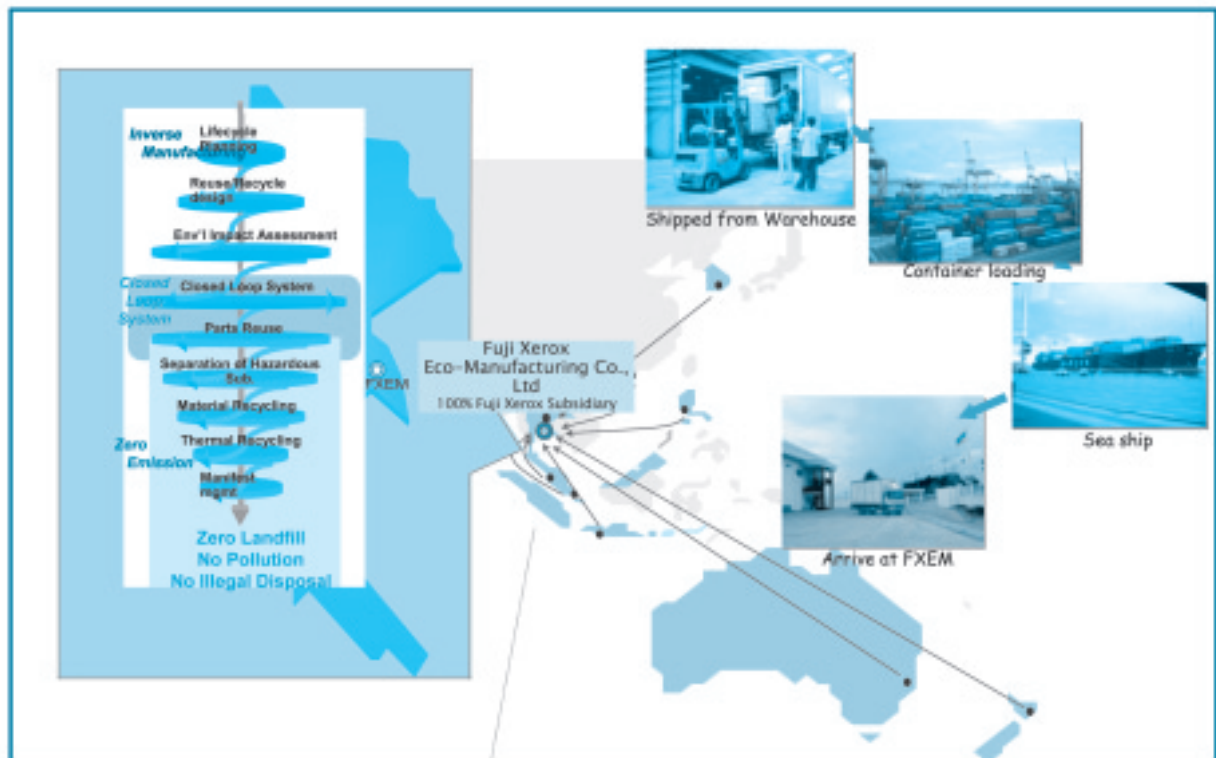


Figure 10-2: Image of Fuji Xerox's IRRS

Initially, the Thai Government did not favor the plan. In order to obtain permission to build the facility in the country, Fuji Xerox had to provide a high level of commitment and proof to the Thai Government that the recycling facility will conduct recycling operations successfully without bringing environmental damage to the community. In addition, since used photocopy products and cartridges are classified as hazardous waste by some countries, their export requires special attention under the Basel Convention.⁷⁰ Therefore, company managers had to work not only with the Thai Government, but also with the governments of the exporting countries to establish the IRRS.

The IRRS facility in Thailand handles most of the reuse and recycling processes. An exception is hazardous waste generated during the processes. This waste is sent to Japan for proper treatment. According to the company, the facility recovers 84% as material for recycling and 15.4% as thermal energy and generates only 0.6% of waste for landfilling or incineration.

The rate for thermal energy is high compared to the 11.1% achieved at the company's operations in Japan. The recovery rate of plastics is 16.9%, much higher than the 3.2% accomplished in the company's operations in Japan. This is because of

⁷⁰ There are significant differences as to the interpretation of hazardous waste under the Basel Convention among companies. For example, used photocopy products are recognized as hazardous waste by Australia, New Zealand, Malaysia, Singapore and Thailand, while they are not by Korea, Indonesia, Philippines and Hong Kong. Used cartridges are not classified as hazardous waste with an exception of Thailand.

the lower labor costs in Thailand, which makes it possible to conduct disassembling of plastics on a manual basis.

The main characteristics of the IRRS are summarized as follows:

- It is rooted in cooperation with nine Asian-Pacific countries. It facilitates recovery and disassembly of the used products over the border;
- The system has set a target for “zero landfill” by improving the recycling rate. It also minimizes environmental impacts of processes by recovering and shipping hazardous components for proper treatment to Japan. It helps the host country (Thailand) to reduce waste, while creating a new industrial opportunity for the country;
- The collection of used components from the nine countries in the region helps to increase productivity through economies of scale.

One challenge for Fuji Xerox is the low collection rate of used photocopy components. In Japan, the collection rate has been as high as 96% for direct sales of its products and as high as 82% for sales through separate sales agencies. According to the company, the current collection rate in the Asia-Pacific region is around 50%. However, it varies from one country to another. For example, the collection rate has been relatively high in Korea, but relatively low in Indonesia. This is a major concern for the company since continuous success of the system depends on the quantity of the collected electronic components.

Conclusion

This paper described the concepts and practices of Fuji Xerox’s international resource recycling system. The authors concluded that the idea to transport used photocopy components across borders was important to encourage the 3Rs of electronic waste in the Asia-Pacific region. From an economic and financial perspective, it was essential to guarantee a high volume of inputs to make some economic sense. A lesson learned from this case is that implementation of a 3R initiative such as the IRRS requires a strong commitment of a company, as well as persistence to negotiate with relevant governments to exercise the EPR concept. Another key factor is the leadership of key managers within the company.

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