Extended Producer Responsibility Policy in East Asia

- in Consideration of International Resource Circulation-

Edited by
Yasuhiko Hotta
Shiko Hayashi
Magnus Bengtsson
Hideyuki Mori

IGES
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With editorial support by Jeffrey Bowyer

This publication is based on a project “Heisei 20 nendo Ajia Shigen Junken Kenkyu Suishin Jigyou (FY 2008 Asia Resource Circulation Research Promotion Project)” funded by Ministry of the Environment, Japan in Fiscal Year 2008.

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List of Acronyms

3R	reduce, reuse, recycle
AC	air conditioner
ADB	Asian Development Bank
ADF	advanced disposal fees
ATFs	authorized treatment facilities
AEE	Association of Electronics Environment (Korea)
AEHA	Association for Electric Home Appliances (Japan)
BFRs	brominated flame retardants
CE	Circular Economy
CEPL	Circular Economy Promotion Law (China)
CFCs	chlorofluorocarbons
CPCB	Central Pollution Control Board (India)
CPRA	Containers and Packaging Recycling Association (Japan)
CRT	cathode ray tube
CSR	corporate social responsibility
DfE	Design for Environment
DSD	Duales System Dueatschland
DTAC	Total Access Communication Company
DTU	Danish Technical University
EC	European Commission
ECF	elementally chlorine-free
ECOPROFIT	Ecological Project For Integrated Environmental Technology (Austria)
EEE	electrical and electronic equipment
EIA	environmental impact assessment
EIPRO	Environment Impact of Products
ELVs	end-of-life vehicles
EM	ecological modernization
EMPA	Swiss Federation Laboratories for Materials Testing and Research
EMS	environmental management system
ENVICO	The Korea Environment and Resources Corporation
EPA	Environmental Protection Administration (Taiwan)
EPR	extended producer responsibility
EU	European Union

FLMS	Fundamental Law for Establishing a Sound Material-Cycle Society (Japan)
FRRC	Fee Rate Reviewing Committee (Taiwan)
FTAs	free trade agreements
G8	Group of Eight
GDP	gross domestic product
GTZ	German Technical Cooperation
IDE-JETRO	Institute of Developing Economies, Japan External Trade Organization
HS	Harmonized Commodity Description and Coding System
IPR	individual producer responsibility
IGES	Institute for Global Environmental Strategies
IIIEE	International Institute for Industrial Environmental Economics, Lund University
IMPRO	Environmental Improvement of Products
IPP	integrated product policy
IRRS	International Resource Recycling System
ISO	International Organization for Standardization
JEMA	Japan Electrical Manufacturers' Association
JETRO	Japan External Trade Organization
JOGMEC	Japan Oil, Gas and Metals Corporation
KORECO	Korean Recycling Corporation
LCA	life cycle assessment
LCD	liquid crystal display
LCPR	Law for Container and Packaging Recycling (Japan)
LELR	Law for End-of-Life Vehicle Recycling (Japan)
LPER	Law for Promotion of Effective Utilization of Resources (Japan)
LREC	Law on Resource Circulation of Used Electrical and Electronic Equipment and Used Cars (Korea)
LRHA	Law for the Recycling of Specified Kinds of Home Appliances (Japan)
LRSR	Law for Promotion of Resources Saving and Reutilization (Korea)
METI	Ministry of Economy, Trade and Industry, Japan
MII	Ministry of Industry Information (China)
MoEF	Ministry of Environment and Forests (India)
MOEJ	Ministry of Environment of Japan
MRTs	mandatory recycling targets
MSW	municipal solid waste
NDRC	National Development and Reform Commission (China)
NGOs	non-governmental organizations

NIES	National Institute for Environmental Studies (Japan)
NTBs	non-tariff barriers
OECD	Organization for Economic Co-operation and Development
PCD	Pollution Control Department (Thailand)
PC	personal computers
PDR	Producer Deposit Refund
PET	Polyethylene Terephthalate
PR	producer responsibility
PRO	Producer Responsibility Organization
PVC	polyvinylchloride
REACH	Registration Evaluation and Authorization of Chemicals
RFMC	Recycling Fund Management Committee (Taiwan)
RoHS	Restriction of Hazardous Substances
SCP	sustainable consumption and production
SCG	Siam Cement Group (Thailand)
SECO	Swiss State Secretariat for Economic Affairs
SEPA	State Environmental Protection Administration (China)
SMEs	small and medium enterprises
SO2	sulfur dioxide
StEP	Solving the E-waste Problem
TBCSD	Thailand Business Council for Sustainable Development
TEI	Thailand Environment Institute
UN	United Nations
UNEP	United Nations Environment Program
UNDESA	United Nations Department for Economic and Social Affairs
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
USA	United States of America
VITO	Flemish Institute for Technological Research
WEEE	Waste Electrical and Electronic Equipments
WTO	World Trade Organization

Foreword

This report summarizes the current situations and challenges that developing Asia faces in introducing Extended Producer Responsibility (EPR). It also discusses various problems experienced by Japan, Korea and Taiwan after the introduction of EPR mechanisms prior to other Asian countries. It then explores issues related to international resource circulation and domestic recycling mechanisms based on the EPR concept. By doing so, the report will present major issues associated with the adoption and dissemination of EPR-related environmental policies in developing countries. It will also examine opportunities to introduce new policy tools that respond to the growing globalization of environmental issues.

The project to develop this report started with a workshop, titled "Workshop on Extended Producer Responsibility (EPR) and International Material Flow", held in Manila in February 2007. The workshop was co-organized by United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and the Institute for Global Environmental Strategies (IGES). Following the workshop, IGES and the presenters updated information on EPR policies up to March 2009, forming the contents of this report. Some additional chapters were included in order to cover topics that were not well discussed in the workshop. Both the initial workshop and the following editorial work were made through financial support from the Ministry of the Environment of Japan. This report is published as an input into the Regional 3R Forum in Asia[1].

We would like to express our gratitude to the all contributors of the chapters for invaluable inputs and tirelessly works. We owe special thanks to our colleagues to the workshop, especially Mr. Masakazu Ichimura, UNESCAP, for his contributions to the initial proposal to start this research project. We are also grateful from extensive editorial supports provided by Mr. Jeffrey Bowyer. This report would not have been possible without patience and understanding from the contributors during the editing process. Finally, we would like to acknowledge that this publication is based on a project "Heisei 20 nendo Ajia Shigen Junken Kenkyu Suishin Jigyou (FY 2008 Asia Resource Circulation Research Promotion Project)" funded by Ministry of the Environment, Japan in Fiscal Year 2008.

[1] Regional 3R Forum in Asia: A regional collaborative facility to develop multilayered networks of stakeholders such as governments, academia, scientific and research community, private sector, and NGOs for the strategic implementation of the 3Rs, to be inaugurated in 2009.

October 19th, 2009

Integrated Waste Management and Resource Efficiency Project
Institute for Global Environmental Strategies

Section I

Introduction

1. Introduction

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Background and purpose

In developing countries, waste collection is not widely available outside of urban areas. Open burning and dumping of waste in rivers and canals and on unused land are still common methods for waste disposal. Because of a lack of source separation, hazardous waste such as infectious waste and used batteries are usually mixed with municipal solid waste. Furthermore, recyclables and scraps which contain valuable materials are commonly recycled using environmentally unsound methods, such as acid leaching and open burning to extract metals, resulting in serious environmental and health risks. In order to reduce the environmental problems associated with weak waste management and recycling in developing countries, it is necessary to improve policies, raise awareness of stakeholders, and support the introduction of environmentally sound and economically sustainable waste management technologies and systems.

In several developed countries, the policy concept of Extended Producer Responsibility (EPR) has inspired the design of successful waste management legislation. The concept was introduced in order to lessen the financial burden of local governments to collect and treat wastes, especially those that are difficult and costly to treat or recycle in a safe manner. This was achieved by putting the financial responsibility for treatment or recycling on the producers of those products. The EPR approach also creates an incentive for producers to redesign their products so that they can more easily be treated at the end-of-life stage.

Since EPR-based policies have achieved a certain success in increasing recycling rates and reducing landfill disposal, the EPR concept is now attracting a lot of attention from developing countries and countries with economies in transition. Concrete policy discussions on the potential value and feasibility of EPR-based legislation are currently under way in several East Asian and Southeast Asian countries.

This report summarizes some of the experiences gained in EPR implementation with special attention to the challenges related to introducing EPR in developing Asia. The following sections provide a brief presentation of the EPR concept and set the scene for the rest of the report. The structure and key messages of the report are then presented.

Extended Producer Responsibility

EPR is a basic policy principle that promotes the 3Rs (Reduce, Reuse and Recycle) of products with a particular focus on the responsibility of producers. Under an EPR scheme, a producer' s responsibility is extended to cover the post-consumer stage of their products. This forces a producer to not only be concerned with making a product, but also with the appropriate treatment and disposal of the product at the end of its useful life. This means that producers have responsibility for appropriate recycling, as well as final disposal of the product.

The basic idea of EPR was first proposed by Professor Thomas Lindhqvist of Lund University in Sweden at the beginning of the 1990s. Since 1994, the OECD secretariat has initiated a study on EPR with financial support from the Japanese government. Based on the study, an EPR guidance manual for governments was issued by the OECD secretariat in 2001. This EPR guidance manual defines EPR as "an environmental policy approach in which the physical and/or financial responsibility of the producers for their products is extended to the post-consumer stage of the product lifecycle".

Two common features of EPR policy are that: (1) it completely or partially transfers physical and/ or financial responsibility for waste management from local governments to upstream producers; and (2) it gives incentives to producers to incorporate environmental considerations into their product designs. While EPR is intended to reduce the amount of materials going to landfills, it is also aimed at promoting environmental considerations at "upstream" stages, which include product design and material selection. If producers must pay for waste treatment of their products, there is a built-in incentive to make products less wasteful.
In this sense, EPR provides the missing link between policies that promote greener product designs and policies that promote environmentally sound waste management and recycling. Together, such policies can help construct an efficient and economic recycling mechanism.

It is important to point out that EPR is a general policy principle and not a detailed recipe. There are many different ways in which producers' responsibility for their products can be extended and how this responsibility can be imposed. The following two subsections discuss two key points to consider when developing EPR-based policies: who is to be regarded as the producer and what instruments should be used to implement the responsibility. The final subsection illustrates how EPR can be put into practice by describing policies in Germany and Japan.

Defining the producer

Under an EPR program, producers are assumed

to be in the best position for improving products by determining product design and material selection and having access to the most precise information on their product(s). Producers must also exercise strong leadership throughout their product supply chain in order to establish an efficient recycling system and to promote environmentally sound product design (e.g. less wasteful, easy to recycle, and longer product life). However, the identification of the producer is not as straightforward as it might seem.

In the case of durable consumer products, such as home appliances and automobiles, brand owners and/or importers are both eligible to be the "producer" in an EPR program (OECD EPR manual 2001). Importers are subjected to the EPR program in the country where they are operating. However, in the case of packaging products, the filler company is eligible rather than the packaging producing company.

The strong influence of the "producer" to other actors in the product chain is a critical factor to establish an efficient recycling system under an EPR scheme. Transparency and smooth communication among concerned actors are essential.

In developing countries' context, however, the situation is more complex and is often difficult to identify "producers". For example, in developing countries, second-hand products are imported and sometimes repaired and reassembled in order to reuse parts for other products.

Policy instruments for implementation
There are several policy instruments that can be applied to implement an EPR program. They include product take-back requirements; performance standards; economic instruments; and waste disposal regulations.

Product take-back requirements

Producers have responsibility to take back their products in the post-consumer stage. The target of the take-back could be the whole product or a part of the product.

Performance standards

Performance standards determine the extent to which producers are required to recycle their post consumer products. Standards for minimum recycled content, for instance, impose on the producer a minimum rate or amount of recycled materials against the total resource inputs. This standard gives an incentive to producers so that they choose a production process and/or products that are easier to reuse and recycle.

Economic Instruments

There are also economic instruments that are considered effective in implementing EPR. They include deposit/refund schemes, advance disposal fees (ADF) and material taxes.

Deposit/refund schemes involve the consumer paying a deposit when purchasing a product and then receiving a refund of the deposit when returning the post-consumer product, the container, or the packaging. The aim is to facilitate product take-back.

Advance disposal fees (ADF) involve charging

consumers at the point of purchase for the cost of treating and recycling post-consumer products (including the cost for take-back). The collected fees are then used to cover the costs of treatment and recycling. This system can also influence consumers' choices of products because the fees can be explicitly added onto the product's price. This system alone will not achieve EPR because the treatment costs are paid by the consumer. Therefore, it is necessary to impose the physical responsibility onto the producer to ensure that the post-consumer products are properly treated and recycled.

Material taxes are usually imposed on raw materials that have high environmental risks. Therefore, these taxes will encourage a shift to the use of more environmentally-friendly materials. Tax revenues could also be used for the collection, separation, proper treatment, and recycling of the products concerned. Again, in this system, it is essential to impose physical responsibility onto the producer.

In addition to the policies described above, other possible measures to strengthen EPR systems include regulating the disposal of waste (e.g. landfill taxes imposed at a metered rate, stiffer punishments for illegal dumping) and promoting environmentally friendly designs and products through tax benefits and subsidies. Eco-labels and awareness raising can also be implemented to help expand markets for environmentally-friendly products, while the promotion of innovative business models, such as servicizing, can promote toward dematerialized economy.

Examples of EPR policies

Since OECD began its work on EPR in 1994, almost every member country has implemented one or more EPR programs. These programs vary considerably due to a number of factors, such as the difference in the products or waste streams covered, instruments used, and the sharing of responsibilities among the players in the product chain and other stakeholders.

Packaging in Germany

A pioneering EPR system is the Duales System Deutschland (DSD) in Germany. The Packaging Ordinance of 1991 imposed a minimum recycled content requirement for containers and packaging on businesses (e.g manufacturers, distributors) that use containers and packaging. This includes those outside the country that export to Germany.. Businesses that are subject to the ordinance have two choices under this system. The first is to pay commission fees to the DSD company, which was jointly established by a group of target companies. The DSD company then collects and recycles the containers and packaging. The second choice is for businesses to collect and recycle the containers and packaging by themselves using deposit-refund systems. Most of the target businesses have chosen the first option.

DSD issues the license to the contracting businesses for the use of the accreditation label "Der Grüne Punkt" on their containers and packaging. DSD will then only collect and recycle the containers and packaging bearing this label. Containers and packaging that do not have this

label are collected by local governments as a paid service, which encourages participation in the DSD system.

The DSD company is a Producer Responsibility Organization established with participation of the producers concerned in order to carry out efficient collection and treatment of containers and packaging.

Automobiles in Japan

Another example of a successful EPR system was created through the Law for the Recycling of End-of-Life Vehicles (ELVs), enacted in July 2002 in Japan. The law, one of many recycling laws introduced in the country, stipulates appropriate roles to be taken by relevant business entities. Automobile manufacturers and importers (hereinafter referred to as "manufactures") are obliged to collect and recycle (destruct in the case of CFCs) air bags and shredder residues generated in the treatment process of ELVs. In addition, rules were established for collecting and delivering ELVs between collecting companies and shredding companies, thereby ensuring that a recycling network would be established.

Recycling expenses of manufacturers are paid by automobile owners as a recycling fee when they purchase new cars. Those who had already purchased their automobiles before the enforcement of the law are requested to pay the fee prior to their first car inspection. Fund management corporations administer the recycling fee, which is claimed by manufacturers when they recycle/dispose of shredder residues. The recycling fee is decided and announced by the manufacturers, but the government can recommend changes in case the proposed fees are considered too high.

Introduction of EPR policies in developing Asia

In addition to China, Thailand, and India（See Chapters 5, 6 and 7, for details）, Vietnam, Malaysia and Indonesia are also considering the introduction of EPR. Vietnam revised the Environmental Protection Law, which in Article 67 states that "owners of production, business and services establishment shall be responsible for recovering the following expired or discarded products: radioactive sources used in production, business or services; batteries, accumulators: electronic electric equipment for civil and industrial use; lubricants, grease and packages hard to discompose in the nature; drugs and chemicals for industrial, agricultural and aquatic use; medicines for human use; means of transport; tubes and tires and others".

In 2007, Malaysia enacted the Solid Waste and Public Cleansing Management Act (Act 672), which stipulates that the government can place responsibility for the collection of post-consumer products on the manufacturer, assembler, importer, or dealer (Article 102).

In May 2008, Indonesia enacted the Law on Rubbish Management, which applies the principles of EPR. Under article 15 of this law, producers are responsible for managing packages and/or products which are neither biodegradable nor easily discomposed by natural processes. The government is still considering applying EPR to packaging waste, e-waste and others.

In this context, it is useful to share lessons and experiences among Asian countries on the possibilities, the challenges and the preconditions for applying EPR to some specific wastes.

Outline of the report and key messages

The first section of the report analyses the achievements made and major challenges faced in the EU, Japan, Korea and Taiwan, all of which have had EPR-based policies in place for several years. The second section reviews the current situation and the most recent policy discussions on EPR in China, India and Thailand. The third section looks at EPR from a regional perspective and discusses challenges brought about by increasing international trade. It also includes an example of a private company which has voluntarily established a regional system for end-of-life treatment of its products. A concluding chapter briefly summarizes the key findings of the report, provides some recommendations for policy makers, and identifies a number of topics for further research.

The report highlights the importance of increasing international trade in used and end-of-life products and recyclable materials. It shows that this international trade may undermine effective implementation of national EPR systems and weaken national legislation. The report indicates that national EPR regulations may have even contributed to increasing international trade by making domestic treatment more costly. It is concluded that in order for national legislation to be effective, EPR-based regulations need to be supported by complementary policies.

Another main topic of the report is the applicability of EPR to developing countries. EPR regulations require institutional infrastructure for registration, reporting, and collection of fees, as well as adequate enforcement capacity. Experiences of introducing EPR in developed countries, such as the EU directive on waste electronic and electrical equipment, clearly show that this process is complex, challenging and time-consuming. The report presents experiences of developing Asian countries and discusses how the EPR concept could be made applicable to social, economic and cultural conditions of these countries.

Finally, the report shows that EPR may have different meanings to different countries and could be implemented in a multitude of ways. The chapters analyzing EPR-based legislation in Japan, Korea and Taiwan and the chapters on China, India and Thailand make this point very clear. It is concluded that there is no single right interpretation of the EPR principle. Indeed, the way to implement EPR needs to be carefully adapted to the situation in each country.

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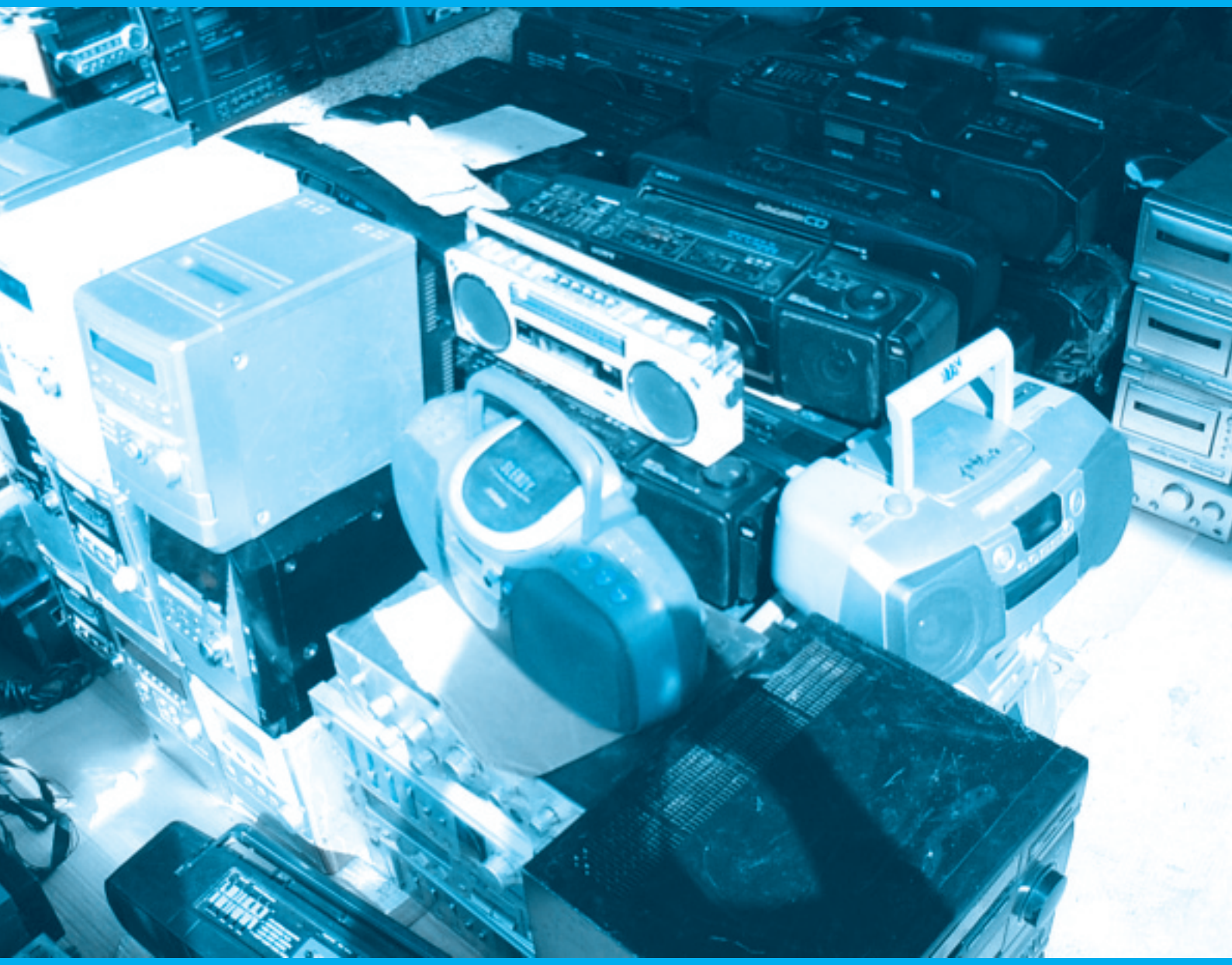
Section II

EPR Policies in Developed Countries



2. Application of EPR to Recycling Policies in Japan, Korea and Taiwan

Sung-Woo Chung
Rie Murakami-Suzuki
Michikazu Kojima

Introduction

The idea of making manufacturers play a significant role in the after-use stage of products dates back to the early 1970s. At that time, municipalities in Japan began arguing that producers of products such as plastics, home appliances and tires should be responsible for the after-use stage. These products were called "tekisei-shori-konnanbutsu", which means "goods difficult to be treated properly". The primary argument for making producers responsible for these products was the higher cost for municipalities to treat them. The Advisory Council of Tokyo's Metropolitan Government on Waste Management seriously discussed the concept of "tekisei-shori-konnanbutsu" intensively from 1973-74.

In response, producers formulated industrial associations to help ensure proper recycling. These associations promoted the development of recycling technologies and pilot collection programs. Municipalities also began to invest in new facilities to treat wastes more effectively. However, the responsibilities of producers were not clearly defined in formal regulations by central government and municipalities in the 1970s.

It was not until the 1990s that the term of *Extended Producer Responsibility* (EPR) was widely discussed as a governmental policy principle. In 1994, the Organization for Economic Co-operation and Development (OECD), as a leading international organization, embarked on a project to conceptualize EPR on the policy level. In 2001, OECD published a governmental manual that introduced EPR to OECD member governments as a potential policy alternative for waste management. The concept of EPR suggested by OECD had two significant features: 1) shifting of responsibility from municipalities to manufacturers; and 2) providing incentives to manufacturers to undertake Design for Environment (DfE), which involves integrating environmental considerations into product design and development[2] (OECD 2001). The

[2] Martin.C and Ursula.T 2001

inclusion of EPR principles in policies spread throughout the world, even to non-OECD countries, in large part due to the merit of reducing municipal expenditures (Lindhqvist 2000).

Affected by this movement, Asian countries swiftly launched new recycling schemes to make their traditional recycling structures more efficient based on EPR principles. In particular, Japan, Korea and Taiwan, countries with limited territories and natural resources constraints, led the way in applying EPR at the policy level. However, each of these countries developed their own version of recycling structures, despite following the general EPR concept.

In this paper, the authors aim to analyze the performances and problematic issues of EPR policies in Japan, Korea and Taiwan, with a focus on e-waste recycling (in case study form). Each of the three countries has implemented EPR policies in order to regulate e-waste over the past five to ten years and has undergone a process of trial and error to construct an effective e-waste recycling structure. Furthermore, because the legislative background and policy development for e-waste recycling greatly varies among the three countries, this comparative study covers a wide range of e-waste recycling policies found in Asian countries. In addition, the authors also hope the results of this study will be used as a reference for countries considering the implementation of EPR policies in the near future.

Japan
Current situation of EPR policy

The EPR policy in Japan started with the enactment of the Law for Promotion of Effective Utilization of Resources (LPER) in 1992. It was seen as one way to impose the 3Rs (Reduce/ Reuse/ Recycle) on manufacturers (Yamaguchi 2000). However, the law is intended to encourage voluntary activities of manufacturers in the design for environment and recycle and other waste reduction practices, by imposing several recycling-related stipulations, such as a list of items to be recycled and recycling targets. In 1997, the Law for Container and Packaging Recycling (LCPR) came into force. This legislation, affected by the enactment of the German Packaging Ordinance, was the first compulsory law based on EPR.

In 2000, the Fundamental Law for Establishing a Sound Material-Cycle Society (FLMS) was enacted. This law promotes a shift from a one-way society to a recycling-based society and features EPR as one of the basic principles in waste treatment. According to the FLMS, EPR involves manufacturers bearing a certain amount of responsibility over their own products from the production/usage stage to the after-use stage (SSRL 2000).

Furthermore, the FLMS states that the necessary costs to ensure the formation of a “Sound Material Society” should be shared among different actors, such as the national government, municipalities, manufacturers, and consumers in a proper and fair way. This stipulation established that manufacturers are not the only actors that should

bear the required cost. This was to become one of the main characteristics of EPR policy in Japan. Moreover, when it comes to deciding the properness and fairness of cost sharing, the FLMS also established that the ability to pay and the ease in collecting fees are essential elements to be considered.

With the above understanding of EPR, individual laws came into force one by one that reviewed the characteristics of different recyclable items (Figure 2-1). Each individual law had various stipulations on how to impose responsibility on the manufacturers and to share cost among relating actors.

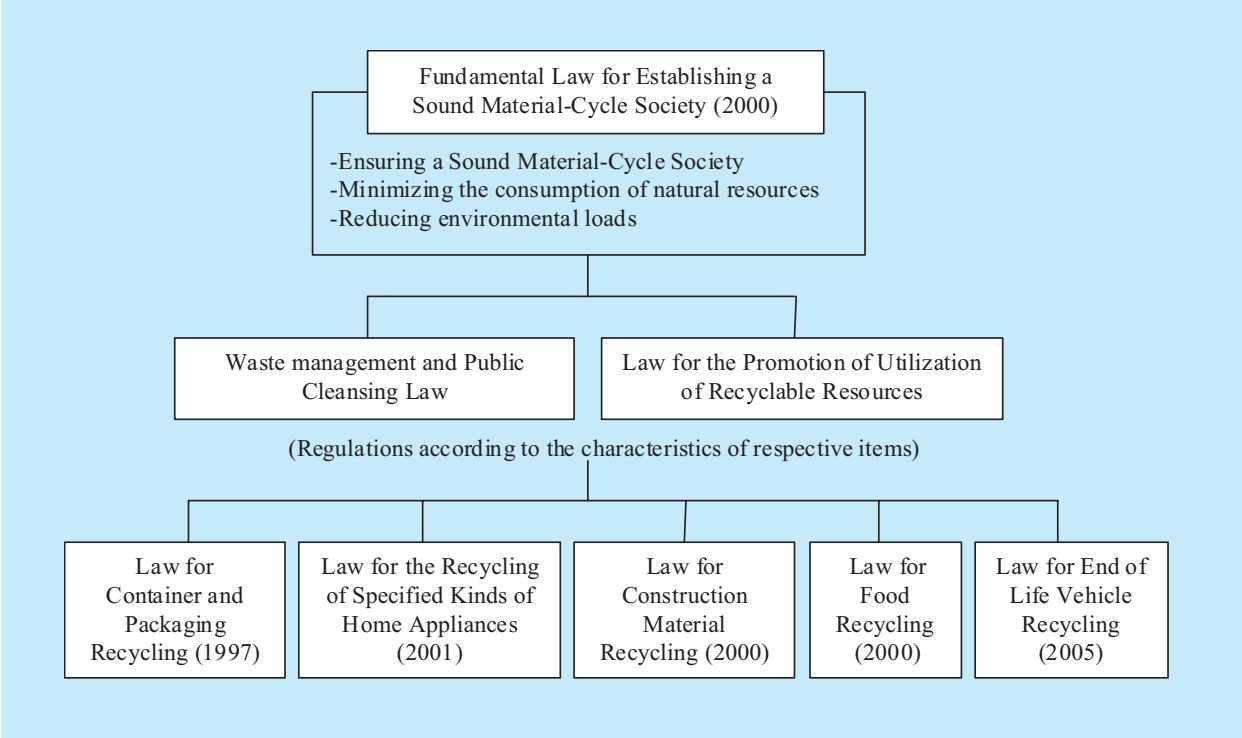


Figure 2-1: EPR-based laws in Japan

Table 2-1 shows the diversity of manufacturers' responsibility and cost sharing under three of the five recycling laws[3]. The Law for Container and Packaging Recycling (LCPR) and the Law for the Recycling of Specified Kinds of Home Appliances (LRHA) both stipulate that manufacturers are to be the main actor to recycle the items covered.

Meanwhile, the Law for End-of-Life Vehicle Recycling (LELR) calls on manufacturers to take responsibility for collecting and recycling three items – chlorofluorocarbons (CFCs), air bags, and shredder residues.

[3] As for the construction material recycling and food recycling, waste generator's responsibility was emphasized.

Table 2-1: Manufacturers' responsibility and cost sharing under three recycling laws

Feature of Law	Law for Container and Packaging Recycling (LCPR)	Law for the Recycling of Specified Kinds of Home Appliances (LRHA)	Law for End-of-Life Vehicle Recycling (LELR)
Manufacturers' responsibility	Recycling	Recycling	Collection and recycling (CFCs, air bags,Shredder residues)
Cost sharing	Manufacturers	Consumers (waste generators)	Vehicle owners

In regards to cost sharing, there are different stipulations in the respective laws. In the case of LCPR, manufacturers are required to pay the recycling costs. Under this law, Japan's Containers and Packaging Recycling Association (CPRA) carries out recycling through contracts with municipalities. Recyclers are decided through public bidding undertaken by CPRA. In contrast, under the LRHA, consumers are required to pay the recycling costs when they dispose of used home appliances (refer to next section). LELR requires vehicle owners to pay recycling fees when they purchase a new vehicle. Recycling fees are collectively managed by a fund management corporation in order to avoid the lack of financial resources when the manufacturing companies would be bankrupted or dissolved.

The recycling performance of manufacturers has been gradually increasing since the enactment of the respective laws[4]. Thus, the laws can be evaluated as successful in terms of extending the role of manufacturers in recycling.

However, these laws share a common problem that was not considered at the time of their enactment – how to account for recyclables that are exported. For instance, the number of waste polyethylene terephthalate (PET) bottles recycled by CPRA has been decreasing since 2004, owing to the sharply growing export of PET flakes to China. Furthermore, used PET bottles are starting to be traded as valuables. This highlights the issue that CPRA requires manufacturers to pay more than the costs actually incurred for recycling. This is because the amount of PET bottles exported is regarded as recycled under the current system.

Similar situations have arisen with appliances and vehicles. Only about half of used home appliances are recycled by manufactures, while about one-third are estimated to be exported as second-hand goods to developing countries, where they are often treated improperly.[5] For example, the process of recovering precious metals from printed circuit boards taken from imported e-waste leads to air and water pollution in China and other developing countries[6]. As for end-of-life vehicles, after the enactment of LELR, more than one million vehicles were statistically

[4] Refer to the following site for details (http://www.env.go.jp/recycle/recycling/index.html).

[5] The rest are likely kept by households or dismantled by un-credited recyclers.

[6] Refer to the BAN and SVTC (2002) for the realities of improper recycling.

estimated to be exported as secondary goods.

Curbing improper recycling in countries that import Japan's recyclables is regarded as a policy challenge. Thus, it is necessary to re-design legislation to reflect the transboundary movement of resources that are currently causing environmental and health problems but could be put to good use in developing countries.

EPR and E-waste management

Policy backgrounds and outline of legislations

At present, Japan deals with e-waste through two pieces of legislation. The first is the Law for the Promotion of Effective Utilization of Resources (LPUR), which enhances measures for recycling goods and reducing waste generation. The other is the Law for the Recycling of Specified Kinds of Home Appliances (LRHA), which imposes certain responsibilities related to the recycling of used home appliances on manufacturers and consumers. LPUR covers personal computers and small batteries designated as recyclable products, while LRHA deals with four classes of items: television sets, refrigerators, washing machines and air conditioners. For these four items, the recycling fees are charged at the time of disposal.

Both laws were enacted to address the increasing scarcity of waste disposal sites and increased costs for waste disposal. The significant difference between LPUR and LRHA is that the former encourages voluntary efforts by manufacturers, while the latter imposes compulsory obligations on manufacturers.
Increased awareness of the imminent necessity to recycle used home appliances in Japan influenced the enactment of LRHA, as well as the Law for End-of-Life Vehicle Recycling (LELR). In the 1990s, municipalities and the Ministry of Welfare (MoW) started demanding that used home appliances should be designated as "tekisei-shori-konnanbutsu" (AEHA 1998). To handle them properly, municipalities needed additional treatment facilities and semi-skilled workers, which led to an increase in treatment costs. To reduce these costs, municipalities simply disposed of the used home appliances in landfills. However, this action only caused the landfill situation to worsen.

In 1990, a case of illegal dumping of hazardous industrial waste came to light in Teshima, Kagawa prefecture. About 500,000 tons of hazardous industrial waste, including shredder dust, used oil, and waste plastics were not properly treated. The improper treatment of shredder dust was particularly troubling since it contains considerable amounts of lead. Used home appliances account for 20 to 40 percent of shredder dust generation, but only 30 percent of them were being properly recycled (MOE 1997).

Used computers

Recycling of used computers does not fall under the LRHA and is therefore not regulated as a compulsory legal requirement under the law. However, since April 2001, computers discarded by businesses must be collected and recycled pursuant to the LPUR.

Computer manufacturers have been voluntarily taking part in collection and recycling since October 2003. For used computers purchased after October 2003, consumers must pay an explicit recycling cost that is included in the

purchase price (internalization). For computers purchased before October 2003, consumers must pay for the recycling fee upon disposal, just as for used home appliances. Consumers can dispose of computers either via the manufacturer or a post office. For the efficient utilization of resources, the following recycling rates[7] per item are recommended by LPUR: 50% for desktop computers, 20% for notebook computers, 55% for cathode ray tube (CRT) monitors, and 55% for liquid crystal displays. However, any provisions on mandatory collection targets are not made in the LPUR.

Moreover, unlike LRHA, LPUR does not stipulate any compulsory responsibility for retailers, which are regarded as one of the main actors in used appliance recycling under LRHA. This difference is a reflection of the difference in purchasing patterns between computers and home appliances. First, consumers generally take newly-purchased computers home themselves. It is quite rare for retailers to deliver computers to the purchasers' home. Second, consumers do not commonly dispose of their old computers at the same time that they purchase a new one due to the need for data migration and other factors. Therefore, consumers are not likely to present their used computers at the time of purchasing a new one.

Used home appliances

As the authors have confirmed, LRHA adopts the principle of EPR. Specifically, LRHA provides a legal framework for assigning responsibilities to manufacturers, retailers and consumers in the flow of used home appliances originating from consumers. As shown in Figure 2-2, manufacturers are responsible for physically recycling used home appliances disposed of by consumers.

Upon the request of consumers, retailers are obliged to take back used home appliances. When discarding used home appliances, consumers are responsible for the cost of transportation, as well as e-waste recycling. Recycling fees range from 2,400 yen (washing machines) to 3,600 yen (refrigerators)[8]. Transportation costs are paid separately. Retailers then must transport the used home appliances to collection sites[9], which are designated by the manufacturers.

Manufacturers are required to either establish their own recycling facilities or commission commercial recycling companies to fulfill their recycling obligations. They are additionally required to achieve compulsory recycling rates to ensure effective utilization of resources. These rates are: 55% for television sets, 50% for refrigerators and washing machines and 60% for air conditioners[10].

[7] Recycling rate of used computers = (recycled amounts as parts or recyclable resources)/(total recycled amounts)×100.

[8] Revision of recycling costs was made in October 2008. There was no change in the recycling fee for TV sets (over 16 inches), washing machines, and refrigerators (over 171 liters).In the meantime, 1,700 yen for TV sets (under 15 inches), 3,600 yen for refrigerators (under 170 liters), 2,500 yen for air conditioners are to be paid for consumers to discharge.

[9] In many cases, transport company offices or existing disposal company yards are used.

[10] Increase of recycling rates is expected in 2009. The rates being discussed are 70% for air conditioners, 60% for refrigerators, and 65% for washing machines.

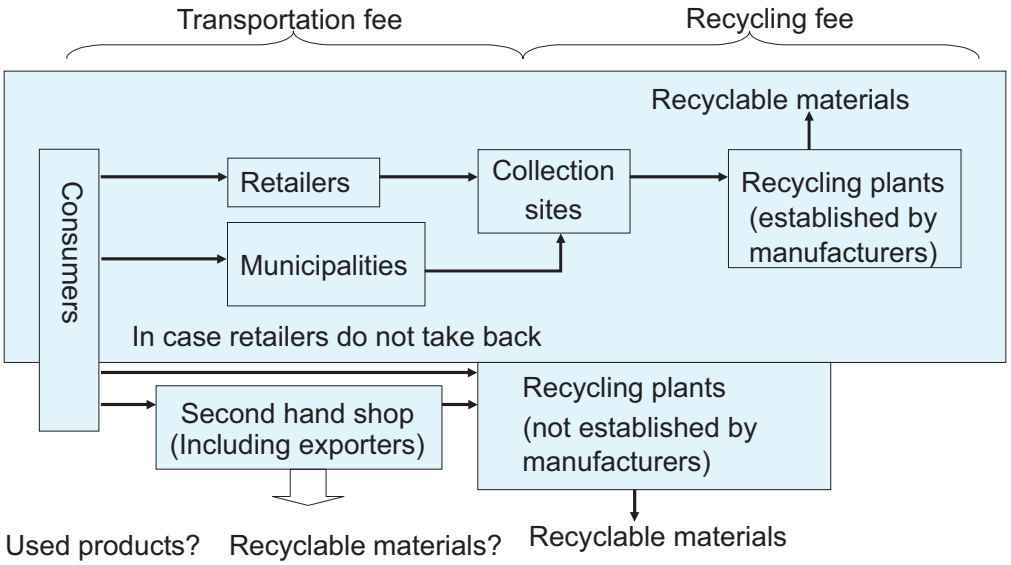


Figure 2-2: Flow of used home appliances and the role of associated actors under Japan's LRHA (Source: Compiled by the authors)

Municipal authorities are no longer obliged by LRHA to collect used home appliances. However, they can still collect and treat used home appliances, including those that have been dumped illegally in their area of jurisdiction. In cases where consumers discharge used home appliances to municipalities, municipalities receive the fees for transportation and recycling from consumers, and they must deliver the used home appliances to designated collection sites.

One weakness of LRHA is that it regulates only a part of the total process, indicated by the box shown in figure 2-2. The processes described outside the box are not managed under the current law. At present, this uncontrolled route constitutes a "hidden flow."

Performances and policy challenges

As mentioned in the above section manufacturers are required under LRHA to construct a recycling infrastructure for used home appliances. However, the specific method is not provided by LRHA. The responses of manufacturers can be broadly divided into two groups, which have different viewpoints about how to reduce general costs, including collection and recycling of used home appliances (Hada 2003).[11]

The first group (Group A) attempted to keep recycling costs down by fulfilling its legal

[11] The reason Japan came to have two types of recycling infrastructure is because competition was promoted between manufacturers, while the violation of anti-trust legislation was avoided. In case a manufacturers or importer does not join either group, they can commission their legal obligation to the Association for Electric Home Appliance (AEHA).

obligations by contracting with 30 existing recycling plants. These can be classified into three main types: industrial waste treatment companies; existing local scrappers; and companies belonging to a Marisoru Network, a national organization of industrial waste treatment companies. Using existing facilities allows for a flexible response to fluctuations in volume, which is important when collection of used home appliances falls short of expectations.

In contrast, the second group (Group B) built 16 recycling plants and attempted to reduce total costs by adopting efficient logistics systems. Although the initial investments were burdensome, this group is able to make adjustments to match operating conditions at recycling plants. Each of these groups provided 190 national collection sites. However, unlike Group A, which utilizes the existing collection warehouses, Group B generally uses transport company warehouses as collection sites.

Because each group's collection sites are managed separately, retailers may not necessarily choose their nearest collection site if costs are lower elsewhere. This creates a heavy financial burden on retailers since they are in position to ask consumers to pay transportation costs. Competition between retailers over sales of new products forces them to lower prices as much as possible, which may preclude them from covering the costs of transportation to collection sites.

A five-year post-implementation review of LRHA is currently underway. A joint committee of the Ministry of Environment (MOE) and the Ministry of Economy, Trade and Industry (METI) is currently reviewing matters that require comprehensive measures. The issues being discussed are: strengthening the measures for illegal dumping, promoting DfE, driving 3R (Reduce, Reuse, Recycle) activities, setting proper recycling fees and recycling rates, covering more items, cutting down the costs for collection in isolated island communities, raising consumer awareness, and reviewing the approach taken with commercial recycling companies.

Furthermore, related to the broader issue of hidden flow, illegal dumping and the export of e-waste (often under the pretext that e-waste qualifies as second-hand goods) are the main points in question. In particular, it is important to research and discuss EPR-based domestic regulations in light of the active transboundary movement of e-waste.

Korea
Current situation of EPR policy

The EPR policy in Korea began in 1992 with the enactment of the Law for Promotion of Resources Saving and Reutilization (LRSR), which emphasized the legal role of manufacturers in the recycling process. The law created the Producer Deposit Refund (PDR) system, which functions on the basis of a deposit-refund principle to promote recycling (refer to section 3.2 for more details).

The law was enacted at a time when local authorities were to be given greater autonomy, which gave rise to concerns that environmental damage caused by municipal development policies would expand across the nation, that the central government's coordinating role in

waste management would diminish, and that interregional disputes over waste disposal would intensify. Thus, another aim of LRSR was to ensure that local authorities were all guided by one national law. An expansion and improvement of waste disposal facilities carried out to mitigate discord among localities brought about substantial increases in the waste management budget (Rhee and Jeong 2003).

Under the PDR system, the list of items covered has been revised a number of times. In 1992, there were 17 items in seven categories under the Waste Management Law, but in 1993 these were reduced to 13 items in five categories. In December 1996, PET bottles for detergent and refrigerators were newly added, finally resulting in 12 items in six categories[12].

In January 2003, the Producer Responsibility (PR) system was launched under an amendment to LRSR. This system was strongly influenced by the OECD manual on EPR. In Korea, EPR was viewed as a system to promote a "resource-circulating society" through 3R by environmentally-friendly performance in designing, manufacturing, distribution and disposal of products, to be carried out by manufacturers (MOE 2003).

Unlike PDR system, which suggests imposing only economic responsibilities on manufacturers, Korea's PR system calls on manufacturers to take direct responsibility for meeting Mandatory Recycling Targets (MRTs). These set minimum volumes that must be recycled, determined in relation with the annual shipping (importing) volume on manufacturers. Also, while the PDR system imposes economic responsibilities based on the assumption that 100% of packaging and products shipped (imported) will be collected, the PR system does not impose explicit economic responsibilities.

Figure 2-3 shows how the PR system works. First, on an annual basis, the Ministry of Environment (MOE) announces the item-specific MRTs, which are set in consideration of the previous year's recycling performance, recycling capacity, amount recovered, and other factors. Each manufacturer can then fulfill their legal obligation in one of three ways. The first way is to construct their own recycling plant and do their own recycling. The second way is to outsource the job to commercial recycling companies. The third way is to join the Producer Responsibility Organization (PRO), pay the required fees, and have them do the recycling. PRO is a third party organization that allows manufacturers to collectively manage items covered, which enhances efficiencies in collection and recycling. In the event that a manufacturer does not fulfill the MRTs, they are obliged to pay a recycling fine. Surcharges are levied in proportion to the amount of the unperformed recycling targets.

Korea's Environment and Resource Corporation (ENVICO) is responsible for running the PR system, such as keeping records on product shipments for each manufacturer, investigating the state of recycling performance, and levying recycling charges. As of 2005, the PR system covers

12 Products requiring waste deposits include: packaging (paper cartons, metal cans, glass bottles, PET bottles), pharmaceutical preparations, batteries (mercury, silver oxide), tires, lubricants, and consumer appliances/ electronics (TVs, refrigerators, washing machines, air conditioners).

four types of packaging and five categories of products for a total of 18 items[13]. Printers, copy machines, and facsimiles were added in 2006 after a pilot period.

[13] Packaging items are paper cartons, metal cans, glass bottles, and plastic packaging; products are consumer appliances, batteries, tires, lubricants, and fluorescent lights.

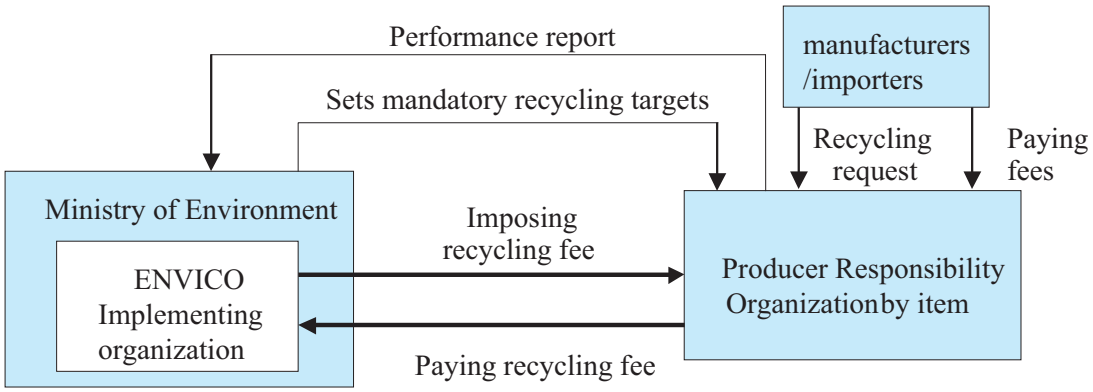


Figure 2-3: Flow chart of PR system in Korea (in the case of recycling through PRO)

Table 2-2 shows that, in most cases, manufacturers of both packaging and products are meeting or exceeding their MRTs, which implies that the PR system is achieving its intended purpose. For packaging, the MRTs and manufacturers' performances have been steadily increasing for every type except metal cans, and in 2005, the performance of manufactures surpassed the MRT for all categories of packaging. Similar success is being seen with products, especially consumer appliances. However, nickel batteries and lubricants have shown performances lower than the MRTs since 2003 (ENVICO 2006).

In 2008, the Law on Resource Circulation of Used Electrical and Electronic Equipment and Used Cars (LREC) was enacted. The law introduced new provisions regarding the efficient use of used consumer appliances and used cars, which were previously regulated separately under the revised LRSR and Car Management Law respectively. Under LREC, new limitations were placed on the use of hazardous substances such as lead and cadmium. Additionally, additional responsibilities were imposed on manufactures to provide information on their recycling practices with commercial recycling companies when requested.

Table 2-2: Mandatory recycling targets and manufacturers' performances under the PR system in Korea (Unit: thousand tons)

		Packaging				Products				
Year		Paper cartons	Glass bottles	Metal cans	Plastic packaging	Tires	Lubricants	Batteries	Consumer appliances	Fluorescent lights
2002	MRT	—	—	—	—	—	—	—	—	—
	Perf.	9	272	152	150	166	146	0.244	43	—
2003	MRT	16	314	184	128	184	141	0.151	46	—
	Perf.	15	295	161	172	195	151	0.135	58	—
2004	MRT	20	315	149	189	195	162	0.214	56	2
	Perf.	19	324	131	226	193	160	0.206	66	2
2005	MRT	20	328	142	219	197	163	0.3	73	3
	Perf.	21	363	144	260	208	147	0.173	80	3

Note: MRT: mandatory recycling target
Perf.: performances by manufacturers
Source: ENVICO (2006)

EPR and E-waste management

Policy backgrounds and outline of legislations

As mentioned above, e-waste (consumer appliances) has been managed as one category under the Law for Promotion of Resources Saving and Reutilization (LRSR) since 1992. LRSR aimed to conserve resources and preserve the environment by promoting recycling to address the rapid increase of waste.

As stated earlier, revisions to the LRSR in 2003 relating to the Producer Responsibility (PR) system were heavily influenced by the OECD's Government Manual on the implementation of EPR (OECD 2001). Subsequently, the PR system emphasized the role of manufacturers in e-waste recycling.

The legal structure and regulations of the Law on Resource Circulation of Used Electrical and Electronic Equipment and Used Cars (LREC) were patterned after EU regulations, such as Integrated Product Policy (IPP) and WEEE directive.

Performances and policy challenges

The PDR system (1992-2002)

Under the Producer Deposit Refund (PDR) system, the MOE requires manufacturers to pay advance deposits to cover recycling costs. Deposits were returned if e-waste was properly collected and

recycled by manufacturers. The deposit rate rose from 30 won/kg in 1992 to 38 won/kg in 1996 for more recycling by manufacturers.

The PDR system can be divided into two periods: before and after 1996, the year in which the deposit rate was increased. In the first period (1992 to 1996), manufacturers contracted out their e-waste recycling to commercial recycling companies to secure the return of their deposits. In the latter period (1997 to 2002), manufacturers chose to construct several recycling plants on a regional basis for e-waste recycling.

Total deposits and refund rates are shown in table 2-3. The increase in deposits since 1997 was caused by the increase of deposit rates the previous year, as well as the addition of refrigerators. The build-up of recycling plants[14], helped steadily increase the refund rate to nearly 9% in 1999. However, from a policy perspective, a refund rate of less than 10% is still considered to be quite low.

[14] Three main manufacturers (Samsung, Hyundai, Daewoo) agreed to build recycling plants on a regional basis to cover the whole country. Due to different understandings of e-waste recycling, construction of e-waste recycling plants was carried out separately under the PDR system.

Table 2-3: Changes in deposits and refund rates under the PDR system in Korea

	1993	1994	1995	1996	1997	1998	1999
Deposits (million won)	3,491	5,015	4,977	6,356	14,476	14,097	8,356
Refund rate (%)	0.03	0.6	3.04	5.56	8.3	7.3	8.7

Source: Environment White Paper (1993–2000).
Note: 100 won = 7.0 yen = 0.1 U.S. dollars (Dec.28, 2008).

The PDR system had two main policy challenges. The first was the lack of economic incentives for manufacturers. The deposit rate was far lower than the actual cost of recycling. As such, it made more economic sense for manufacturers to pay the deposit rather than to recycle e-waste. The actual cost was 169.1 and 160.1 won/kg for television sets and refrigerators, respectively, which is approximately more than four times higher than the deposit rate (KORECO 1990).

The second challenge related to the improper recycling of e-waste is via the municipality route where there was a strong possibility of improper treatment, thus causing environment impacts (Kim 1998). Because the discharge fee was low (3,000 to 10,000 won), there was a strong incentive for consumers to take municipality as a discharge route.

The PR system (2003-Present)

Prior to launching the PR system, a two-year pilot program was launched to lay the foundations for the PR system. This followed a voluntary

agreement that entered into effect on June 2000 by MOE and three major manufacturers – Samsung, LG and Daewoo. During this period, manufacturers were required to construct nationwide recycling infrastructure rather than making deposits.

The actual recycling was carried out by the Association of Electronics Environment (AEE) by proxy. With a few years' gap between each, the manufacturers constructed three recycling plants, starting with Samsung's Asan Recycling Plant (1988), and followed by LG's Chilseo Recycling Plant (2001) and finally the Metropolitan Recycling Plant (2003). These plants successfully increased the recycling capacity of manufacturers. They mainly recycled refrigerators and washing machines.

Commercial recycling companies that contract with AEE are paid by the volume recycled. In 2006, there were 28 such companies (six for television sets and monitors, 10 for computers, seven for CRTs and five for mobile phones).

However, only about 40 percent (98 out of 232) of the municipalities actively cooperate with manufacturers. This is largely due to the poor financial situation of municipalities. While recycling costs are imposed on manufacturers, municipalities are required to pay the costs of transportation to the manufacturers' recycling facilities.

The collection and recycling performance of manufacturers under the PR system is shown in Table 2-4. Used home appliances of high quality are inclined to be traded at positive prices in the second-hand market, rather than taken back for free by manufacturers. In addition, air conditioners show relatively low performances by manufacturers, probably because recyclers outside of the system collect them to recover the copper.

Table 2-4: The MRT and manufacturers' performances under the PR system in Korea (thousand units)

Product	2003		2004		2005		2006	
	MRT	Perf.	MRT	Perf.	MRT	Perf.	MRT	Perf.
Refrigerators	276	434	400	477	513	542	654	672
Washing machines	309	421	309	411	468	547	463	402
Air conditioners	9	14	10	20	32	28	33	30
TV sets	283	370	313	326	319	391	366	466
Total	877	1,239	1,032	1,234	1,332	1,508	1,516	1,570

Note: MRT: mandatory recycling target
Perf: performances
Source: AEE (2007)

Despite the general increase in collection by manufacturers, there were still several policy challenges. First, manufacturers are required to collect CFCs, but environment-friendly treatment after collection is not mandated. At present, the Asan recycling plant is the only one that destroys CFCs contained in refrigerator insulation. Most CFCs collected are reused without their harmful characteristics being nullified.

Second, the PR system primarily focuses on increasing the amount of recycling and guaranteeing proper treatment, rather than on promoting Design for Environment (DfE). In the manufacturer-built plants, fulfilling mandatory recycling targets takes a higher priority than DfE. Know-how obtained in the recycling process is hard to incorporate in new product design if it is not economically-profitable.

Finally, from the perspective of e-waste flow control, it is worth paying attention to the export of e-waste. E-waste, including mobile phones and CRTs, are actively exported to East Asian countries. According to the Korea Custom and Trade Institute (KCTI), 305,460 television sets, 184,906 main units of pc, and 951,077 CRTs of pc were exported in 2005 alone. The absence of a monitoring system to ensure that these items are properly treated in importing countries is an urgent problem.

Taiwan
Current situation of EPR policy

Taiwan introduced a recycling system in 1998 to promote recycling of "difficult-to-process, hazardous materials, and valuable items for recovery and reuse". This system obliges manufacturers, as well as importers, to pay recycling fees to the Environmental Protection Administration's (EPAs) Recycling Fund Management Committee (RFMC) to promote recycling.

Under the RFMC system, manufacturers have no responsibility to collect and recycle the items. Instead, they bear the full responsibility of paying fees into the Recycling Fund. These fees are then used as a source of revenue for the RFMC to provide subsidies to those who participate in collection and recycling efforts, such as consumers, retailers, and collection sites/recycling plants. This provides an incentive for collectors and recyclers to participate in the system.

The system does not oblige collectors and recyclers to participate. They have a choice of whether or not to comply with government recycling standards that must be met to qualify for the subsidy. Failure to conform to the system is not illegal; it merely means that the party gains nothing from the fees that they pay into the Recycling Fund. Actually, considerable collectors and recyclers tend to do their business outside of the RFMC system.

Recycling fees paid by manufacturers are determined by a rates committee, which is composed of members from government, academia, consumer groups, manufacturers, and other sectors. Annual revisions of the fees are made in consideration of the funds that are required for recycling (collection costs, the costs of recycling at recycling plants, and management cost for the committee) and current prices for recyclable materials.

Since 1998, targeted items have continued to increase. Currently, 33 items in 14 categories have been selected. Items include five types of home appliances, computers and some peripheral equipment, containers (made from several kinds of materials), automobiles, motorcycles, dry-cell batteries, tires, lubricants, lead-acid-batteries, and fluorescent lamps.

Table 2-5 shows that recycling of most items within the RFMC system has been uneven from year to year. This fluctuation has been influenced by differences in annual recycling fees and subsidies and varying levels of participation by collectors and recyclers. To some extent, the volume has been influenced by the demand for used goods and recyclables from foreign countries.

Table 2-5: Recycling amount of items under RFMC System in Taiwan (1998~2007)

	General containers (kg)	Insecticides containers (kg)	Automobiles (unit)	Motorcycles (unit)	Tires (kg)
1998	126,668,008	620,043	52,031	134,607	56,630,061
1999	187,263,919	665,239	102,257	431,504	94,647,603
2000	225,947,110	737,707	137,668	366,034	100,282,527
2001	245,298,818	886,051	221,718	308,633	119,034,446
2002	280,959,152	960,952	198,024	344,570	103,747,228
2003	356,909,132	1,004,430	142,549	182,994	120,541,496
2004	351,862,052	1,123,285	155,026	260,741	107,190,754
2005	336,195,604	887,779	186,819	306,329	103,053,525
2006	158,659,062	334,668	221,137	356,577	103,494,760
2007	167,612,856	272,385	223,637	310,483	107,420,781

	Dry-cell batteries (kg)	Lead-acid batteries (kg)	Lubricants (l)	Household appliances (unit)	IT objects (unit)	Fluorescent lights (kg)
1998	13,514	26,285,710	8,008,169	416,413	138,528	—
1999	256,684	30,334,316	13,023,086	1,155,270	485,975	—
2000	632,099	31,688,269	11,996,340	985,548	946,518	—
2001	585,808	36,580,896	12,328,261	1,848,757	1,247,946	—
2002	922,632	32,855,862	9,413,072	1,300,235	1,701,337	523,500
2003	1,016,562	41,778,207	9,008,457	1,283,213	1,819,883	7,891,706
2004	1,363,568	37,738,839	13,324,648	1,285,343	1,930,054	4,363,711
2005	2,177,218	38,390,203	14,437,080	1,463,998	2,006,916	4,675,873
2006	4,289,493	44,602,881	16,676,364	1,465,409	2,137,526	4,736,784
2007	2,387,866	35,278,505	22,381,083	1,637,341	2,294,095	4,557,818

Source: Environmental Protection Administration Executive Yuan, R.O.C. (Taiwan)
Homepage of Recycle Fund Management Board
(http://recycle.epa.gov.tw/EPA/result/QP08-T2206_86-96.xls)

EPR and E-waste management

Policy backgrounds and outline of legislations

In Taiwan, mixed metal scrappers, known as fei-wujin, have traditionally treated e-waste. However, their methods of extracting metals, such as burning non-metal parts or refining metal with chemicals, had high environmental impacts, including air pollution caused by burning in fields, polluting water and soil with heavy metals, and illegal dumping of unwanted parts (EPA 1985). As a countermeasure, the Environment Protection Administration (EPA) in 1984 organized mixed metal scrappers together in two districts in an attempt to effectively monitor their recycling practices. However, this measure was not successful. In 1986, polluted water containing heavy metals that had originated in the monitored districts ended up in neighboring sea areas, affecting nearby oyster farms.

In this context, the EPA sought to reduce environmental pollution by introducing a government-led recycling scheme. As explained in the above section, the RFMC system was introduced in 1998. Similar to that of Korea, it regulated 11 product categories. For e-waste, categories include home appliances and IT equipment, which contain five items, respectively[15].

[15] In Taiwan, the category of "home appliances" and "IT objects" correspond to e-waste. The category of "home appliances" includes TVs, refrigerators, washing machines, air conditioners, and electric fans. "Computers and some peripheral equipment" include notebook computers, frames, motherboards, drivers, printers, adapters and keyboards.

RFMC system

Figure 2-4 shows how the RFMC system works. Under the RFMC system, only manufacturers bear economic responsibility for e-waste recycling. This responsibility comes in the form of fees paid to the RFMC, and not for the collecting or recycling of e-waste. Subsidies are paid out of the Recycling Fund to organizations participating in the collection and recycling of e-waste, which include consumers, retailers, collection firms and commercial recycling companies.

The amount of the fees and subsidies are determined by the Fee Rate Reviewing Committee (FRRC), which is composed of representatives of government, academia, consumer groups, manufacturers and other sectors. Fees and subsidies are revised on an annual basis in consideration of the funds required for recycling (collection costs and costs of recycling at recycling plants), current prices for recyclable materials, and other factors. The amount that a manufacture must pay is determined by the annual fee decided by the FRRC, multiplied by the amount of sales of the previous year.

Under the system, retailers, municipalities, collection firms, or other parties collect each item from consumers. Items are then taken to collectors that are assigned by RFMC. In turn, collectors hand the items to recyclers that are also assigned by RFMC.

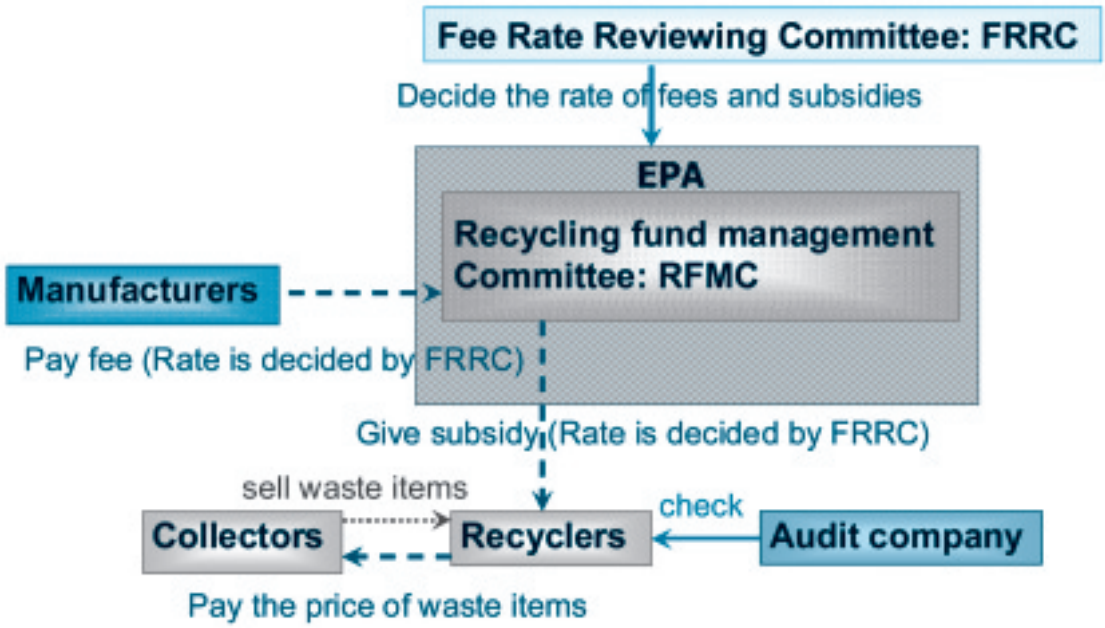


Figure 2-4: Flow chart of RFMC system in Taiwan

Taiwan's e-waste recycling scheme can be summarized as having three main features. First, the RFMC system emphasizes the economic responsibility of manufacturers. The second feature is the economic incentive (subsidies) used to induce commercial recycling companies to participate in the scheme. The third is that the proper treatment of e-waste is thoroughly guaranteed, which creates a huge monitoring cost.

Performances and policy challenges

Under the RFMC system, four types of used home appliances (television sets, refrigerators, washing machines and air conditioners) and used personal computers have been selected as one category in the system (Chang and Shaw 2000).

E-waste flow in Taiwan is shown in Figure 2-5.

Consumers can freely choose their preferred route for disposal of e-waste. Since e-waste has a high value, collectors typically sell the items to recyclers. Collection firms obtain revenue (sales and subsidies) by selling e-waste, which is generally collected from various routes such as retailers, municipalities and collectors. Recycling plants then buy e-waste from collection sites[16] and recycle them to obtain subsidies from the RFMC. After recycling, subsidies are paid by the RFMC when the unit counts are confirmed to be in agreement. However, only entities that are monitored by public auditing institute are able to claim a return for collection and recycling. Recyclers that do not participate in the scheme are not penalized, but are rather not able to claim subsidies.

[16] Unlike in Japan, the collection sites are managed by the specific collection firms rather than the manufacturers. Manufacturers are not required to organize collection sites in Taiwan.

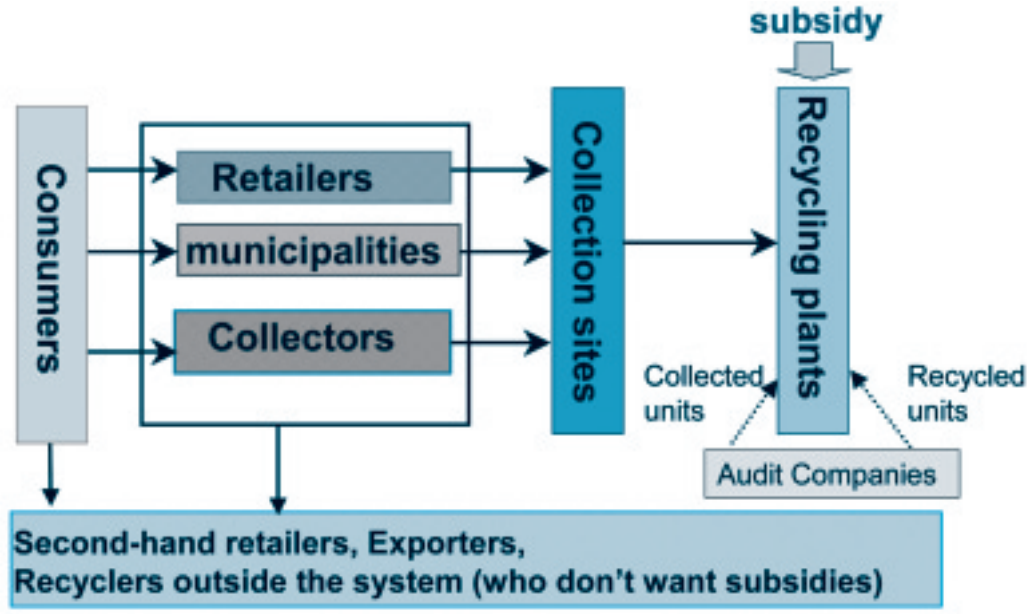


Figure 2-5: General flow of E-waste under the RFMC system in Taiwan
(Source: Compiled by the authors)

One reason manufacturers are thought not to be assigned responsibility during collection and recycling stages is that the home appliance manufacturing sector in Taiwan is made up of numerous small and medium-sized manufacturers. There are no leading companies; thus, no single manufacturer is able to act as a driving force. In addition, recyclers are not compelled to perform all recycling within the RFMC scheme. Recyclers can choose whether or not to participate in the RFMC. This system is inadequate in managing improper processing and encouraging proper processing methods throughout the country (Murakami 2005).

In 2009, fifteen recycling plants (fourteen companies) were recycling waste home appliances within the RFMC system. Two plants managed by one company were established by relatively major manufacturers with joint investment, while other recycling plants were established by existing recyclers and/or retailers. These recyclers purchased used home appliances from 128 collection firms at a national level. In the case of IT equipment, 19 recycling plants (18 companies) can collect from 132 collection firms. Out of those 19, 15 recycle home appliances as well as IT equipment.

Table 2-6: Number of recycling plants and collection firms for used home appliances and IT equipment in Taiwan

		2005	2006	2007	2008	2009
Home Appliances	Collection firms	N/A	87	116	127	128
	Recycling plants	7	9	14	13	15
IT equipment	Collection firms	N/A	89	118	132	132
	Recycling plants	N/A	11	17	16	19

Source: EPA Web site

There are currently two challenges for policymakers. The first is that the economic incentive for recyclers to join the RFMC system is insufficient. Because the decision of whether or not to join the system can be made entirely at the discretion of the commercial recycling companies, such decisions are typically based only on economic concerns. This has resulted in a considerable number of commercial recycling companies not joining the RFMC system. This is problematic, as there is no monitoring of recycling undertaken outside of the RFMC system, despite the fact that the RFMC system was developed to promote proper treatment.

The second problem is that the RFMC has only a weak influence on DfE. Under the current system, manufacturers are fulfilling their responsibilities through the Recycling Fund configured by the Taiwan EPA. Fluctuations in the fees do not provide sufficient incentives for manufacturers to actively take part in DfE activities (Murakami-Suzuki 2007).

Conclusion

In this paper, the authors gave a general description of current EPR policies in Japan, Korea and Taiwan before identifying realities and clarified problematic issues on e-waste recycling in the respective countries. Several implications acquired by the author's analysis were as follows.

First, the authors have confirmed that the three countries have constructed their respective recycling structure on the basis of EPR, but the details of each system significantly differ according to the policy challenges that each country considered imminent. In Japan, the basic framework law and respective laws to deal with the characteristics of individual items were enacted to provide for efficient use of recyclable waste. In contrast, in Korea and Taiwan, initial legislation was fundamentally based on the deposit refund principle of the 1990s. However, Korean policymakers followed the lead of the EU by initiating a separate initiative to manage recyclable waste by standardizing packaging and products.

Second, through the analysis of e-waste management in three countries, it becomes evident that each e-waste management system in respective countries has significant weak points, perhaps reflecting that each country was quickly striving to solve imminent problems. This implies that countries that are considering developing new e-waste management systems should thoroughly consider policy implications before implementing recycling structures. For example, deciding who will play the leading role within an electronic waste collection and recycling system is an essential issue to be solved. Countries must choose between a manufacturer-centered recycling system and a commercial recycling company-centered recycling system. Naturally, this decision should be approached from both physical and economic perspectives.

Third, the authors were able to confirm that e-waste regulations in the three countries stipulate an economic responsibility for collection and recycling. However, regulations on physical responsibility show different patterns. Japan is the only country to explicitly stipulate payment by consumers for e-waste collection and recycling costs. However, for used computers purchased after October 2003, consumers do not have to pay explicit recycling fees. The different structure in recycling fees in Japan comes from the understanding that home appliances and computers have different purchase and discharge patterns.

In contrast, Korea and Taiwan both placed the economic responsibility for e-waste on manufacturers, but did not specifically stipulate who should physically treat e-waste. Japan and Korea have the common feature that physical responsibilities are fulfilled by manufacturers (although, the range of responsibilities differs). This resulted in a similar phenomenon, in which manufacturers set up new recycling plants to fulfill their legal obligations. Although manufacturers in Taiwan operate two recycling plants, the manufacture has limited power to control the flow of waste items. The responsibility of producers is defined in connection with the manufacturers' economic responsibilities.

Finally, as a general proposition, it is uncertain if regulations adopted by one country will bring the same outcomes in other countries. This can be understood intuitively that different countries have different legislative backgrounds and perceptions about current situations, which are the most significant factors for constructing sustainable recycling system. This is also applicable to e-waste.

Acknowledgments

This paper is a revised and reorganized version of our paper, Sung-Woo CHUNG, Rie Murakami-SUZUKI (2008): "A comparative study of E-waste recycling systems in Japan, South Korea and Taiwan from EPR perspective: implications for developing countries"

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3. Resource Efficiency, Integrated Product Policy and Extended Producer Responsibility: European Experiences

Greg Tyson

Introduction

A significant and emerging trend in European environmental policy in recent years has been a shift in focus away from point sources of pollution toward product- and consumption-related issues. This shift has occurred within the context of general success of traditional policy approaches to point sources of pollution that nonetheless have failed to address growing consumption-related problems. Such problems include a continuing intensification of non-point source discharges of toxic substances, continuing resource consumption and material flows, and wastes in society.

Many policy makers in EU member states have recognized that addressing these challenges will require new approaches that engage consumers as well as producers within new production-consumption frameworks. One such approach is Extended Producer Responsibility (EPR), which requires producers to assume life-cycle responsibility for products they produce and sell.

In a number of EU countries, legislation based around the principle of EPR has set the stage for an expanded role for the EU in the field of product-related environmental policy. A key initiative that to date lacks a specific legislative foundation is the EU Integrated Product Policy Initiative, which aims to understand product-related environmental problems and develop innovative solutions to production and consumption related challenges in consideration of life-cycle wide impacts.

In addition, as the complexity of addressing such challenges, as well as the global nature of production and consumption, become more clear, policy makers in the EU are beginning to focus their attention on international-level approaches to sustainable consumption and production. Two such initiatives of note include the United Nations "Marrakech Process" on Sustainable Consumption and Production and the EU Strategy on Sustainable Consumption and Production.

Recognizing the differences between the

European and Asian contexts, this chapter aims to summarize selected European EPR cases, integrated product policies, and sustainable consumption and production initiatives, with the objective of drawing some general insights that may inform a discussion on facilitating an increase in movements of both pre- and post-consumer resources and materials in Asia.

Challenges in products and product systems

For many decades, public authorities have been engaged in managing municipal waste with a primary focus on reducing health risks due to unsanitary disposal practices. Over time and with the emergence of modern consumer economies, the scale and complexity of products and materials entering the waste stream has grown in lockstep with economic and population growth. In many countries, this has led to significant difficulties for public authorities in securing sufficient disposal capacity. The difficulties have taken the form of public opposition to the construction of new waste disposal facilities near populated areas and are coupled with increasing expectations for improved environmental performance – twin challenges that led to what eventually amounted to a waste disposal crisis in some countries.

Furthermore, as a consequence of the environmental movement of the 1970s and afterward, attention to conserving natural resources through recycling efforts increased.. Given their traditional role as waste managers, public authorities appeared to be logical service providers to collect and recycle end-of-life products. Generally speaking, few products at that time were developed with environmental considerations in mind, and this was equally the case with respect to end-of-life management concerns. Publicly-operated recycling initiatives faced a number of challenges, particularly with developing reliable markets for collected materials. Another significant complicating factor was the unreliability of end-markets for many collected materials. While these two factors imposed significant challenges for the prospects of closing material cycles and reducing resource consumption, public authorities could do little about either.

The focus on product- and consumption-oriented policy that is seen today in leading jurisdictions evolved in part from the recognition of the limitations of traditional approaches to environmental protection, which was largely directed at large industrial emitters. These early efforts did not really aim to address systemic issues in production that led to polluting by-products and wastes, but were rather aimed at encouraging technical 'end-of-pipe' measures to treat emissions. However, end-of-pipe solutions proved costly and often served to merely shift environmental impacts from one medium to another (e.g. contaminants removed from water get disposed in landfill) or disperse pollution over ever greater distances.

Given the inherent cost and limitation of many end-of-pipe pollution control technologies, many leading businesses began to shift the focus toward preventing the generation of wastes and polluting substances through a variety of environmental management strategies. The success of initial corporate initiatives led policymakers in both Europe and

America to undertake programs aimed at both reforming relevant policy frameworks (e.g. industrial permitting) and supporting business stakeholders, especially small and medium sized firms, to implement preventive environmental management systems within their operations. Successful early examples of such business support initiatives include the Ecological Project for Integrated Environmental Technology (ECOPROFIT) program in Austria, the Effizienz-Agentur initiative in the German state of North Rheine-Westphalia and the Production Integrated Environmental Protection (PIUS) initiative at the national level in Germany.

This movement toward preventive approaches in manufacturing and production became known under several different terminologies in different regions, including pollution prevention, green manufacturing, clean production and cleaner production. Regardless of terminology, the central defining characteristic of these approaches was the recognition that problems could be most effectively addressed by taking systematic preventive measures rather than treating pollution after it had been created. Such measures could include intensive management of energy and other inputs, substituting toxic process inputs for less or non-toxic inputs, and internal material recycling initiatives.

A large body of literature has been developed that documents the success of these approaches across a broad scope of industrial sectors, company sizes and regions of the world. Many firms found that systematically examining and monitoring their operations with the objective of preventing environmental and health problems also led to significant new efficiencies and cost savings in production processes, as well as lower regulatory compliance costs. Consequently, what began as an environmental protection and compliance exercise ended up increasing both production quality and corporate profitability.

The success in addressing point source pollution at production facilities did not extend to the broader production and consumption system in society. While environmental challenges in production facilities remain even today, particularly in some newly-industrializing regions, by the 1990s evidence began to emerge that for many toxic and polluting substances, industrial discharges were decreasing significantly. Lindhqvist (2000) discussed a research project undertaken by the Swedish government's Ecocycle Commission in the mid 1990s which estimated the origin of various pollutants in the environment. The study found that for chromium, toxic metal, industrial discharges in Sweden had steadily increased from the early days of industrialization. This proceeded until the advent of government imposed emission limits in the 1970s, after which industrial discharges of chromium declined steadily to very low levels. Over the same time period, chromium discharges from the use and disposal of products grew steadily to a point that, by the 1990's, it was these diffuse product-related discharges, not industrial processes, that were the largest source of chromium entering the environment. Extrapolating from evidence such as this Swedish study, it became increasingly apparent that measures focusing on production facilities and point sources of pollution alone were insufficient to satisfactorily resolve many environmental challenges.

Despite the increasing analytical tools and information arising from product life-cycle studies that indicate that a growing share of environmental impacts arise from activities outside of production facilities, existing environmental management efforts on the part of policy makers and firms continues to focus largely on this life-cycle stage in the production system. While cleaner production and preventive environmental management practices in production facilities are both successful and in many cases profitable, major opportunities for environmental improvements are being missed in other life-cycle stages, specifically in the resource extraction and use/end-of-life stages.

The following figure illustrates a generalized picture of the current focus of environmental management efforts in relation to the life-cycle of a product. A majority of government and business efforts are aimed at managing impacts at production facilities, while significant impact areas in resource extraction and in product use and disposal are managed under ad hoc or sporadic efforts.

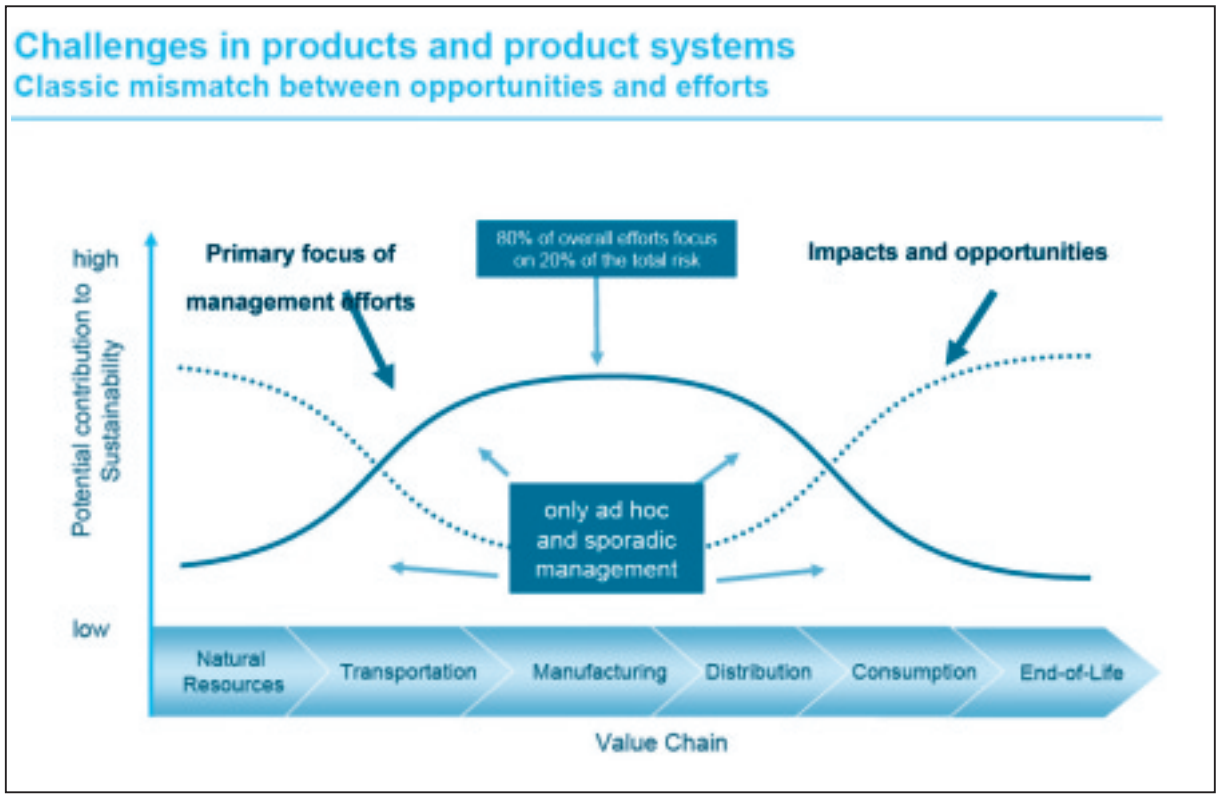

Figure 3-1: Classic mismatch between opportunities and efforts

Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

What is now needed is to extend the innovative prevention-based logic of cleaner production and pollution prevention that has been so successfully applied at the firm level to society' s broader production-consumption systems. However, this is a considerably more complex process than addressing impacts at discreet production facilities. Product supply chains are long, complex and global in nature, and gaining a meaningful understanding of life-cycle impacts from any particular product is a complicated process. Developing effective and efficient policy responses to improve the life-cycle performance of even a narrow grouping of product types is a uniquely challenging task. These complications are further compounded by the fact that different life-cycle stages – from raw material extraction to manufacturing, assembly, use, reuse and end-of-life management or disposal – can occur across vast distances and in different countries.

International Developments toward sustainable consumption

In the decade following the 1992 UN Conference on Environment and Development, held in Rio de Janeiro, new analytical tools added new dimensions and perspectives to understanding the nature of environmental issues. These include: life cycle assessment; material flow accounting and product material intensity indicators; and the 'factor four' and 'factor ten' concepts of resource productivity. Given the increasingly global nature of production and consumption, it became increasingly clear that there were significant impacts only indirectly related to production facilities and located across vast distances. What emerged was a greater understanding of the complexity of production and consumption dynamics, as well as recognition by industry and policy leaders that a broader perspective in dealing with environmental issues was needed.

The need for a new focus on broader life-cycle issues in production and consumption was one outcome of the 2002 Johannesburg UN Earth Summit, the first major international forum that formally advocated for sustainable consumption as a critical aspect of sustainability. Under the leadership of the United Nations Environment Program (UNEP) and the United Nations Department for Economic and Social Affairs (UN-DESA), a major international project – the Marrakech Process – was launched following the Summit. Drawing its name from the location of the inaugural meeting, the process aims to develop a plan to "accelerate the shift towards sustainable consumption and production (SCP), to promote social and economic development within the carrying capacity of ecosystems by de-linking economic growth from environmental degradation" (UNEP). The final proposal for the ten-year framework will be presented to the UN Commission on Sustainable Development in 2010/11.

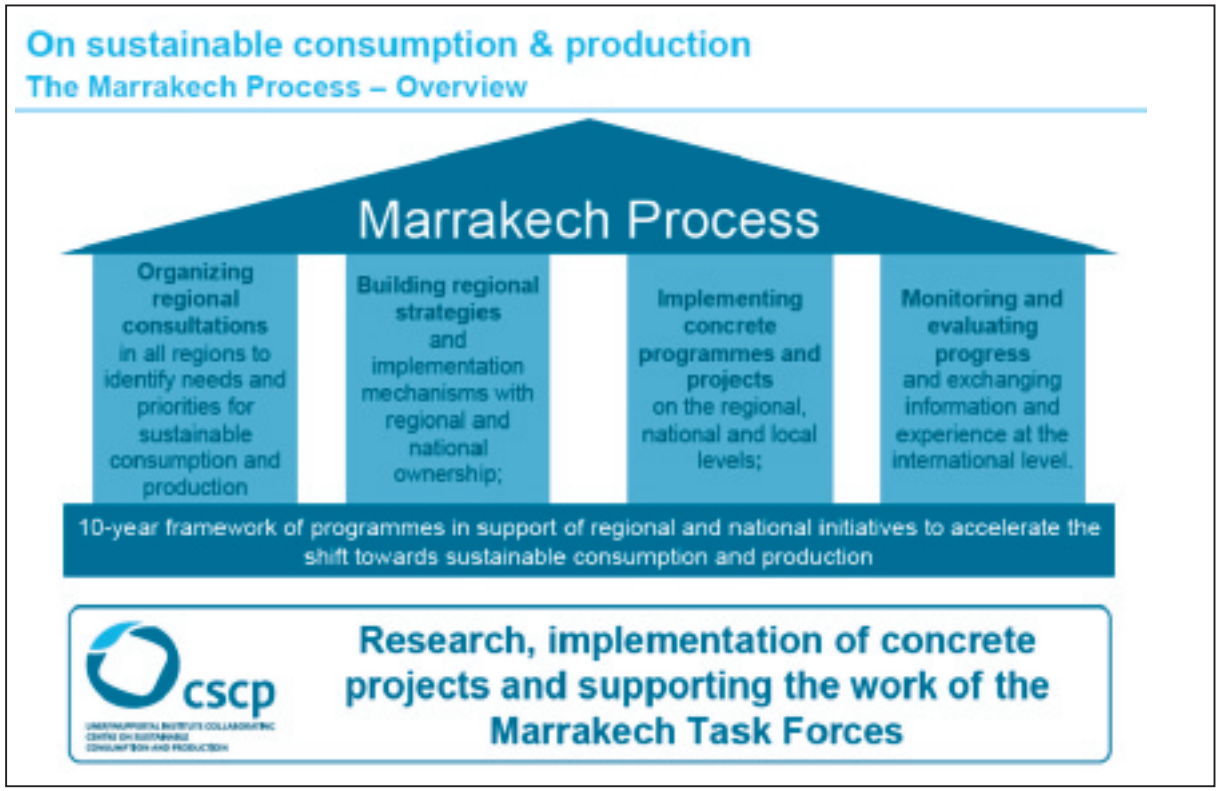

Figure 3-2: The Marrrakech Process-Overivew

Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

With the objective of developing a Global Framework for Action on SCP, national governments, private companies, development agencies and civil society groups began a process to develop a ten year framework of SCP programs. There are four parallel phases: regional consultations and strategies; implementation of concrete demonstration projects; evaluating progress and exchanging knowledge and information at the international level.

Within the process, a number of Task Forces led by national governments are developing and testing SCP tools and sharing knowledge. These Task Forces focus on such themes as: Cooperation with Africa, Education for Sustainable Consumption; Sustainable Buildings & Construction; Sustainable Lifestyles; Sustainable Products; Sustainable Public Procurement; and Sustainable Tourism.

EU Integrated Product Policy Initiative

In response to a recognized need for new approaches to environment and sustainability challenges, the European Commission initiated work on its Integrated Product Policy (IPP) initiative in the late 1990s. The initiative aimed to optimize and harmonize existing policy tools and to develop a host of new measures to foster life-cycle improvements in products (European

Commission, IPP). Although this was among the first initiatives to strive to comprehensively address life-cycle impacts, there was already a clear recognition within the Commission that product- and consumption-related impacts should not be merely reduced in ways that result in greater impacts in other stages of the product life cycle.

Ideally, the vision for IPP was to extend the health, efficiency and competitiveness benefits previously achieved through cleaner production initiatives in production processes to the broader production-consumption system, both within Europe and at the international level (European Commission 1998).

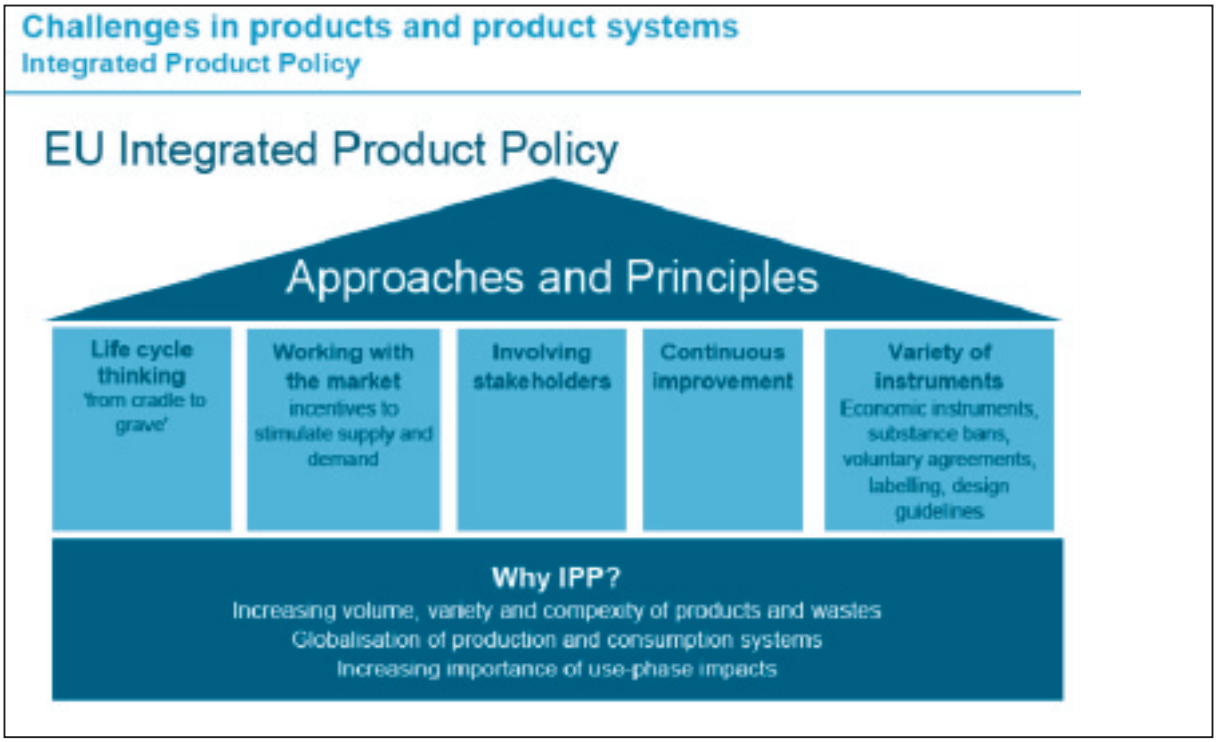

Figure 3-3: EU Integrated Product Policy

Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

A 2001 European Commission Green Paper on IPP set the stage for a debate among stakeholders and policy-makers on the future role and implementation of the IPP initiative in the European Union (European Commission 2001). The Green Paper proposed a broad range of policy instruments to implement the IPP vision, including working with markets via state aid, applying differentiated taxation, applying producer responsibility concepts, stimulating demand for environmentally-friendly products such as via public procurement policies, and strengthening internal capacity for green design and production.

Following a considerable amount of work and consultation, the Commission published its proposed approach in 2003 within its IPP Communication. In part due to an enhanced understanding of the immense complexity and breadth of products in the modern marketplace, the ambitions of the 2001 Green Paper were not fully realized in the Communication. The Communication instead affirmed a commitment to proceed on the basis of five key principles: (1) consider life-cycle thinking; (2) work with markets through incentives; (3) closely involve stakeholders; (4) aim for continuous improvement; and (5) apply a host of complementary instruments and tools (European Commission. 2003a).

Given the complex and global nature of production and consumption, the vision of the IPP project has been difficult for the Commission to realize in practice. To date, practical outputs have consisted of ongoing stakeholder consultations, IPP pilot projects on mobile telephones and tropical wood garden chairs, and significant support to research initiatives, such as large-scale life cycle assessment models and studies. The challenge of addressing such a wide range of impacts across diverse geographical regions will require the initiative to promote new roles and functions for government, industry and consumers not seen to date in the lexicon of environmental policy.

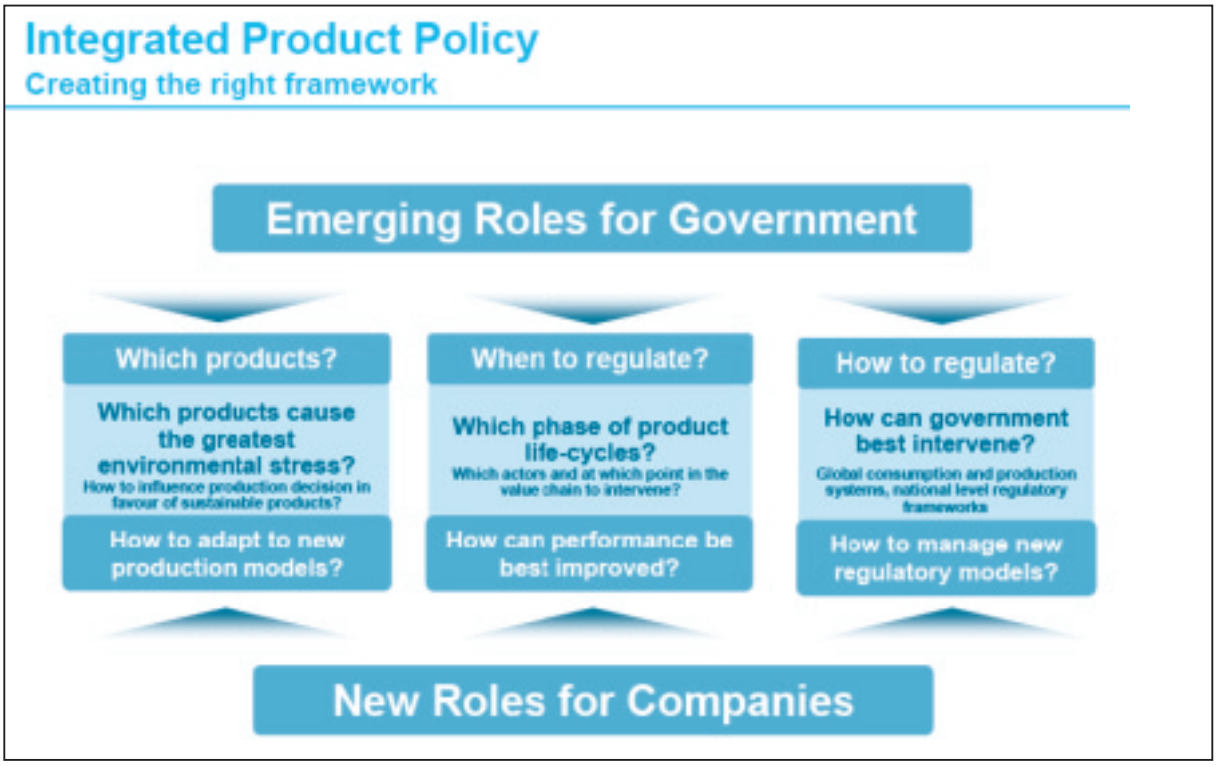

Figure 3-4: Creating the right framework for Integrated Product Policy

Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

While the ambitions of the IPP project have not yet been fully realized, the initiative has supported research that has provided an important understanding of production and consumption dynamics and their relation to the environments within which these dynamics take place. A major need identified by Commission's 2003 IPP Communication was to identify products that impose the greatest environmental burden to enable the Commission to prioritize action on IPP.[17] To accomplish this aim, a three-phase project was initiated following the 2003 Communication. The first phase of the project – the Environment Impact of Products (EIPRO) study – was led by the European Commission' s Directorate General for the Environment Institute for Prospective Technological Studies, with support from a host of European research institutions. These included the Dutch TNO-CML Centre for Chain Analysis, which acted as project manager, the Flemish Institute for Technological Research (VITO) in Belgium, and the Danish Technical University (DTU). Impact areas that were studied included global warming impacts, acidification, photochemical ozone formation and eutrophication in aquatic ecosystems.

Remarkably, the research project found that a large percentage of environmental impacts resulted from just three broadly defined areas of consumption demand:

- food and drink - 20 to 30 percent of impacts, meat being the largest factor
- transportation - 15 to 35 percent of impacts, depending on methodology and impact area, but less for eutrophication and photochemical oxidation (private automobiles are by far the largest contributor, representing the source of some four-fifths of transport impacts)
- housing - 20 to 35 percent of total impacts (space heating, hot water and electrical appliances among the greatest source of impacts).

Together, these three fields of demand were found to represent some 70 to 80 percent of impacts and 60 percent of consumption expenditure among European consumers. All other consumption combined represents a maximum 20 to 30 percent of impacts in most impact categories, with clothing being the greatest (between 2 and 10 percent). These results are even more remarkable given that the findings are based on concurring results of several studies within the overall project, each applying differing approaches and methodologies.

17 See EIRPRO Study http://ec.europa.eu/environment/ipp/pdf/eipro_summary.pdf

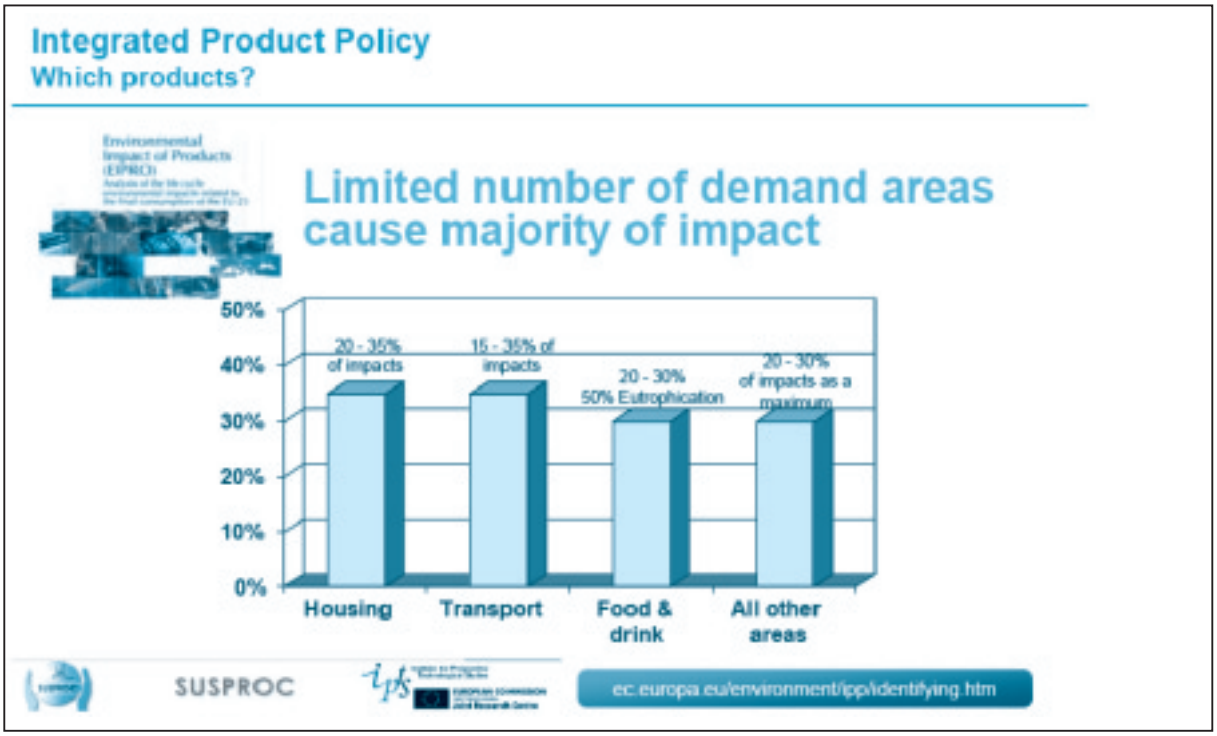

Figure 3-5: Which products to be focused by integrated product policy?
Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

Phase II of the initiative – the Environmental Improvement of Products (IMPRO) – was launched in 2008. Specific projects are examining the technical potential for life-cycle improvements in private automobiles, residential buildings and meat and dairy products. Based on the results of Phase II, the third phase of the project will seek to identify policy instruments and measures likely to be successful in addressing the identified challenges. This phase started in 2009.

Much of the research conducted by the IPP project has formed a cornerstone of the European strategy on sustainable consumption and production (SCP), which aims to broaden the focus beyond that of the IPP initiative to include the role of consumers, as well as potentially engaging with trading partners outside the EU. In July 2008, the Commission proposed a series of measures and projects on SCP, which included initiatives on private consumption, green public procurement, energy efficiency, and ecodesign (European Commission 2008).

Extended Producer Responsibility in the EU

In response to significant increases in the quantities of waste being generated and intensifying expectations among public and government authorities for improved environmental management of wastes, attention has also begun to shift toward producers

taking a more active role in managing end-of-life products. This new Extended Producer Responsibility (EPR) policy approach aims to shift responsibility for product-related environmental impacts away from public authorities to producers, with a particular focus on the end-of-life phase of the product life-cycle.

An important aim of EPR policy is to achieve the often contradictory objectives of reducing burdens on public authorities and taxpayers, while at the same time improving waste management and recycling standards. Implicit in the EPR policy approach is to bring new financial and management resources from business to bear on waste management issues.

EPR-type legislation has been implemented in many European countries across a broad mix of product types, most notably for packaging, but also for household hazardous wastes, medications, various batteries and accumulators, end-of-life vehicles, and for electrical and electronic equipment.

A critical and defining feature of producer responsibility systems is the creation of market-based incentives to influence the design of products and product systems. Lindhqvist (2005) at the International Institute for Industrial Environmental Economics describes four key policy objectives of EPR systems that are often articulated explicitly or are implied within legislation (Lindhqvist and Rossem 2005). These are to establish:

(1) effective collection of end-of-life products from consumers;
(2) environmentally sound treatment, including dismantling and/or sorting to enhance reuse and recycling potentials;
(3) reuse and recycling such that collected materials can displace extraction of virgin materials from the environment; and
(4) ultimately design improvement for products and product systems through the provision of market-based incentive structures for producers that endure over time.

These four overarching objectives can be considered a valid framework within which EPR systems can be evaluated.

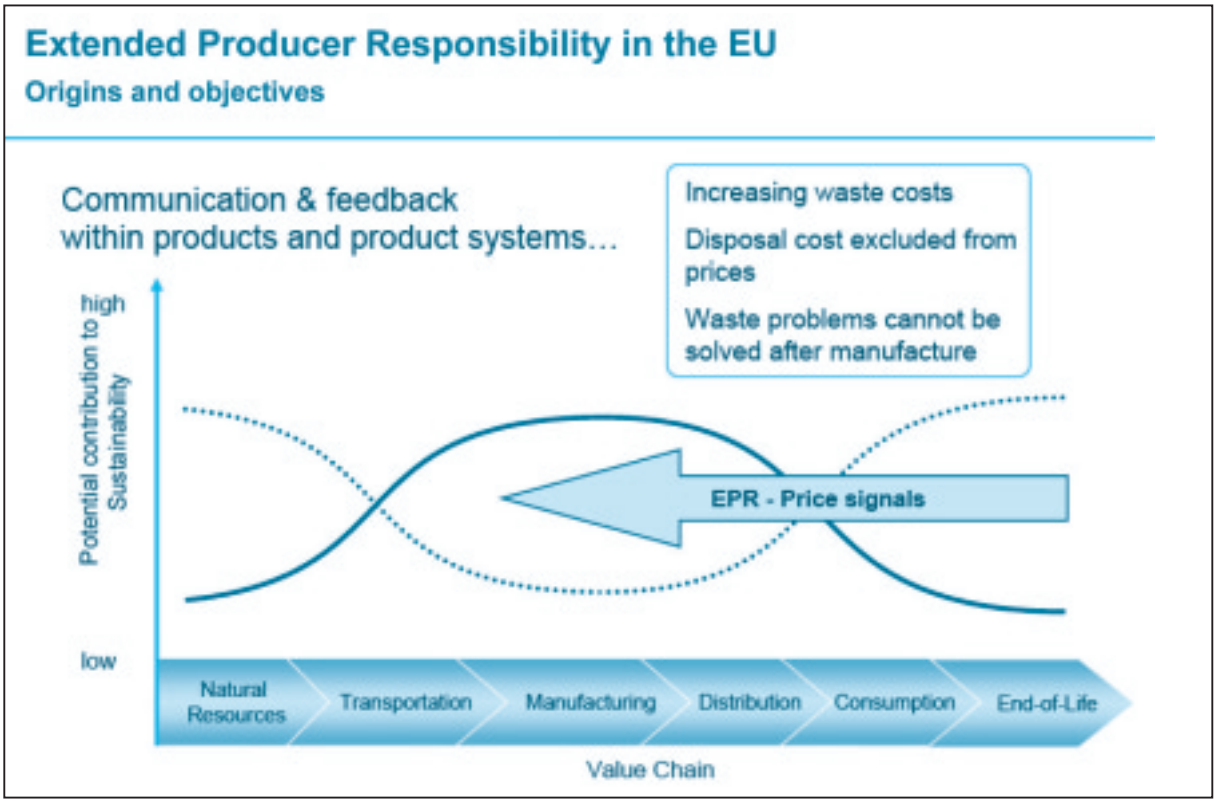

Figure 3-6: Origins and Objectives of Extended Producer Responsibility in the EU
Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

International Material Flows and EPR: Two European Cases

The overarching theme of this publication is to scope the potential role of EPR policy within a context of international flows of materials and resources. In principle, there are potential benefits to be realized from an increase in movement of post-consumer materials for environmentally sound recycling operations, as opposed to requiring that end-of-life products be managed strictly within national boundaries.

Overall, there are many positive effects of the internationalization of material movements in terms of trade in goods and services. While many environmental challenges have emerged, economic theories concerning the division of labor and economic specialization suggest that increases in productivity seen on the production and distribution side can be expected for product end-of-life management activities, if implemented properly and with effective monitoring.

There are now mounting questions whether similar benefits from increased internationalization of material flows in new goods and services can be effectively extended to end-of-life management activities. EPR policy tools have been suggested to hold the potential to unlock such benefits. Could international

level cooperation and investment partnerships in end-of-life processing technology help address pressing waste challenges across the Asia region? Are there opportunities to improve not only economic efficiency of product end-of-life management but also provide improved environmental management and employment opportunities in resource recovery and recycling operations?

If an 'international' EPR system is to proceed, concerned governments must be able to avoid potential pitfalls and provide the best opportunity for realizing the system's potential advantages. The German Packaging Ordinance and the European Directive on Waste Electrical and Electronic Equipment can provide some useful observations to inform a proposal for an EPR system operating in an international context.

German Packaging Ordinance

Among the world's first and probably most well known EPR system emerged under the German Packaging Ordinance. As detailed in a case study by the Organization for Economic Cooperation and Development (OECD) on the implementation of the Ordinance, the Germany policy in the 1980s of incinerating municipal solid waste was facing increasing public opposition (OECD 1998). At the same time, waste volumes continued to grow to a point where the country was facing a waste disposal crisis.

To overcome these challenges, the German government adopted the Packaging Ordinance following consultations with industry and consumers. This imposed significant packaging take-back and recycling obligations on industry. Specifically, the Ordinance established a requirement for retailers, rather than producers, to either take back packaging from consumers at retail shops or participate within a national collective system for packaging collection and recycling.

Recognizing the significant challenges associated with collecting used packaging at retail shops, the retail, consumer goods and packaging industry established a voluntary organization – the 'Duales System Deutschland' (DSD) – to collectively carry out their joint packaging management responsibilities under the Ordinance

The DSD organization established a packaging recycling and collection system across all of Germany that operated in parallel to the municipal waste collection system, hence its name meaning the 'dual' system. Collection and processing from households and small businesses is physically undertaken by service providers operating under contract to the DSD.

This service for used packaging recycling is provided by the DSD without directly charging consumers. However, to finance their activities, the DSD charge license fees to producers that sell package goods (in practice packers and fillers) using the well known 'Green Dot' trademark as a means to prove that appropriate license fees have been paid.

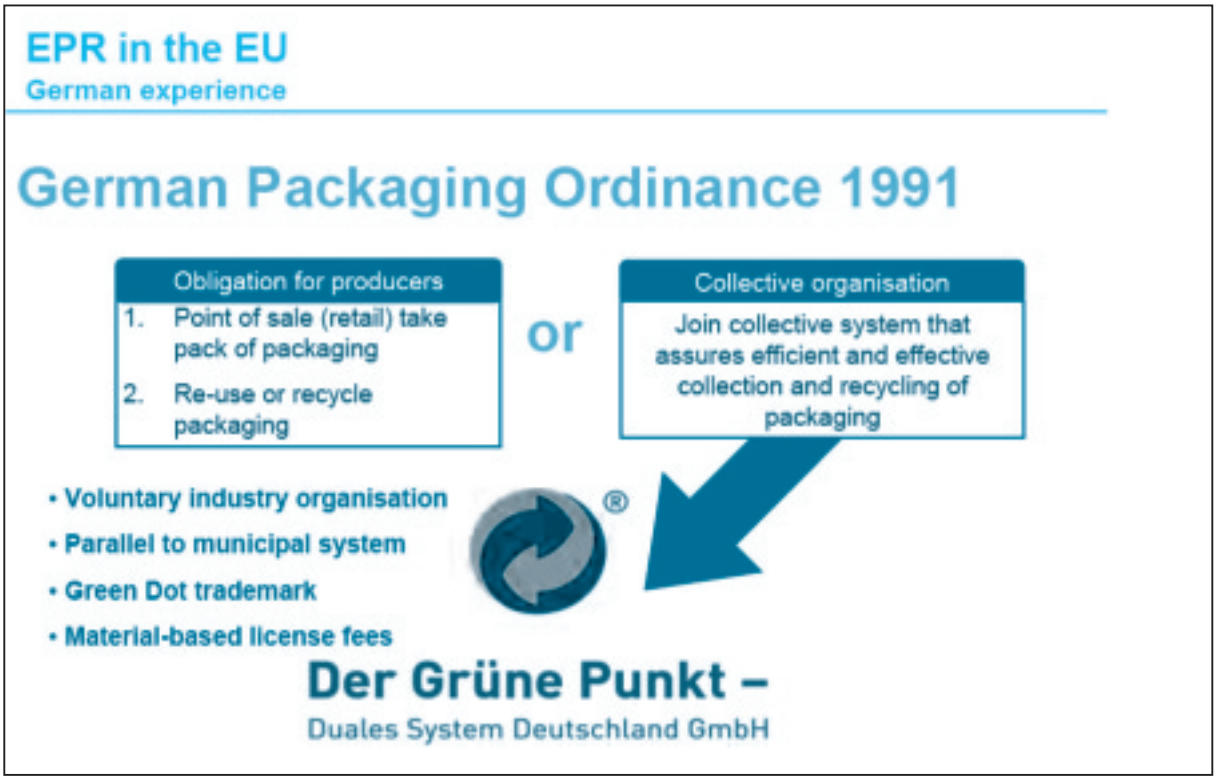

Figure 3-7: German Packaging Ordinance 1991

Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

From an environmental perspective, the Packaging Ordinance has been largely successful. The German Federal Ministry responsible for environmental protection indicates that recycling of packaging increased from some 2.85 million tonnes in 1991 to 5.6 million tonnes in 2000, a significant increase (German Federal Ministry for the Environment 2008). By 2005, although recycling of packaging fell slightly to 5.15 million tonnes, it is remarkable that the overall increases in recycling corresponded with an actual reduction in sales packaging placed on the market despite sustained increases in retail sales to consumers. This strongly suggests that the application of EPR policy was successful in preventing the generation of packaging waste in Germany through redesign efforts on the part of producers.

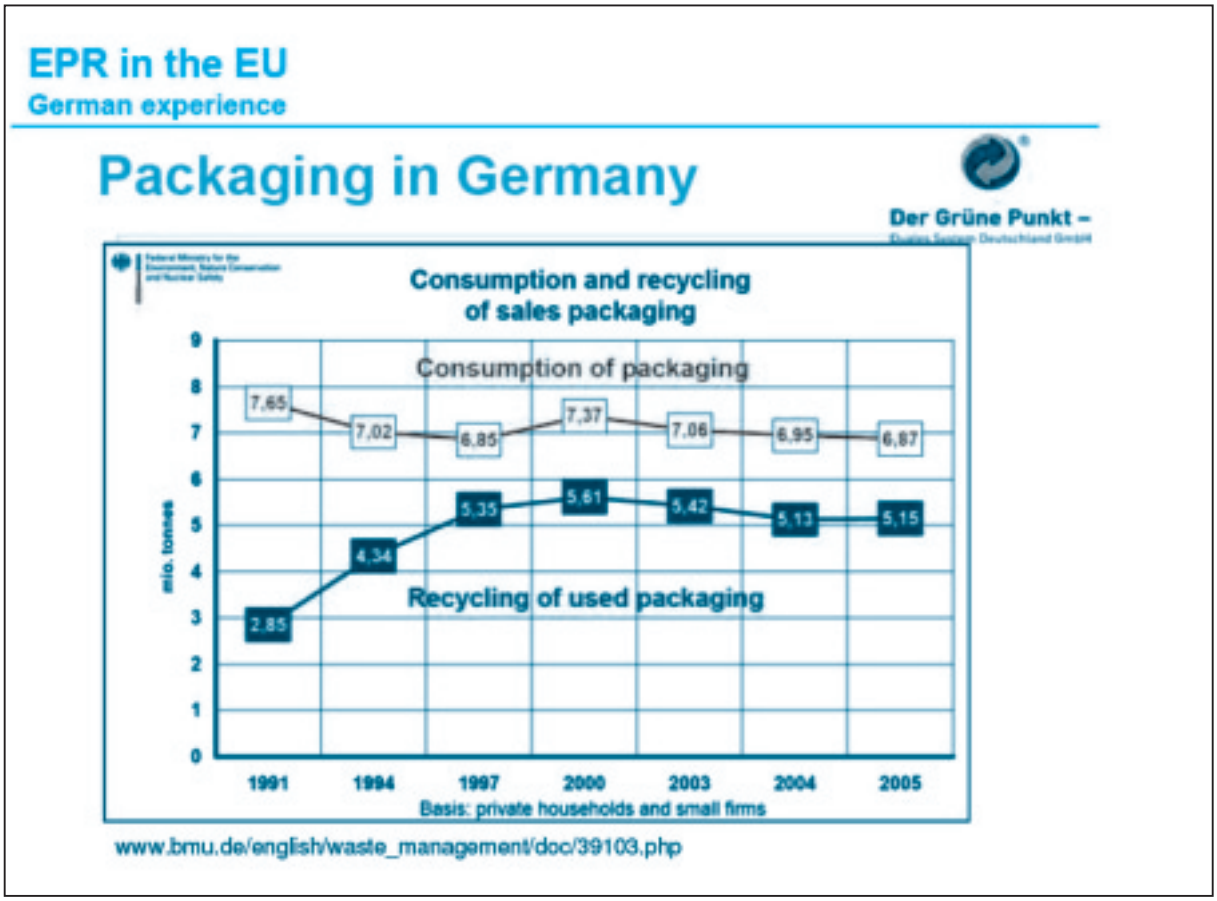

Figure 3-8: Consumption and Recycling of Packaging in Germany

Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

Despite the success of the program, a number of factors led to some significant implementation challenges. The Ordinance imposed very ambitious targets for packaging collection and recycling and imposed a very short timeline for implementation by industry. In addition, while the recycling sector saw new investment and increased capacity (particularly in material sorting capabilities), this new capacity was insufficient to process all the materials generated in Germany given the unanticipated enthusiasm for packaging recycling shown by consumers.

This forced the DSD to export materials to neighboring countries for recycling. Large-scale packaging waste exports, along with various measures on packaging waste that were eventually adopted by other European countries, caused significant reductions in prices for post-consumer commodities in Europe to a point where prices became negative in some cases (e.g. DSD would pay processors to accept the materials). These price impacts caused significant problems for other countries, whose recycling systems had traditionally relied on a positive market price for materials collected for recycling. The European Commission recognized these "serious internal market problems" (European

Commission 1994) concerning post-consumer packaging recycling.

The problems reached a point that EU member states and many businesses sought to resolve them by introducing the European Directive on Packaging and Packaging Waste. The Directive aimed to harmonize national approaches across the EU so that such market disruptions could be overcome and avoided in the future.

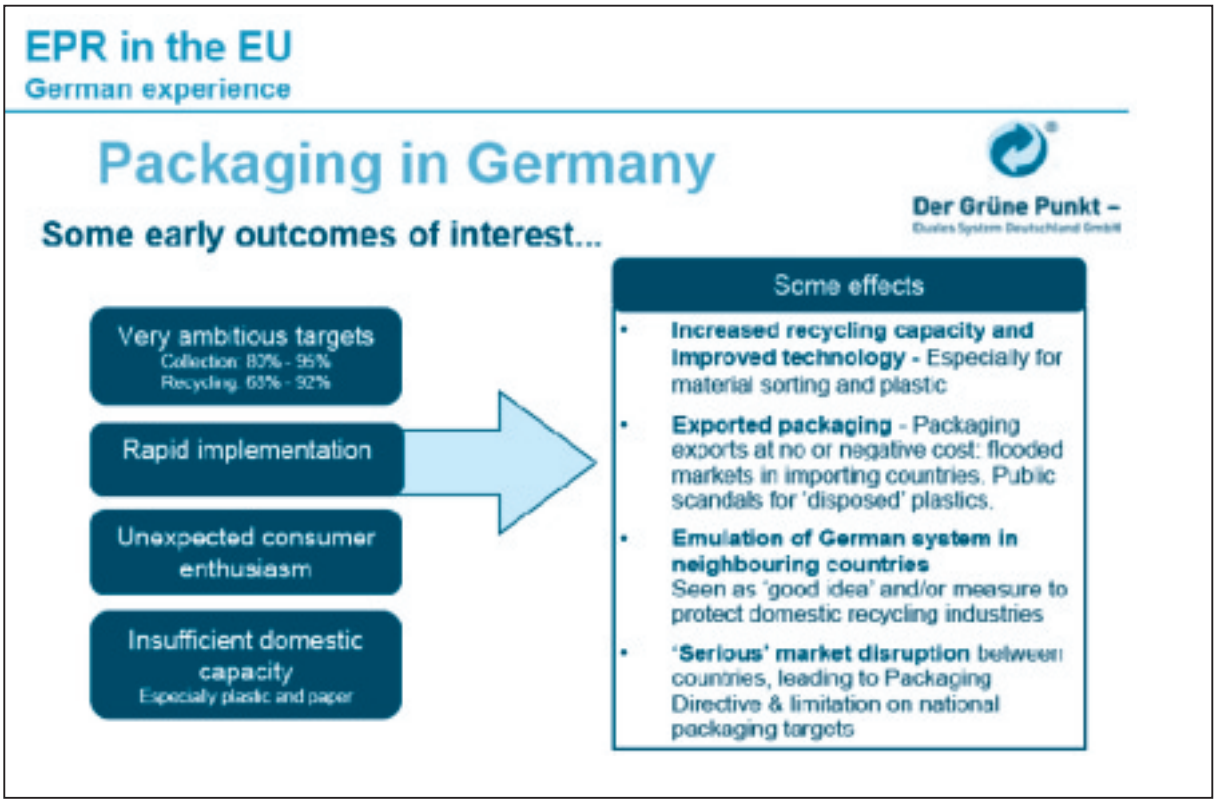

Figure 3-9: Some Early Outcomes of Packaging Ordinance in Germany

Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

Directive on Waste Electrical and Electronic Equipment

A second relevant European example of an EPR system operating across national boundaries is the transposition and implementation of the country-level national measures under the Directive on Waste Electrical and Electronic Equipment (WEEE).

The objective of the Directive is to reduce the quantity of WEEE disposed by ensuring consumers are provided access to take-back and recycling facilities free of charge, as well as by providing producers with incentives to consider environmental and end-of-life aspects in the design of electrical and electronic equipment (European Commission 2003b). Because products covered under the Directive can be in the hands of consumers for an extended period of time, the

Directive also required that producers provide a financial guarantee that ensures the viability of WEEE recycling in the event that a producer becomes bankrupt or exits the marketplace in the future.

The Directive was implemented in tandem with a separate but related directive restricting the use of prescribed hazardous compounds. Together, the two directives have established what many have referred to as a de facto global standard for recyclability and elimination of toxics in electronic products.

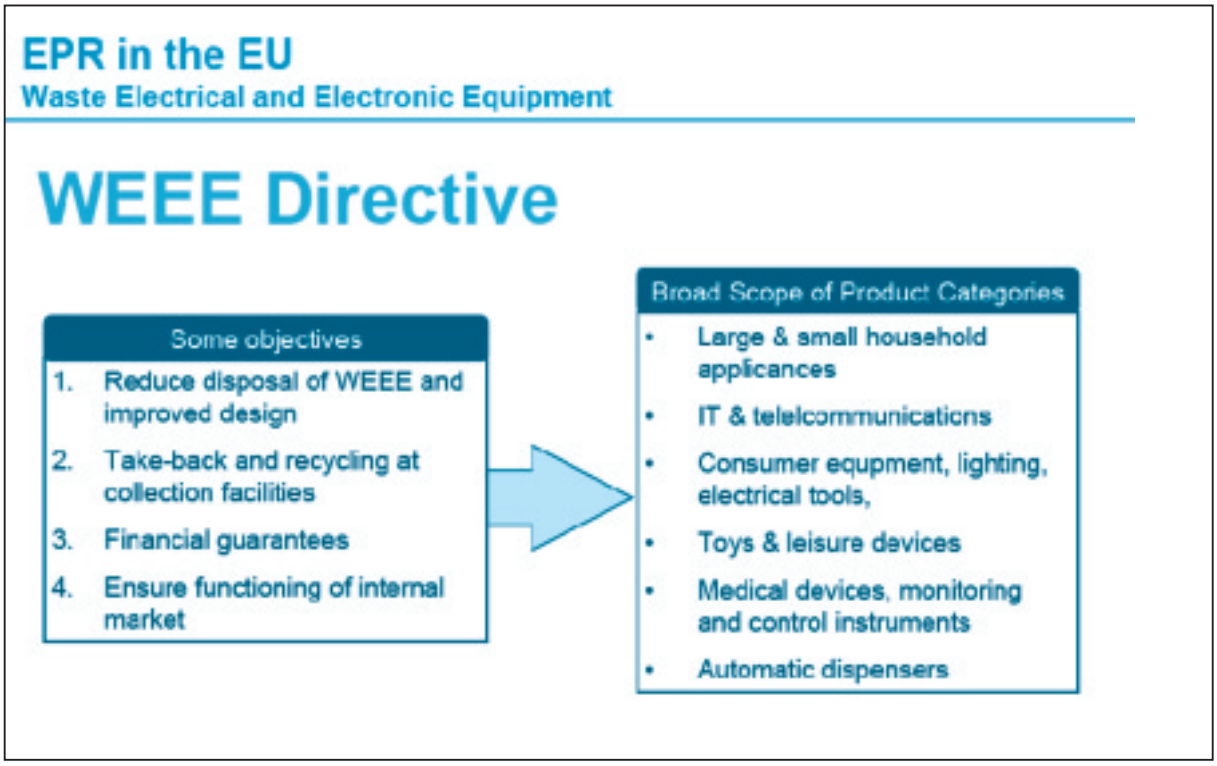

Figure 3-10: WEEE Directive

Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

Though an association of some 42 compliance systems, producers developed a common data management and reporting system to demonstrate results to regulatory authorities and ensure environmentally sound treatment of collected WEEE. The data management software tool is referred to under the name "'WF_RepTool" and is operated under the WEEE Forum umbrella organization (WEEE Forum). It enables compliance schemes and WEEE recycling and treatment firms to track and determine the results of the collection and treatment systems across the chain of ownership among multiple material streams, collection systems and treatment firms Europe-wide.

The Directive does not apply directly to firms, but rather requires that EU member states translate

the Directive's requirements into national law, a process referred to as "transposition". While high-level requirements for collection, recycling and treatment of WEEE are defined, many details were left to member states to decide during the transposition process.

The different interpretations of the Directive' s requirements and differing environmental ambitions of member states resulted in some important legal and administrative differences in the transposition process. The effect of these different interpretations and approaches in the member states was analyzed in 2006 by Lindhqvist, Tojo and Van Rossem at the International Institute for Industrial Environmental Economics (IIIEE) at Lund University. In their study, entitled "Lost in Transposition? A study of the implementation of Individual Producer Responsibility in the WEEE Directive", they identified a number of key areas that presented substantial barriers to achieving the Directive's objectives (Lindhqvist et al. 2006).

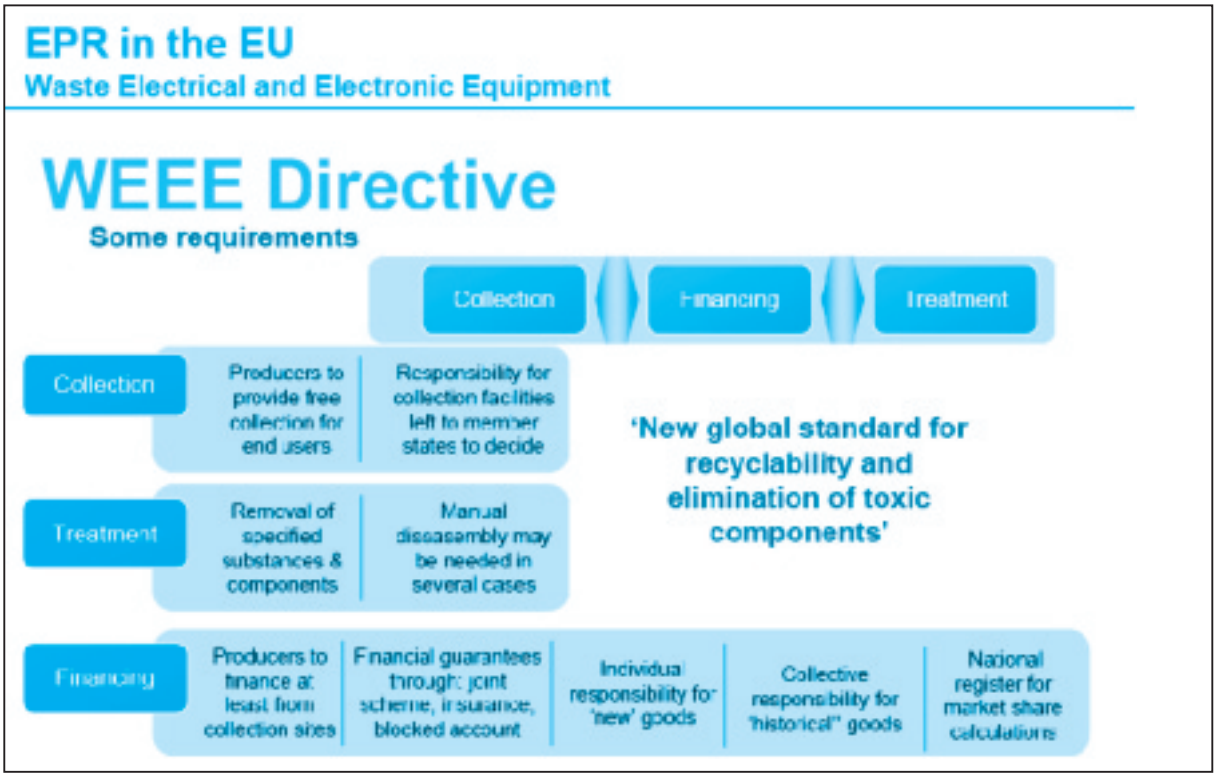

Figure 3-11: Some Requirements of WEEE Directive

Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

One of the key problems identified in the IIIEE study is that member states have different provisions for collection facilities. Some states require producers to provide and pay for these facilities themselves, while others in effect allocated this important responsibility to municipal governments. This difference has had the practical effect of preventing individual firms from operating their own systems, since public authorities have been disinclined to make separate collection arrangements with multiple producer systems. Many people have characterized this as a significant obstacle in incentivizing innovation and ecodesign.

Other significant differences that were identified include legal and administrative mechanisms for producers to provide financial guarantees, as well as substantial differences in the interpretation of how to implement the Directive's requirement for "individual responsibility". These differences have had the effect of creating a substantially fractured market that decreases the likelihood of achieving the Directive's overall environmental ambition of waste prevention through improved environmental design.

These problems were significant enough that the European Commission announced its intention in 2006 to undertake a review process on the transposition of the Directive by member states. The review was completed in December 2008, and proposals were made to amend the Directive to address key challenges. Key proposed changes include harmonizing registration and reporting obligations for producers and to require inter-operability of national registers; introducing a mandate for a 65% recovery rate target in each member state and a combined recycling and re-use target to facilitate reuse; and setting minimum inspection and monitoring requirements, especially for waste shipments.

Discussion

While the European context is in many ways unique, and conditions in other regions can differ substantially, the brief discussion above was presented in order to highlight some key issues that may be relevant to a discussion on application of the EPR policy principle in the Asia region.

Figure 3-12: Key Learnings from Packaging Ordinance in Germany and WEEE Directive
Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

When considering the implementation of the German Packaging Ordinance, the transboundary movement in secondary or recyclable materials can pose substantial challenges when overall conditions and markets for end-of-life materials differ. This is especially true when there is insufficient domestic capacity in the receiving country to process the imported materials, even where there is a sound tracking of materials from the country of origin through to the processing and recycling in the receiving country.

Expanding the amount of materials received for processing would seemingly increase opportunities for waste processors, while generating additional investment and expanded capacity in receiving countries. However, this is not necessarily the case. Where imported materials displace materials generated domestically in securing access to processing capacity, there is a very real risk of increased dumping or a reduction in recycling of domestic materials within the receiving country. This could be particularly problematic where large international firms negotiate preferential access to processing facilities in receiving countries, in effect squeezing out domestic sources of recyclable materials.

With regard to stimulating new technologies, the European experience has indeed shown a clear development of new technologies following the introduction of EPR legislation. However, the relative technological positions of the various EU

countries are fairly similar, and many countries are among the leading technological economies globally.

In Asia, however, there can be significant differences in technology development, both between different countries in the region and within countries (e.g. urban versus rural areas). In order for any EPR system to be effective internationally, significant attention will need to be given to ensuring that the overall management of materials results in improved environmental outcomes and that the system leads to an improved application of technology to manage end-of-life products in both exporting and importing countries.

It also clear from the European experience that organizing effective end-of-life management for complex and durable products, such as electronic and electrical equipment, is substantially more complicated than for simple short-lived products like packaging. Thus, a core issue that must be addressed in any international trade in complex end-of-life products is treatment standards and enforcement of those standards. It is clearly undesirable if the end-of-life management that occurs in a receiving country results in a lower standard of care than what would be expected in the exporting country.

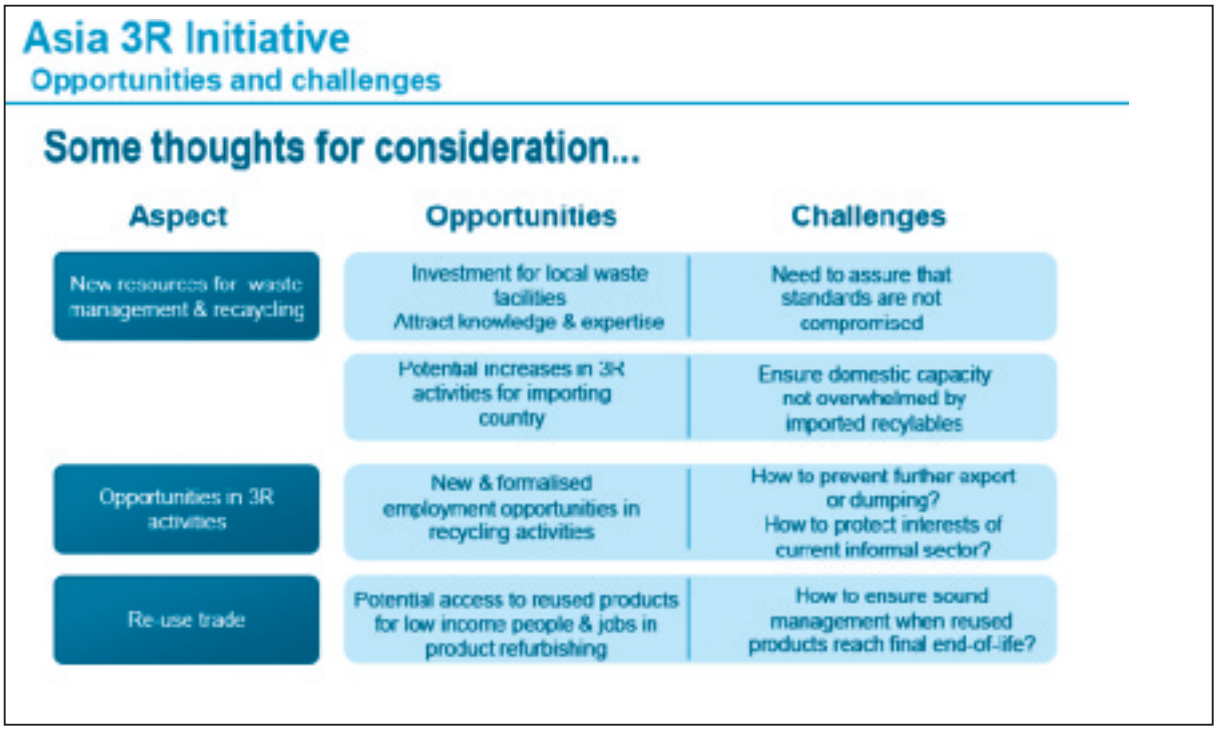

Figure 3-13: Opportunities and Challenges for Asia 3R Initiative

Source: The UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP)

When considering international trade of goods for reuse (so-called "second-hand markets"), another relevant issue is how an EPR system that operates at an international level would manage the inevitable final end-of-life disposal of used products if they have traded hands a number of times across multiple borders. In such cases, it is difficult to identify a "producer". This is especially relevant to products with a longer life that tend to become discarded due to obsolescence in more technologically advanced countries, but retain productive value in other regions. Such products include mobile telephones, automobiles and industrial machinery.

Conclusion

This chapter has sought to provide an overview of the European Integrated Product Policy initiative, its relationship to resource efficiency efforts in Europe and to emerging global sustainable consumption and production policies. In the context of international material flows and EPR policies, the German Packaging Ordinance and the European Union Directive on Waste Electrical and Electronic Equipment were also profiled. In both these cases, the importance of harmonizing key aspects of EPR legislation was highlighted.

The chapter further emphasized the need to ensure sound environmental management across all phases of product life-cycles and that environmentally-sound life-cycle management should be the paramount objective within an EPR program, whether implemented at a national or international scale. Should an EPR system be undertaken in the Asia region, it is hoped that environmental, social and economic benefits can be realized for participating countries.

As with any economic trade agreement, an international application of the EPR principle poses both opportunities and risks for the countries involved. For potential importing countries, there are opportunities to secure new investments in recycling and processing capacity and to formalize the current informal workforce that is present in the recycling sector of several Asian countries. Taking these steps may offer potential for new investments and increased access to environmental technologies and economic development opportunities.

However, there will be a need to ensure that environment and social standards are not compromised and that environmental outcomes for materials processed in receiving countries are at least as sound as those in exporting countries. Furthermore, where there are significant differences in the cost of processing end-of-life materials between countries, steps will need to be taken to ensure that markets for recycled materials in lower-cost countries are not overwhelmed by imported materials. Moreover, where new recycling technologies are installed, the interests of participants within the current informal sector must be considered and disruptive workforce displacement must be avoided.

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4. The Emerging Need for Sharing Environmental Product Information and Reconsidering the Producers' Informative Responsibility[18]

Shiko Hayashi
Yasuhiko Hotta
Hideyuki Mori

Abstract

This chapter will briefly review how the EPR concept was originally designed and how it has been implemented in actual product policies. The original vision of the EPR concept and its implementation are analyzed from the standpoint of the regime assigning the producers' responsibility for their products including the post-consumer stage, with a focus on "producers' informative responsibility"[19].

The chapter will also emphasize the need for producers' informative responsibility, with reference to rising needs for environmentally sound management and resource recovery of waste electrical and electronic equipment. Such a responsibility requires producers to share information on what substances are contained in a product and how the product should be treated by various stakeholders through the entire product life-cycle, especially at the end-of-life stages. The chapter concludes with a suggestion that, in order to effectively utilize information about products' environmental properties, current EPR-based policies should expand their scope to mandate informative responsibility.

The original vision of EPR concept and its actual implementation

Original vision of the EPR concept

The term "Extended Producer Responsibility" (EPR) was first presented and defined by Thomas Lindhqvist in the early 1990's. EPR is a market-oriented environmental policy concept aimed at reducing the environmental burdens of a product through its life-cycle, especially at the end-of-life stage (Roine and Lee 2006). Under the

[18] This chapter is based on chapter 2 of the research report, "Research on management measures of hazardous and valuable substances contained in products toward sound international resource circulation (written in Japanese)", prepared by IGES in March 2009, under the research project funded by the Ministry of the Environment, Japan Grant-in-Aid for Scientific Research in 2008.

[19] Informative responsibility requires producers to supply information on the environmental properties of the products they are manufacturing (Lindhqvist, 2000).

concept, producers are assigned certain types and levels of responsibility for their products, and their responsibilities are extended to the post-consumer stages. Two major policy features include: 1) transferring the responsibility for managing end-of-life products from municipal governments to private producers; and 2) providing incentives to producers so they will incorporate environmental considerations into the design of products (OECD 2001).

Lindhqvist originally defined EPR as follows:

"Extended Producer Responsibility is an environmental protection strategy to reach an environmental objective of a decreased total environmental 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. The Extended Producer Responsibility is implemented through administrative, economic and informative instruments. The composition of these instruments determines the precise form of the Extended Producer Responsibility."
(Source: Lindhqvist (1992).)

According to the EPR principle introduced by Thomas Lindhqvist (2000), a product's ownership is categorized into various elements of responsibility: financial, physical, liability, and informative (Figure 4-1).

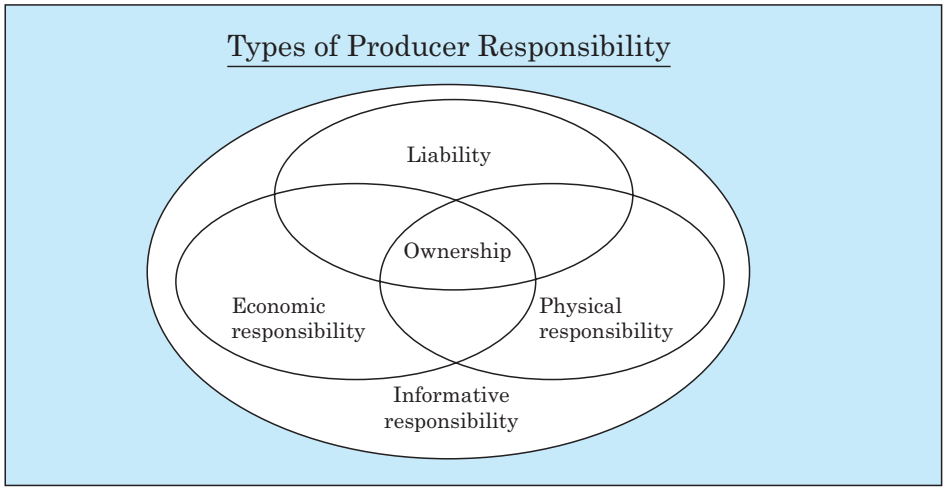

Figure 4-1: Types of producer responsibility under EPR concept
Source: Lindhqvist (2000).

Financial responsibility requires a producer to cover the costs incurred for managing their end-of-life products, including collection, recycling, and final disposal. Physical responsibility requires a producer to take back their end-of-life products and to properly treat and recycle those products in line with some established standards. Liability requires a producer to compensate for environmental damages caused by the product. Finally, informative responsibility requires producers to provide information on the environmental properties and composition of their products to consumers and recyclers. It is regarded as a basis for all other elements of producers' responsibility as shown in the Figure 4-1.

Implementation of EPR-based policies depends on a combination of different policy instruments (Table 4-1) and the level to which each instrument is legally binding. Each country introduces EPR-based legislation in a different manner; thus, EPR-based policies have been implemented differently among countries.

Table 4-1: Policy instruments for the EPR-based policy

Administrative instruments	Collection and/or take-back of discarded products, substance and landfill restrictions, achievement of collection, re-use(refill) and recycling targets, fulfillment of environmentally sound treatment standards, fulfillment of minimum recycled material content standards, product standard, utilization mandates
Economic instruments	Material/product taxes, subsidies, advance disposal fee systems, deposit-refund systems, upstream combined tax/subsidies, tradable recycling credits
Informative instruments	Reporting to authorities, marking/labeling of products and components, consultation with local governments about the collection network, information provision to consumers about producer responsibility/ source separation, information provision to recyclers about the structure and substances used in products

Source: Tojo. (2004).

Under the original EPR concept, these elements of responsibility are fully assigned to an individual producer, an arrangement usually referred to as "Individual Producer Responsibility" (IPR) (Lindhqvist 2000). Under an IPR arrangement, an individual manufacturer is responsible for the end-of-life management of their own products (Tojo 2004).

Such an arrangement provides an effective incentive for producers to improve their product designs to minimize costs at the end-of-life stages. In pursuit of cost-savings, producers will make their products more environmentally-benign by using fewer harmful substances and facilitating easier recycling or treatment at the end-of-life stage (Lifset and Lindhqvist 2008). This preventive approach lies at the core of the original EPR concept.

Under such circumstances, if a rational producer is given an incentive to disclose accurate and relevant environmental information about their products to recyclers, it will be possible to promote improvements in safety and efficiency of recycling processes and to realize cost savings

by an individual producer at the recycling and recovery stages (Toffel 2003).

However, in most cases where EPR legislation is in place, IPR arrangements are not practiced. Where they are in place at some extent, the regime is often not strong enough to give an individual producer enough economic incentive to improve their product designs. As a result, incentive mechanisms are falling short in promoting design for environment.

Actual implementation of the EPR concept

The "Guidance Manual for Governments" published by the Organization for Economic Cooperation and Development (OECD) in 2001 defines the EPR concept as

"an environmental policy approach in which a producer's responsibility, **physical and/ or financial, fully or partially**, for a product is extended to the post-consumer stage of a product's lifecycle" (OECD 2001 p.18).

While financial and physical responsibilities are stipulated as core elements, the provision of information (and liability) is regarded as a secondary responsibility assigned to producers.

In most countries where EPR-based legislation has been introduced, producers of similar product groups have established a producer responsibility organization (PRO), which typically organizes a national collection scheme for the end-of-life products concerned (OECD 1996) (Table 4-2). Under a PRO scheme, producers ensure the end-of-life management of their products regardless of brand, an arrangement usually referred to as Collective Producer Responsibility (CPR).

Table 4-2: Cross-country comparison of the EPR-based policies for WEEE

	Waste Electrical and Electronic Equipment (WEEE)					
	OECD	Europe				
		EU	Germany	U.K.	France	Switzerland
Legislation	Guidance Mannual for Governments	WEEE Directive	Electrical and Electronic Equipment Act (ElektroG)	The Waste Electrical and Electronic Equipment Regulations	Decret No 2005-829	Ordinance on the Return, the Take Back and the Disposal of Electrical and Electronic Equipment
(year of promulgation)	2001	2003	2005	2006	2005	1998
Existence of PRO	Third party organization which collectly manages the take-back of products on behalf of an individual producer	At least one PRO in a country	Elektro-Altgeraete-Register (EAR)	Producer Compliance Scheme	Eco-organismes	PROs (e.g. SWICO and SENS)
Physical responsibility	Responsibility of proper treatment of the end-of-life product	Separate collection (Article 5), Treatment (Article 6), and Recovery (Article 7)	Producer Obligation to Take Back WEEE (Article 10), Treatment (Article 11), and Recovery (Article 12)	Obligation to join a scheme (Article 10)	Separate collection (Article 10) and Treatment (Article 14)	Mandatory Take Back Obligation (Article 4) Mandatory Disposal Oblifation (Article 5)
Financial responsibility	Responsibility for paying all or part of the costs incurred for managing the end-of-life product	Financing in respect of WEEE from private households (Article 8)	Clearing House, Registration and Financing Guarantee (Article 6)	Financing (Article 8 and 9)	Financing the cost of collection (Article 8)	
Informative responsibility (the provision of information)	Not stipulated in the definition of EPR	Information for treatment facilities (Article 11)	Producers' Information and Reporting Obligations (Article 13)	Information on new types of EEE (Article 17)	Provision of product information to treatment facility (Article 7)	Not stipulated
Restriction of the use of certain hazardous chemicals in articles	—	RoHS Directive	Integrated in ElektroG	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations	Integrated in Decret No 2005-829	the Ordinance on the Reduction of Risks from Chemicals
(year of promulgation)	—	2003	2005	2006	2005	2006

Waste Electrical and Electronic Equipment (WEEE)				End-of-Life Vehicle	Packaging
North America	Asia				
U.S. (California)	Japan	China	South Korea	Sweden	Germany
Electronic Waste Recycling Act of 2003	Electronic Home Applinace Recycling Law	Regulation on the Administration of the Recovery and Disposal of Waste Electrical and Electronic Products	The Act for Resource Recycling of Electrical/Electronic Products and Automobiles	Motor Vehicle Scrapping Act The Ordinance on Producer Responsibility for Cars	Ordinance on the Avoidance and Recovery of Packaging Wastes
2003	1998	2009	2007	1975 and 1997 respectively	1991
California Integrated Waste Management Board	PROs (Group A and B)	Establish a fund for managing WEEE and use a fund for costs of collection and waste treatement	Korea Environment & Resources Corporation (ENVICO)	BIL Automobile Producer Responsibility Sweden	Duales System Deutschland (DSD)
Recycling Covered Electronic Waste (SB20/SB50)	Obligation to Collect (Article 17)	Recovery and disposal of WEEE listed in the Catalogue (Article 3)	Recycling Requirements of Manufacturers and Importers (Article 15)	BIL certified dismantler collect and treat the end-of-life vehicles from the last owner with free of charge	Private collectors bring the EoL products to recycling companies on commissioned by DSD.
Funding system for the collection and recycling (Electronic Waste Recovery and Recycling Account)	Charges for Fees (Article 19)	Contribution to the Fund for the disposal of waste electric and electronic products (Article 7)	Collection of Recycling Charges for Electrical and Electronic Equipment (Article 18)	BIL paid treatment costs to dismantlers (BIL: Swedish Automobile Manufacturers and Wholesalers)	Producers pay license fees to DSD
Not stipulated	Not stipulated	Provision of Recycling Information（Article 10）	Provision of Recycling Information（Article 13）	Provision of Recycling Information (Section 10）	Not stipulated
Integrated in Electronic Waste Recycling Act of 2003	Law for Promotion of Effective Utilization of Resources（J-moss）	Administration on the Control of Pollution Caused by Electronic Information Product（China RoHS）	Integrated in the Act for Resource Recycling of Electrical and Electronic Equipment and Vehicles	—	—
2003	2006	2006	2007	—	—

Source: compiled by authors

Under a CPR scheme, the member companies of a PRO are often charged identical flat recycling fees per unit of weight. Therefore, the benefits of taking individual actions (e.g. redesigning products so that they are easier to recycle) are not directly returned to the company that made the effort, but are instead shared and diluted among a group of producers (Toffel 2003). As a result, each producer is given little incentive to improve their product designs (Lindhqvist and Lifset 2003). Thus, CPR regimes have not been fully effective in achieving the core intentions of EPR (Lifset and Lindhqvist 2008).

Comparing the two different arrangements, an IPR arrangement is more effective than a CPR arrangement in providing producers incentives for design improvements (Tojo 2004). Even though IPR arrangement puts into place, however, if the recycling fees are set at flat rate, the regime has not given strong incentive for an individual producer to promote the design improvements of their own products.

In addition, CPR regimes have given little incentive for an individual producer to collect and disseminate information that could help reduce the costs of end-of-life treatment. Therefore, producers rarely provide information under current EPR-based policies. This represents a failure to give individual producers strong incentives to make design changes, although this responsibility is clearly stipulated in the legislation of some countries (Table 4-2). As a result, information exchange between producers and recyclers has not been practiced.

Rising need for sharing information on product compositions

The latter half of the paper discusses the need for sharing information on product compositions focusing on waste electrical and electronic equipments (WEEE). In many countries, the EPR concept has been applied to WEEE with the aim of separating it from flows of municipal solid waste management. Because of their complex compositions, which include both hazardous substances and precious metals, information sharing is crucial to promote safe and efficient recycling of WEEE.

WEEE contains both hazardous and precious substances

Some WEEEs include highly toxic heavy metals, such as lead, mercury, cadmium, and brominated flame retardants (Table 4-3). If WEEEs are not properly treated, hazardous chemicals can be released into the environment and may impact human health. At the same time, many products, especially printed circuit boards, contain valuable metals and other materials which can be economically profitable to recycle. These metals include iron, aluminum, nickel, gold, silver, copper, and some rare metals (Table 4-4).

Table 4-3: Contents of hazardous chemicals contained in electrical and electronic products

Part	Chemicals
Batteries	cadmium, lead, lithium mercury
Printed circuit boards	antimony, beryllium, cadmium, chlorine and/or bromine, and lead
Cathode ray tube	antimony, barium oxide, cadmium sulfide, lead, phosphors
Liquid crystal displays	mercury in liquid crystal
Plastics	polyvinylchloride (PVC), brominated flame retardants (BFRs), cadmium,

Source: based on the work by Oyuna Tsydenova

Table 4-4: Contents of selected metals in the printed circuit boards of seven types of electronic products

Products	Valuable metals contained in products
TV (CRT monitor)	gold, silver, copper, platinum, antimony, nickel, yttrium, neodymium, iron, and aluminum
Washing machine Air conditioner Refrigerator	gold, silver, copper, platinum, antimony, iron, and aluminum
TV (LCD, plazma)	gold, silver, platinum, antimony, indium, yttrium, iron, aluminum

Source: Recycle One (2007)

Rising concerns for environmentally sound management of electrical and electronic wastes and resource recovery from waste electrical and electronic equipments

Concerns about improper treatment of WEEE are rising, especially in communities that handle the recycling and disposal of the equipment. In some developing countries, people in such communities undertake primitive recycling processes/techniques – e.g. open burning of plastics and wires and open melting of printed circuit boards in acid baths – with their bare hands with no or very little protective equipment or pollution control measures. As a result, these communities experience high levels of localized air and water pollution and soil contamination, which pose serious health risks for the communities (Wong et al. 2006). In addition, some heavy metals contained in the residues from the recycling processes are sent to municipal landfills. As a result, toxins such as lead, mercury and cadmium can leach into groundwater (Yang et al. 2008).

In response to these concerns, a number of developing countries began to develop policy initiatives similar to those of the European Union's Restriction on Hazardous Substances (RoHS) Directive and Waste Electrical and Electronic

Equipment (WEEE) Directive.

At the same time, policymakers still recognize the importance of recovering valuable metals from WEEE. The recent steep rise in resource prices has led to increased interest in recovering some precious metals, especially rare metals, from WEEE.

In addition, the Japanese government has initiated several model projects aimed at recovering rare metals from small electronic wastes, such as mobile phones, digital cameras, and portable music devices. Five municipalities – Akita, Fukuoka, Ibaraki, Tokyo, and Minamata-city – have already started model projects to collect small electronic equipment in order to recover rare metals. Also, Sony Corporation has started an experimental project to collect small electronic equipment in collaboration with Kitakyushu's municipal government in 2008.

Importance of information sharing

Sharing information on product composition (e.g. how much toxic substances and precious metals are contained in different parts of a product) between producers and recyclers can be a key tool in promoting environmentally sound management of WEEE and recovering valuable metals from those wastes. In turn, this can lead to higher recycling rates and higher quality of recycled materials (Bengtsson, 2009).

In fact, this is stipulated as an important feature in EPR-based legislation of some countries (Table 4-2). In the EU's WEEE Directive, the producer's informative responsibility is stipulated as follows:

"Information on component and material identification to be provided by producers is important to facilitate the management, and in particular the treatment and recovery/recycling, of WEEE."
Source: Directive 2002/96/EC of the European Parliament and of the Council, (22).

"Member States shall … ensure that producers provide reuse and treatment information for each type of new EEE put on the market … This information shall identify … the different EEE components and materials, as well as the location of dangerous substances and preparations in EEE."
(Source: Directive 2002/96/EC of the European Parliament and of the Council, article 11-1.)

In addition, several global forums have focused on the role of information sharing and identified a need for improvement. One example is the recent "Informal Workshop on Stakeholders' Information Needs on Chemicals in Articles/ Products" organized by UNEP and Sweden. In the workshop, participants recognized that information exchange is one key factor to enable stakeholders to avoid and/or properly manage hazardous chemicals and reduce risks to human health and the environment (UNEP 2009). Similarly, a recent study in Japan identified a clear need for improved availability of information on products' composition, including both valuable metals and hazardous chemicals. Studies in the EU and the US have made similar conclusions[20].

[20] Interview survey is conducted by IGES to various stakeholders, including recyclers, manufacturers, industrial association, municipalities, and researchers, under the research project funded by the Ministry of the Environment, Japan Grant-in-Aid for Scientific Research in 2008.

Producers' informative responsibility should be effectively utilized under the current EPR-based policy

This chapter briefly reviews how the EPR concept was originally designed and how the concept has actually been implemented in product policies, with a special focus on producers' informative responsibility. It is observed that incentives for product redesign have not been fully effective in policy implementation and that the provision of information has been limited. However, increasing calls for environmentally sound management of durable goods, such as WEEE, and efficient resource recovery from such wastes are putting pressure on producers to share information on substances contained in products, including both hazardous chemicals and precious metals. This is in line with the original intention of the EPR concept.

To make sure that adequate product information is made available to those who need it, we recommend that the current EPR-based policies should explicitly require and enforce the producers' provision of information. As argued above, this would promote both the environmentally sound management of WEEE and effective resource recovery.

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Section III

Current EPR Policies in Developing Asia

5. Circular Economy and EPR Mechanism in China: Current Situation and Perspectives

Xuejun Wang
Katharina Kummer Peiry

Background

China has been experiencing rapid economic growth for over thirty years, with an annual average GDP growth rate of about 9% over that period. This rapid growth has brought about a significant improvement in living standards has contributed significantly to poverty reduction and job creation.

However, despite bringing many benefits, this rapid growth has not come without a price. Unsustainable growth patterns have triggered significant environmental problems, including depletion of natural resources, degradation of ecosystems, and declining air and water quality due to rising pollutant levels.

According to the 2006 State of Environment Report of China, 54% of river sections of the country's seven major water systems did not meet minimum surface water standards. Almost half of these river sections were placed in Category V, the worst in China's surface water standards system (SEPA 2007). Meanwhile, sulfur dioxide (SO_2) emissions reached 25.89 million tons, far more than the 12 million tons called for by the national ambient standards.

In recent years, China has become the manufacturing center of the world. In 2004, China produced a staggering percentage of the world's appliances, including refrigerators (40%), washing machines (40%), air conditioners (80%), vacuum cleaners (60%), and electric irons (60%).(China Household Electric Appliance Research Institute 2006). While many of these electronics products (or "e-products") are exported, a growing number are staying in China for local consumption, including roughly 130 million refrigerators, 170 million washing machines, and 400 million televisions.

With so many electronics products in China, the country must now manage increasing amounts of "e-waste" that is being generated on their own soil. Since 2003, the Chinese discard about 4 million refrigerators, 6 million washing machines and 5 million televisions each year (Zheng 2007).

Besides domestic e-waste, China also accepts tens of millions of discarded electronics equipment every year from the developed world. It has been estimated that around 70% of the world's e-waste ends up in China (Tao and Yuping 2007). The most infamous destination for e-waste is Guiyu in Guangdong Province. The city is almost entirely devoted to receiving e-waste shipped from the United States, Europe, and Japan. In Guiyu and other destinations, poor management of e-waste has led to serious pollution of the soil, water and air, which in turn has caused serious health problems for affected communities

Partly in response to the mounting e-waste problem, the Chinese government developed a new national economic framework – the Circular Economy (CE) – in an unprecedented effort to integrate economic, environmental, and social strategies to achieve very high resource efficiency.

On January 2009, a Circular Economy Promotion Law (CEPL) went into effect. This groundbreaking legislation, which was adopted by the Standing Committee of the National People's Congress on August 29th, 2008, offers a long-term transformational plan. Unlike recent efforts in other countries, it is largely seen as an economic approach rather than an environmental one and is managed under the National Development and Reform Commission (NDRC), not under environmental protection agencies, such as the State Environmental Protection Administration (SEPA).

At the heart of the CE is life cycle management, which looks at the economic and environmental impacts across the full life cycle of products, from the mining or extraction of raw materials used in production and distribution, to its use, possible reuse or recycling, and eventual disposal. Promoting the CE involves controlling material and energy flows along the entire life cycle of products through the implementation of the 3R principles (reduction, reuse and recycle) with the support of government policies and market mechanisms. This involves changing the traditional linear patterns of material flow of "resources—products—wastes" to a new pattern of "resources–products– recycled resources" in order to reduce the harmful impact of socio-economic activities on the environment (Kummer 2007).

The CEPL also adopted the concept of Extended Producer Responsibility (EPR), which is a widely accepted concept in western society and has also been widely discussed in China (Sifeng and Jing 2005, Xisheng and Guopeng 2005).

It is widely believed that the adoption of an EPR mechanism in China could help mitigate environmental problems that occur from the use and disposal of e-waste. However, experiences in the European Union (EU) show that the implementation of an EPR system faces many hurdles. Therefore, careful study must be carried out and the responsibilities of enterprises, consumers and governments allocated reasonably.

CE and EPR Legislation in China

The CEPL is the culmination of many years of legislative progress that has shifted environmental management from end-of-pipe pollution control to whole life cycle

management. Throughout this decade, the Chinese government has promoted CE through legislation, policy-making, regional planning, pilot projects and many other ways. This section reviews how recent legislation has promoted EPR.

The main piece of legislation on waste management is the **Solid Waste Pollution Prevention and Control Law**, which was enacted in 1996 and subsequently amended in late 2004. It provides stipulations on the responsibilities of manufactures, sellers, importers and users (consumers) on solid waste pollution prevention and control. These include:

- Article 5: Manufactures, sellers, importers and users of products shall, in accordance with law, be responsible for preventing and controlling pollution by solid waste generated by products.
- Article 37: Used electrical appliances, automobiles and vessels shall be dismantled, utilized and disposed of in compliance with the relevant laws and regulations, and measures shall be taken to prevent environmental pollution.

However, the Law offers no specific and concrete collection and reuse/recycle measures.

The **Cleaner Production Promotion Law**, enacted in 2003, deals with pollution prevention in production processes. This Law was widely criticized because it is quite general and there is a lack of detailed implementation provisions. However, there are some stipulations that are relevant to the concept of CE, including:

- Article 27: If any product or package is listed in the compulsory retrieval directory, the production or sale companies shall have the obligation to retrieve the discarded product or the used package. The compulsory retrieval directory of products and packages shall be formulated by the competent department for economy and trade under the State Council and should be submitted to the State Council for approval and release. A guarantee deposit system is implemented by the state for the products and packages listed in the compulsory retrieval directory. The amount of money of the guarantee deposit and retrieval requirements should be noted on related products and packages by its production or sale companies according to the stipulations made by the competent department for economy and trade under the State Council.
- Article 35: For products produced from wastes, value-added tax can be reduced or remitted according to the related stipulations of the state on waste reuse or recycling promotion.

In 2002, SEPA and other ministries jointly issued the **List of Commodities which were Banned for Import** (Categories 4 and 5). According to this list, certain types of waste, including batteries, air conditioners, computers, refrigerators, and TVs, were banned for import. In 2003, SEPA issued the **Notice on Strengthening the Environmental Management of E-waste** with the goals of reducing the overall volume of e-waste, increasing the reutilization rate, and reducing negative environmental impacts.

On February 25th, 2009, the **Ordinance on the Collection and Treatment of Waste Electrical and Electronic Products** was promulgated by the State Council. It will be implemented starting from January 1st, 2011. Under this Ordinance, NDRC and other ministries were authorized to formulate a special list of waste products and the roles of different actors in the collection and reuse/recycle system were defined. A Waste Electrical and Electronic Products Treatment Fund will also be created to support the collection and treatment activities of the waste, but no detailed stipulations were made on how to create this Fund. Instead, the Ministry of Finance and other ministries were authorized to formulate concrete measures on imposing, utilizing and managing the Fund.

Another effort is the Measures for the Administration of Prevention and Treatment of Pollution by Electronic Information Products (MII), often referred to as the Chinese version of RoHS (Restriction of Hazardous Substances) legislation. Enacted in March 2007, it was issued by the Ministry of Information Industry, NDRC and four other ministries. The target of this regulation is to control and reduce the pollution of e-waste. It covers all electronic information products in the Chinese market, including imported products. Some of the key stipulations include:

- Environmentally-friendly production methodology shall be applied in the design and production of electronic information products;
- Before the electronic products enter the market, the toxic and hazardous materials and reuse/recycling information shall be labeled on the products;
- For those products listed in the Pollution Control List of Key Electronic Information Products, six kinds of toxic and hazardous materials shall be prohibited or restricted.

SEPA also issued the **Waste Home Electronic Appliance and Electrical Pollution Prevention and Control Technical Policy**. This Policy calls for environmentally-sound technologies to be used in production processes, as well as in e-waste collection and treatment processes.

The aforementioned **Circular Economy Promotion Law** (CEPL) adopted the principle of EPR. Government agencies such as NDRC were authorized to formulate a list of products. For those products in the list, EPR should be applied (see text box). Major instruments stipulated in this law include: planning; standards and statistics; list of products for encouraging, restricting and prohibiting; resource utilization quota; labeling; supervision and management on key units and enterprises; environmentally-friendly design; responsibilities of producers and consumers; incentives; green consumption; and others. However, the stipulations are quite general. For example, Article 15 is the only article in the law that deals with EPR, but there is yet no detailed requirement. The NDRC has been authorized to formulate the detailed rules for implementation.

Article 15 of the CEPL states that

"enterprises producing products or packages listed in the catalogue of articles subject to compulsory recycling must be responsible for recycling discarded products or packages. For those that are usable, the producers thereof shall be responsible for using them, while for those products that are inappropriate for reuse due to the absence of technical or economic conditions, the producers shall make them environmentally harmless. For the discarded products or packages as prescribed in the preceding paragraph, if the producers thereof entrust the distributors or other organizations to recycle or dispose of them, the entrusted parties shall recycle or dispose of them in accordance with the relevant laws, administrative regulations and contractual stipulations. For products or packages listed in the catalogue of articles, consumers shall deliver the discarded ones to the producers or the distributors or other organizations entrusted by the producers for recycling. The catalogue of products and packages and the administrative measures shall be determined by the administrative department of circular economy development under the State Council".

CE Pilot Projects

In 2005, NDRC and six other Ministries enacted Guidelines for CE Pilot Projects to promote the concept to enterprises. Based on the Guidelines, the first round CE pilot projects were initiated. The pilot projects were carried out in seven key sectors, four key areas, thirteen industrial parks, and ten provinces and cities. The purpose of the pilot projects is to reduce resource consumption and waste emissions and increase resource utilization efficiency.

The pilot projects have achieved significant success. For those enterprises involved in the pilot projects, such as Jinan Iron and Steel Company and Laiwu Iron and Steel Company, waste reuse/recycling rates, along with energy utilization efficiencies, have improved significantly. In addition, in Tsingtao City, a waste home appliance collection system was created and dismantling lines were established. As a result, the comprehensive utilization rate of industrial solid wastes in Tsingtao now exceeds 97% (Feng 2007).

NDRC initiated a second round of pilot projects in late 2007. These were carried out in eleven key sectors, four key areas, twenty industrial parks, and seventeen provinces and cities.

Jiangsu Province was involved in the first round pilot projects. As an important industrial city in Jiangsu, Suzhou City has achieved significant progress in promoting a CE (Wang 2007). In the 10th five-year plan period, the city established a CE Promotion Center, which provides technical and information support for CE activities. According to a plan made by the municipal government during the 11th five-year plan period, the energy consumption per unit of GDP will reduce 20% and the emissions of major pollutants for per unit

of GDP will reduce 30%. 2.36 billion RMB will be invested in CE activities during the 11th five-year plan period.

Recent efforts have also focused on e-waste reuse/recycling areas (Wang 2007). For instance, in 2003, NDRC selected Tsingtao City as one of the two pilot areas for waste home appliance collection and reuse/recycling (Zhejiang Province was the other). Tsingtao City, a major producer of electrical appliances in China, has made great efforts in the past few years in creating an e-waste collection, reuse and recycle system. One of the efforts is the creation of a treatment industrial park for waste home appliances, including a treatment company. In this park, waste air conditioners, washing machines, televisions, and refrigerators can be treated.

Recent efforts have also focused on developing a collection system for waste home appliances. For example, Haier Company initiated an activity together with some big retailers in Tsingtao City. Under the system, consumers can receive a new microwave oven after they return used ones to the retailers by paying an extra 100 Yuan RMB. Other costs were covered by Haier. No government subsidies were provided.

Looking forward

The EU Model and its Relevance for China

As China considers taking further measures to promote EPR under its CE framework, policymakers are considering whether to adopt legislation similar to what has been passed in industrialized countries and particularly in the EU. In 2003, the EU enacted two directives relevant to WEEE:

- Waste Electrical and Electronic Equipment Directive (WEEE Directive), with the aim of preventing the generation of WEEE and promoting their reuse and recycling; and
- Restriction of Hazardous Substances Directive (RoHS Directive), with the aim of reducing the use of hazardous substances in the production of electric and electronic appliances.

In some areas, Europe and China have tried similar approaches, such as standards for production of electrical equipments (prohibition of use of certain hazardous substances); prescribed methods of treatment/disposal of WEEEs (environmentally sound, using state-of-the art technology); provision of information to consumers on e-products; monitoring; and requirements for licensing and reporting. However, there are also many fundamental differences that are worth noting. China can learn from some of the current differences (shown in Table 5-1) to identify gaps in its current programs.

Table 5-1: Differences between EU and China in managing WEEE

Issue	EU	China
Perception of WEEE	WEEE is generally considered worthless and are discarded. Therefore, the aim of EU Directives and legislation of European countries is to combat unsound disposal.	WEEE is generally seen as a resource and there is a market for them. Therefore, the aim of Chinese legislation could be to upgrade existing systems for collection/ reuse/ recycling to make them environmentally sound.
Public Awareness	In some European countries, public awareness of environmental issues has developed over the last decades. Relevant legislation builds on environmental awareness.	Environmental awareness and responsibilities is as yet less developed.
EPR Responsibilities	European legislation provides for extended responsibility for the producer and other private actors (importer, distributor, retailer).	Current Chinese legislation does not have detailed equivalent provisions.
Collection of WEEE	Some European systems provide for the establishment of WEEE collection points, which consumers are expected to use.	There are existing systems for collection from households by traders (partly informal). Chinese consumers might not be prepared to deliver WEEE to collection points. A better option could be to build on existing collection systems and upgrade them.
Re-sale and re-use of old e-appliances	WEEE Directive establishes priority of re-use over recycling or disposal. Legislation in some EU countries provide for re-use as a preferential option	For China, the NDRC Draft Regulations prescribe the sale of used e-appliances in designated markets and testing and labeling by a certified enterprise. Given the importance of second-hand goods, the approach of the NDRC draft could appear more appropriate for China than the European approach.

Operation of the WEEE management system	In some European countries, the system is essentially operated by private actors under the supervision and with cooperation of state authorities.	Current legislation does not specifically address this point. The European approach may be feasible for China if there is an effective supervisory role for state authorities.
Target Quota	The laws of EU countries provide target quotas for collection and recycling of WEEE.	Chinese drafts do not currently establish such quotas. In this respect, the European precedent might be helpful for China. Quotas can be an effective tool for monitoring implementation.
Financing	In some European WEEE legislation, financing of the system is the responsibility of the producer. In Switzerland and Belgium, an Advance Recycling Fee is paid by the purchaser of e-appliances.	The NDRC draft provides for special funds to be established by the State. The source of financing will cover different parties.
Lead Authority	In some European countries, there is one lead authority at the national level that assumes the overall responsibility for the WEEE management system, with other authorities cooperating.	A number of different authorities at all levels have competences related to the WEEE system. Designation of a lead authority could ensure streamlining of the process. For broad participation, other authorities can be given participatory functions.

The roles of government, industry and the public

In China, the government has extensive power for managing economic activities and protecting the environment. The government develops CE-related policies and supervises and implements the policies through various approaches, such as imposing resource taxes, providing financial support for CE projects, and providing education and necessary information services.

Industry is the key to the success of the CE. In China, enterprises face increased competitive pressure in the market. Therefore, some enterprises have shown increased interest in CE activities. For example, more enterprises now tend to produce environmentally-friendly products to attract the attention of consumers. Many more are trying to use less energy and raw materials in their products. However, there are still many enterprises, especially medium and small scale enterprises, that know little about CE. For these enterprises, incentive measures, such as financial support and technology transfer, should be applied to encourage them.

As discussed above, EPR is one of the key responsibilities of industry required by the **CEPL** and the **Ordinance on the Collection and Treatment of Waste Electrical and Electronic Products**. NDRC and other ministries will develop a detailed implementation plan on the adoption of EPR mechanism for selected products and sectors before January 1st, 2011, when the Ordinance will be implemented.

The CE must also include the consumption end of a product's lifecycle. Therefore, it is essential to make the public involved in the CE development. There are many ways for the public to be involved in CE activities, such as:

- preventing excessive packaging,
- reducing packaging waste,
- promoting environmentally-friendly consumption patterns,
- instituting charges for collection and recycling of waste (in Beijing, each household pays 3 yuan RMB each month for domestic solid waste),
- encouraging consumers to use products for a longer time before discarding them,
- taking proper measures to dispose of durable products, like clothes, home appliances and furniture; and
- taking actions on water conservation, energy conservation, etc. (World Bank 2007)

Stipulations in current laws and regulations on the responsibility of the public are not very enforceable. Article 10 of the **CEPL** states that citizens shall enhance their awareness of resources conservation and environment protection; consume resources in a reasonable way, and save resources. The state encourages and guides citizens to use products that save energy, water, and materials, as well as environment-friendly and recycled products, so as to reduce the production and discharge of wastes. Citizens have the right to report acts of wasting resources and damaging the environment. They also have the right to access government information about the development of CE and propose their opinions and suggestions.

Market oriented instruments

Experiences in developed countries have demonstrated that the use of market-oriented instruments in promoting a CE could achieve significant success. More and more economic instruments have been adopted in environmental protection and energy conservation, and these can be applied to help achieve CE targets.

Among these instruments, pricing is the most important. Low prices for energy and resources are among the key reasons for environmental, resource and energy problems in China and throughout the world. China could learn from the experiences of some developed countries that demonstrate that raising the price of energy and raw materials encourages enterprises and consumers to adopt more environmentally-friendly patterns of production and consumption. Therefore, reforming existing pricing systems for raw materials and energy is badly needed. However, these reforms must be made gradually to avoid inflationary pressures.

Taxation policy has been used in China extensively in many areas. Although tax exemption and reduction might play important roles in promoting CE, it should be used properly. In China, there are many kinds of tax exemption and reduction instruments applied in environmental protection, cleaner production, energy conservation, and other areas. This complicated taxation system may add to the cost of implementation since the government must carry out detailed evaluations on taxpayers to see if they are qualified to receive preferential treatment and how much they should receive. In comparison, pricing policies may be more flexible and effective and implementation costs may be much lower.

Financial policy could also play an important role. For instance, for e-waste collection/dismantling/reuse/recycling, it is widely recommended that a fund should be established to help compensate for expenses. The fund should be created with money coming from different sources, including enterprises and the government. The newly formulated **Ordinance on the Collection and Treatment of Waste Electrical and Electronic Products** adopted this idea. However, the stipulations in this Ordinance are quite general. No detailed stipulations were made on how to create this Fund. The Ministry of Finance and other ministries were authorized to formulate concrete measures on imposing, utilizing and management of the Fund.

In developing market-oriented instruments, it is also important to consider that command-and-control measures, while not nearly as flexible, are effective in certain situations. These include setting energy conservation and pollution reduction targets, developing a responsibility system for local governments, and implementing strict environmental standards. Over the long-term, the government should consider how market-oriented and command-and-control policies can complement each other.

Conclusion

Although significant efforts have been made, such as the adoption of the **CEPL** and the **Ordinance on the Collection and Treatment of Waste Electrical and Electronic Products** and the implementation of CE pilot projects, the circular

economy and extended producer responsibility in China are still in their early stages, especially in the areas of management capacities, regulatory systems, economic instruments, technological support, and waste collection/reuse/recycling mechanisms. Enforcement is also a major problem. Environmental management agencies lack effective instruments to force industries to reduce the intensities of energy and resources use and to cut pollutant emissions.

EPR refers to producers taking environmental responsibility for the entire life cycle of products. Experiences in EU show that the implementation of EPR systems faces some problems, such as an appropriate financing mechanism. Therefore, careful study should be carried out. Responsibilities of enterprises, consumers and governments should be allocated reasonably. A detailed implementation plan for EPR should also be developed.

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6. Applicability of EPR Mechanisms in Thailand

Qwanruedee Chotichanathawewong
Natapol Thongplew

Introduction

In Thailand, the concept of Extended Producer Responsibility (EPR) has been slow to develop and implement. The Government has acknowledged its effectiveness by preparing a law regarding EPR; however, this law is not yet being implemented. To date, only administrative policy instruments (e.g. the National Integrated Waste Management Plan and the Strategic Plan on Waste from Electrical and Electronic Equipment) and pilot projects (e.g. green procurement at Pollution Control Department) are in place. In comparison, the implementation of the EPR concept is more tangible in the business sector.

In this chapter, we will introduce the voluntary initiatives being undertaken by the business sector in line with the concept of EPR. Although the activities introduced in this chapter are varied, these examples will show existing cases of environmentally sound management along the entire of life cycle of manufactured products, which lies at the heart of EPR. Such activities are implemented under different names, including Corporate Social Responsibility (CSR), voluntary environmental management, or something similar to "product stewardship" in the U.S. The chapter will then discuss driving factors and barriers for implementing EPR in Thailand.

EPR in Thailand

The core idea of EPR is to shift responsibility for environmental management of products throughout their entire life cycle from the public sector to the private sector. In this sense, one can argue that Thailand has a number of instruments related to the concept of EPR, either promoted by the government or actively implemented through initiatives by producers with support from the government.

EPR has only recently been perceived as a major concept in the development of environmental policy in Thailand. In the past, environmental policies focused on end-of-pipe control. Thus, for most producers, the idea of taking responsibility for environmentally-sound management of post-consumption of products is a new concept. While

EPR-related measures are still not implemented in a concerted and comprehensive manner in Thailand (see Figure 6-1), the country has started to observe some voluntary efforts by producers to improve the final process of their products' life cycles.

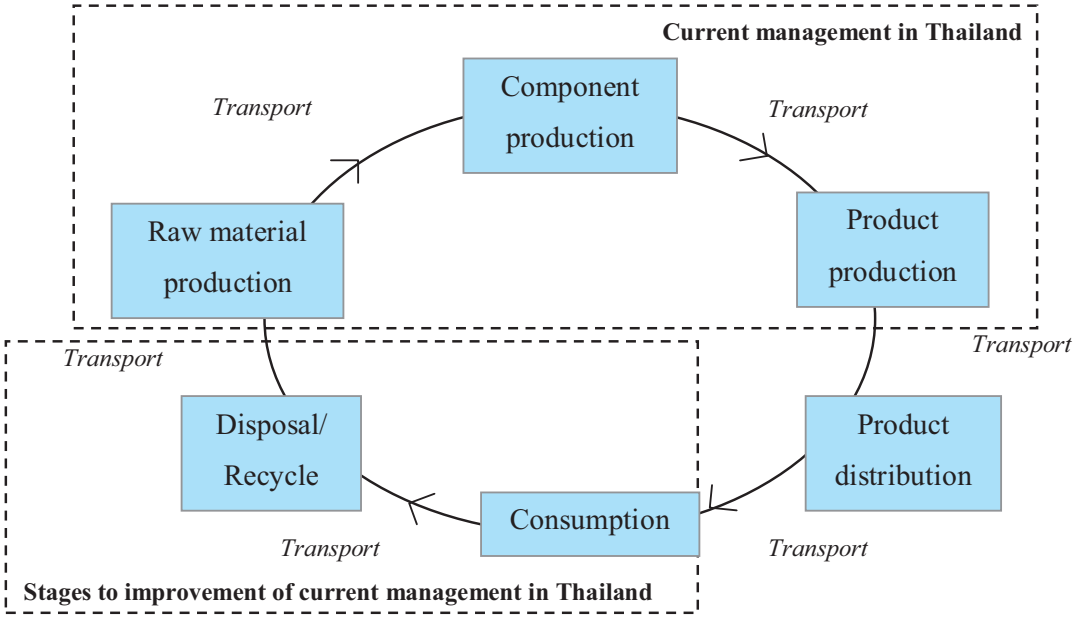

Figure 6-1: Product life cycle in Thailand
Source: Compiled by authors.

Thailand has made some progress at the national governmental level in implementing EPR in the country. Since 2000, some administrative policy instruments and pilot projects relevant to the EPR concept have been implemented (Table 6-1). Several policy instruments extend physical and/or economic responsibilities to producers for their products. These include: the National Master Plan on the Cleaner Production and Cleaner Technology (2002); the National Integrated Waste Management Plan (2003); the Strategic Plan on Waste from Electrical and Electronic Equipment (2007); and the draft Strategic Plan on Packaging and Packaging Waste Management (2004).

Most importantly, however, is the draft Promotion of Hazardous Waste Management from Used Product Act. This draft Act addresses environmental management at the post-consumption phase of products' life cycles by emphasizing a product surcharge and a buy-back system for some products. Currently, the draft Act is merged under a broader environmental policy - the draft Economic Tool for Environmental and Water Pollution Tax Management Act. As of December 2008, this latter draft Act is in the editing process and awaiting submission to the Committee of Ministry of Finance. If the draft Economic Tool for Environmental and Water Pollution Tax Management Act becomes effective, it is likely that the product surcharge and buy-back system contained in the draft Promotion of Hazardous Waste Management from Used Product Act will be enforced as a Decree under the Act. PCD is undertaking a study on product selection and surcharges to be used for this system.

Table 6-1: Administrative policy instruments in Thailand related to EPR

Plan or Act	Major Content	Status /date
The National Master Plan on the Cleaner Production and Cleaner Technology	◦ Aims to promote cleaner production in many sectors, including the industrial sector, to minimize pollutions and wastes ◦ Employs legal instruments, supporting tools, economic instruments ◦ Regarding industrial sector, the aims are to reduce pollution and hazardous substances from production processes and products	Approved in 2002
National Integrated Waste Management Plan	◦ Cradle to cradle concept ◦ Addresses minimizing waste generation, increasing waste segregation, and enhancing waste utilization	Approved in 2003
Strategic Plan on E-Wastes	◦ Aims for environmentally sound management of e-waste by improving collection and segregation systems and suitable management of e-waste ◦ Introduces Polluter Pays Principle (PPP) ◦ Covers responsibilities of producers, importers and consumers	Approved in 2007
(Draft) Strategic Plan on Packaging and Packaging Waste Management	◦ Aims to reduce waste from packaging ◦ Employs integrated waste management and life cycle approaches ◦ Covers design, production, consumption, treatment and disposal of packages	Drafting
(Draft) Promotion of Hazardous Waste Management from Used Product Act	◦ Aims to reduce environmental and health impacts from hazardous waste originated from used products, to promote the utilization of the product, and to properly disposal of used products ◦ Employs EPR concept by applying charges for producers/importers of regulated products, setting up a buy-back system, and establishing a fund to manage all financial capital related to hazardous waste and used products	Merged under the (draft) Economic Tool for Environmental and Water Pollution Tax Management Act (editing and waiting for submitting to the committee of Ministry of Finance; as of December 2008)

Source: Compiled by Authors

Green Procurement is another example of the government's effort to expand EPR-related concepts in Thailand. Green procurement activities were started under a pilot project of the Pollution Control Departments (PCD) and were officially adopted in 2007 for all governmental agencies. Since the government is one of the largest purchasers in the country (with a total annual procurement budget of approximately 11-17 percent of Gross Domestic Product) (PCD 2009), the adoption of green procurement serves as an incentive for producers to undertake design for the environment (DfE). To further assist producers in taking DfE measures, the Thai government is expected to introduce policies incorporating the polluter pays principle, environmental taxes, and a deposit-refund system

Voluntary initiatives to implement the concept of EPR by the business sector (for example, through pilot projects supported by the government) are serving as another key driver, at least until the forthcoming Act for Economic Tool for Environmental and Water Pollution Tax Management Act comes into force. Such initiatives promote Individual Producer Responsibility (IPR), a policy concept that emerged from EPR in which individual producers take responsibility for their products throughout the entire life cycle (Lifset and Lindhqvist 2008).

Unlike in some countries, EPR-related measures in Thailand are not simply meant to be implemented to improve waste management systems and promote the implementation of Cleaner Production. Since Thailand's economy mainly relies upon manufacturing and exporting products and goods to other countries, trading conditions set by trading partners greatly impact its economic performance. Such conditions have increasingly included improving corporate social (and environmental) responsibility, which has pressured Thai industries to make improvements related to the environment, labour, and social welfare.

In addition to pressure from outside trading partners, non-tariff barriers (NTBs) are another concern for Thailand. Some NTBs include:

- Selective measures: Trading partners will choose suppliers with good performance in environmental management and high quality product production.
- Legislation: For example, the EU's introduction of the End-of-Life Vehicle Directive (ELV), Waste Electrical and Electronic Equipment Directive (WEEE), Restriction of Hazardous Substance Directive (RoHS), and Registration Evaluation and Authorization of Chemicals (REACH).

Compliance with NTBs is crucial for Thailand' s economy, which depends on export-oriented manufacturers. In general, EU regulations, such as WEEE and RoHs Directives are a comparatively lower obstacle for large and multinational corporations, which have the technical, managerial, and financial capacities to adjust its managerial systems and technologies to follow the requirements of these directives. However, small and medium enterprises (SMEs) face larger problems. Many SMEs lack the funds, knowledge, and technology to meet such requirements, which directly or indirectly influence their operations through their supply chains. Without

more active voluntary efforts to incorporate the EPR concept to comply with such directives, Thai SMEs that supply exporting companies/ corporations will not be able to qualify for supplying materials and parts (related to the directives).

Good Practices from the Business Sector in Thailand

This section presents nine examples of companies that are applying a broad range of EPR-related measures, including greening of supply chains and take-back programs. These cases cover various types of products.

Ricoh (Thailand), Limited: Green procurement

The company conducts green procurement for raw materials used in production. These raw materials are imported from the parent company in Japan, where green procurement is also practiced. Further, the company in Thailand is implementing green procurement for office supplies and materials and is in the process of announcing its official policy on green procurement. In Japan, Ricoh also practices greening their supply chain by providing support to suppliers to obtain ISO 14001 certification or certification under Ricoh guidelines.

General Motors (Thailand), Limited: Eco design

General Motors (Thailand), Limited, as a producer of Chevrolet, has become an environmental leader in their production processes and products. Two cars, the Chevrolet Optra Estate and Chevrolet AVEO, were endorsed with Green Labels[21] (Eco Label) (TEI 2008). The criteria for obtaining the label included reducing the life-cycle environmental impact of the product by taking into account fuel efficiency, emissions, recycling of parts and components, hazardous substances, and wastes (TEI 2004). Some specific criteria include the heavy metal content in paints and chemicals, zero ozone depletion potential of car refrigerants, and good waste management in the production stage.

Bangchak Petroleum (Public) Company, Limited: Environmentally-friendly product

Bangchak has been continuously developing renewable energy and improving their products to become more environmentally-friendly. At present, Bangchak serves their customers with Gasohol 91 and 95, and Gasohol E20. Ethanol used in these products is made from agricultural products grown in Thailand. Moreover, Bangchak recently introduced a new product in the market – Bangchak Biodiesel Power D B5 – which meets Euro 4 emission standards (European Emission Standard) (Bangchak Petroleum 2008a). One of the raw materials for producing the biodiesel is used cooking oil, which are purchased from people around Bangkok and the surrounding area (Bangchak Petroleum 2008b).

[21] Green Label (Eco Label Type I) is an environmental certification awarded to specific products that are shown to have minimum detrimental impact on the environment (considering multi criteria through the product's life cycle) in comparison with other products serving the same function. Green Label was initiated by the Thailand Business Council for Sustainable Development (TBCSD) in October 1993 and was formally launched in August 1994. The auditing and certification processes are carried out by the Thailand Environment Institute (TEI).

Biodegradable Packaging for Environment Company, Limited: Eco design and product

The company produces single use tableware and food container products that are eco-friendly. Raw materials are not made from trees and forest products. Instead, the materials come from agricultural products. The products themselves are made from chlorine free pulp material (ECF) and do not contain toxic substances. Additionally, the products are biodegradable and breakdown within 45 days after disposal (TEI 2007a).

Siam Cement Group (SCG): Green procurement

SCG greened their supply chain with their suppliers and service providers. The group also implemented green procurement for products and services by establishing green procurement guidelines (including commonly used materials and targets), as well as sharing knowledge and communicating information to trading partners (Siam Cement 2008).

Philips Electronic (Thailand) and Thai Toshiba Lighting Company, Limited: Take-back and environmentally sound waste disposal

Both companies manufacture fluorescent light bulbs. The companies ran a campaign to collect used fluorescent light bulbs from their customers by providing drop boxes in various areas and onsite collection services (in cases where there are a large number of light bulbs). All used fluorescent light bulbs collected from consumers are properly treated and recycled (TEI 2007b).

PTT (Public) Company, Limited: Environmentally sound waste management

PTT is one of the largest companies doing business in oil, gas, petrochemicals and refineries. From its beginning, PTT has implemented environmental and safety measures starting from the production stage. PTT also takes responsibility in the management of used engine oils.

Amway (Thailand) Company, Limited: Eco product, take-back and recycling of waste

Amway provides a wide range of products for the Thai market in concentrated forms, which helps reduce the size of product packaging and has resulted in requiring fewer materials for packaging. The packages themselves are also manufactured to decompose naturally. Even so, the company ran a campaign to collect used packaging called "I'm not Rubbish" (TEI 2006). All returned used packaging is recycled and used to produce plastic bags. This campaign provided opportunities for Amway's members to return used packaging to the company and allowed them to collect points, which could then be claimed for awards in an ecological travel program.

Total Access Communication (Public) Company, Limited (DTAC): Environmentally sound waste disposal

DTAC is a telecommunication services provider that sells mobile phones and provides mobile phone services. DTAC has run campaigns to collect used mobile phone batteries from mobile phone users (TEI 2006). Since collected batteries

are passed to a disposal facility for proper disposal, this activity serves as a remedial measure to solve the emerging environmental problem of electronic waste (e-waste) in Thailand.

Note: DTAC is taking the role of producer in a typical EPR arrangement, even though they do not produce mobile phones. Instead, DTAC sells mobile phones and provides mobile phone services. The campaign run by the company is only for the collection of mobile phone batteries. DTAC does not limit collection to batteries purchased from DTAC; they are willing to receive mobile phone batteries purchased from any other sellers/dealers.

Driving Factors for EPR in Thailand

The implementation of EPR-related measures differs from one country to another. Some of the unique factors that drive the successful implementation of EPR include: perceptions and willingness of stakeholders, market systems, the economic status of the country and stakeholders, and policies of the country. Some prominent drivers of the EPR concept in Thailand are discussed below.

Operational efficiency: EPR and instruments related to EPR may bring efficiency to operational processes. EPR measures can improve efficiency and reduce costs in the production stage, including improvements in product design, preservation of raw materials, reduction of waste from production processes, and decrease of environmental management costs. Additionally, environmental impacts can be lessened.

Decision making and strategic instrument selection are crucial to bring out these benefits. Implementing the right EPR instruments could promote cleaner production, which would improve operational efficiency for the company. In cases where businesses are competing with other companies producing the same product, implementing EPR could lower costs throughout the life cycle of the product. As a result, improved operational efficiency would allow the company to compete with other companies. Additionally, implementing EPR instruments can lead to reduced health risks for workers, representing an additional benefit for companies.

Competitiveness in international trade: Environmental concerns are increasingly being integrated into trading conditions, especially international trade. Since environmental requirements are integrated into regulations and measures with trading partners, environmental issues must be thoroughly managed within and outside those companies that participate in international trade (or those that would like to participate).

As mentioned earlier, NTBs are crucial for producers that participate in international trade. With the implementation of EPR and/or IPR activities and programs, transactions could be facilitated under some NTBs issues. For example, the effectiveness of the WEEE Directive brought in requirements for producers regarding waste collection, recycling, and recovery. Without complying with the activities and programs (EPR and/or IPR), international trade on EEE could be halted.

Brand image and license to operate: Focusing solely on generating revenue without addressing environmental concerns can ruin the reputation of a company. On the contrary, operating businesses with a high sense of responsibility in all aspects can bring about a better reputation and improve the visibility of a brand and its image. Besides, introducing a license system, in which only licensed companies could enter the recycling industry, may be applicable where formal EPR program has not been yet established, such as Thailand. Taking environmental responsibilities beyond what the law had been stated could be considered as a well-known domain of the company that could be visibly perceived and acknowledged from the public.

In turn, this could help create more opportunities for the company to place products in the market by having a larger group of consumers. Consequently, other companies (in the same business) that do not take any responsibility for their products could lose some market share.

Policies from parent companies: A number of parent multinational corporations in Thailand encourage and/or require their subsidiary companies to comply with similar environmental policies. The improvement of environmental performance through the product lifecycle includes promoting DfE and improving product managing in the post-consumption stage. This is particularly true for many European and Japanese companies. The main reasons behind forcing subsidiary companies to comply with the same standard of parent companies are the pressure from international society and the avoidance of double standards. With such a strong and increasing enforcement from parents companies, the implementation of EPR concept could be widen.

Informal recycling sector: The informal recycling sector plays a crucial and very active role in Thailand, which creates unique opportunities for managing the end-of-life products. Workers in this sector conduct waste collection, transport, separation, and basic disassembling, providing recovered valuable materials to supply to the recycling market.

However, a number of concerns must be considered when implementing an EPR program involving the informal sector. Some worker practices impact their health and sometimes the environment. As a result, capacity building programs on health and environmental issues should be implemented as a preventative measure.

Barriers for EPR in Thailand

Even though many producers have implemented environmental measures, these do not cover the entire life cycle of the products manufactured by producers. Most producers focus on managing products within the boundary of the factory (gate-to-gate), but they do not set policies to extend environmental management of their products outside the factory (cradle-to-grave). Some of the main barriers of extending producer responsibilities to the collection and disposal stages are summarised below.

Illegally imported products: Thailand has taken some measures to prevent the import of some types of products, including WEEE. For instance, the country ratified the Basel Convention[22].

However, there are still cases where illegally imported products cross the border into Thailand. This highlights one of the main problems in implementing an EPR program. In such cases, a "producer" cannot be identified. Thus, it is almost impossible to shift responsibility to the producer because it is difficult to identify them. Consequently, responsibilities from the consumption stage to final disposal cannot be shifted to producers, leaving the problem to both government and civil society.

Trading schemes: Trading at the international level has led producers to take action on the environment due to compliance with regulations and measures of trading partners. However, the majority of factories in Thailand are operated by SMEs, which are mostly not directly involved in international trade. Generally, the majority of SMEs are involved in the supply chain as suppliers only within the country. It is difficult for producers that are not involved in international transactions to practice EPR because a key driver – competitiveness in international trade and policy from parent companies – is missing.

Pricing: Typically, environmentally-friendly products have higher prices compared with general products in the market. Higher prices limit the quantity of purchases and the number of consumers, since most consumers are more concerned with prices, especially in developing countries such as Thailand. As a result, EPR applications are limited

Knowledge dissemination: Even though some EPR-related measures have already been conducted, good practices have not yet been set and disseminated. The lack of dissemination and sharing of knowledge results in fewer Thai companies pursuing EPR-related practices.

[22] Thailand has not yet ratified the Ban Amendment of the Convention, as of December 2008.

What Should Be the Next Steps for Thailand?

In order to move the implementation of EPR forward in Thailand, there are several essential actions that need to be taken. The government, business sector, and other sectors can contribute to this movement. Pressing issues that should be considered are discussed below.

Increasing consumer awareness: Environmental problems have been perceived as a high priority issue by the public at large. However, there is a need to increase the awareness and understanding of people about their role as consumers. Such an understanding would increase the public's engagement and would help expand the implementation of EPR. A full understanding of the consumer's role and responsibility would create synergy between consumers and producers, which would lead to more prominent opportunities for the implementation of EPR.

Support from large corporations: In Thailand, approximately 99% of enterprises are SMEs. Some of the disadvantages of SMEs are a lack of capability and capacity to improve environmental management and extend their responsibility regarding the environment. SMEs would benefit from assistance from large corporations through such actions as knowledge sharing, training, and

internal audits. Large corporations could start with those SMEs with which they have the closest supplier relationships.

Market-based mechanisms/policies: Introducing appropriate market-based mechanisms/policies by the government could be another pivotal method to encourage and broaden the implementation of EPR in Thailand. Some of the possible measures/policies include deposit systems for products, collection of fees for managing products at the end-of-life, and incentives.

Supporting policies: The government should also enact policies and provide support to build the capacity of entrepreneurs. This will initiate sufficient capacity and encourage all producers to take part in the integration of business interests, economics, and social and environment factors, resulting in the implementation of more comprehensive EPR measures.

Conclusion

EPR has a high potential to be successfully promoted and implemented in Thailand. Nevertheless, significant obstacles must first be overcome. Looking at the drivers and barriers of EPR in Thailand stated earlier, significant steps by all stakeholders must be taken to move forward.

EPR-related measures are being taken by both the government and business sectors. In addition, the efforts of both parties have paved the way for the implementation of more comprehensive EPR programs. To accomplish this, the government must play a key role in promoting EPR as a core policy. Even though the government plans to enforce an act to promote EPR, the implementation details are still unclear. Thus, strategic plans that provide these details should be formulated with the involvement of all parties.

In order to develop and create appropriate strategic and action plans resulting in an effective EPR program, policymakers must thoroughly consider several issues (socially, nationally, and globally), since EPR will directly or indirectly involve all actors in the country. Among other issues, policymakers must consider how the government can promote and support the existing voluntary IPR activities of producers as part of a national EPR program. As soon as rigorous and comprehensive analysis is conducted, it will be possible to identify the most effective approach to implement an EPR program in Thailand.

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7. Current Situation of EPR Policy in India

Amit Jain

Introduction

EPR has been defined as "an environmental policy approach in which a producer's responsibility for a product is extended to the postconsumer stage of a product's life cycle" (OECD 2001). Conceptually, it provides a basis for the selection of policy instruments (Lindhqvist 2000). These policy instruments could include fees, subsidies, bans/restrictions, permits, targets, standards, labels, and information campaigns. Since EPR emphasizes the responsibilities of producers after product usage, it supports twin objectives: 1) design improvements of products and product systems; and 2) downstream collection, treatment and reuse or recycling in an environmentally-friendly and socially-acceptable manner.

This paper describes the application of EPR in India, including its current status and future trends for selected products. The first section describes the regulatory framework for EPR. The second section details the existing status of EPR with respect to four major products – waste electrical and electronic equipment (WEEE), also called electronic waste (e-waste); waste batteries; waste polyethylene terephthalate (PET) bottles; and waste automobiles. Some important considerations regarding these items include the following:

- rapidly growing consumption of each of these products;
- the similarity of existing take-back mechanisms for batteries and pet bottles;
- internal and external pressure on policymakers from civil society organizations, international agencies, and industry associations to improve the management of e-waste; and
- the absence of such pressure regarding used automobiles.

For each item, the fundamentals of the EPR program are summarized, including: "identifiable" and "unidentifiable" products; sources of the products; consumption patterns (including "historical" and "orphan" products); collection mechanisms or take-back mechanisms; recycling infrastructure; and future trends. Further, the externalities of "importing" these products are

discussed.

Regulatory Framework

During the 1990s, India's Ministry of Environment & Forests (MoEF) adopted pollution control policy by formulating multi-pronged strategies in the form of regulations, legislation, agreements, fiscal incentives and other measures to abate pollution (Ministry of Environment and Forests, Government of India 2006). The National Environmental Policy, which was declared in 2006, identified pollution abatement as an important issue affecting human health and poverty (Ministry of Environment and Forests 2006). The policy focuses on optimizing resource efficiency and minimizing pollution loads. An analysis of policy statements reveals that there has been a gradual shift from simple pollution control to the promotion of reduction, recovery and recycling.

Table 7-1 shows the legal framework for managing industrial waste at different stages, including planning, construction and operation. It also shows the agency responsible for implementing the legislation. As shown, the Factories Act, Environmental Impact Assessment (EIA) Notification, Air Act, and Water Act apply to all three stages of the project life cycle (Lal and Reddy 2005). Their application involves procurement of "Environmental Clearance, Consent to Establish, and Consent to Operate", as well as "Site Notification and On-site Emergency Plan Clearance".

Table 7-1: Legal framework for industrial waste in India

Legislation	Planning	Construction	Operation	Central Government	State Government
Basic					
Factories Act 1948	✓	✓	✓		✓
EIA Notification 2006	✓	✓	✓	✓	✓
Air Act 1981	✓	✓	✓		✓
Water Act 1974	✓	✓	✓		✓
Others					
Municipal Solid Waste (MSW) Rules 2000	✓		✓		✓

Hazardous Waste (Management, Handling and Transboundary Movement) Rules 2008	✓		✓	✓	✓
Batteries (Management and Handling) Rules 2001	✓		✓	✓	✓
Recycled Plastic (Manufacture and Usage) Rules 1999/ Amendments 2003	✓		✓	✓	✓

Source: Compiled by author

In addition to the above legal framework, recyclers are required to register with the Central Pollution Control Board (CPCB), MoEF, Government of India, if they are handling the following (Hazardous Wastes Rules 1989):

- Hazardous waste, per Hazardous Waste (Management & Handling) Rules 2003;
- Lead acid batteries, per Batteries (Management & Handling) Rules 2001; and
- Plastics for recycling, per Recycled Plastic (Manufacture and Usage) Rules 1999/ Amendments 2003.

Further, registered recyclers are required to undertake clearances under the applicable regulations and maintain records detailing quantities recycled, along with inputs and outputs for annual reporting. They are required to use environmentally-sound technologies for recycling/ re-refining and follow a proper marking system to identify and transport hazardous waste.

There are no specific EPR regulations with respect to e-waste, waste PET bottles and waste automobiles. E-waste is partly covered under the Hazardous Waste (Management, Handling and Transboundary Movement) Rules 2008. However, the Batteries (Management and Handling) Rules mandate a lead acid battery "take-back" mechanism at the point of sale. This take-back mechanism is similar to take-back mechanisms implemented in other countries.

Status of EPR and its Elements

The gradual shift in policy and subsequent amendments in the regulatory framework necessitates an evaluation of the status of EPR and its elements in India. This evaluation has been carried out by identifying various elements of an EPR program and their application in waste management.

According to Manomaivibool (Manomaivibool 2007 and 2009), there are at least three necessary elements in any EPR program regardless of its exact configuration:

(1) Controlled downstream activities;
(2) Resource flows from identifiable producers for downstream activities; and
(3) Monitoring and reporting mechanisms.

Though the author describes controlled downstream activities in terms of authorized treatment facilities (ATFs), this paper also considers waste collection and transportation systems as part of downstream activities.

The second element aims at internalizing end-of-life consequences to producers by increasing their "resource flows." These flows should be proportional to the environmental consequences of their products and should include more than just money transfers. Resources flows can also include end-of-life information of products to consumers (e.g. how to properly discard waste products) and downstream actors e.g. collection and transportation or treatment facility operators. It may also include physical involvement in downstream activities by the producers themselves (e.g. producers establishing their own collection and/or treatment systems).

The third element – monitoring and reporting mechanisms – is essential for the success of the first two elements.

The presence or absence of these elements for the four identified waste products in India are summarized in Table 7-2, which indicates that e-waste, waste batteries, and waste PET bottles are all subject to controlled downstream activities, while waste automobiles are not.

Treatment, Collection and Transportation: There are six ATFs in India with a total capacity to treat 40 percent of the e-waste generated in the country. However, there is no mandatory mechanism that requires producers to be responsible for e-waste collection and transportation. There are ATFs, as well as collection and transportation systems, for both waste batteries and waste PET bottles.

For waste batteries, producers have a mandatory responsibility for collection and transportation (MAIT and GTZ 2007). Consumers are required to return used batteries, while manufacturers/assemblers/re-conditioners/importers are responsible for their collection and transport to registered recyclers. .

For waste PET bottles, the mechanism for collection and transportation is both voluntary and market-driven. The major drivers are: conformance to voluntary Environmental Management Systems (EMS) implemented by companies as part of their corporate social responsibility and quality systems; and demand for raw material inputs from PET recyclers. For example, major soft drink manufacturers in India have implemented EMS. PET bottle manufacturers that are vendors to these soft drink companies also require used PET bottles as raw materials.

Money Flows: In terms of money flows, there is a take-back mechanism for waste batteries, waste PET bottles and waste automobiles that ensures a discounted value of new products to consumers. In the case of waste batteries, customers can buy a new battery with a discounted value for the returned battery at the point of sale. In the case of automobiles (small car segment) and PET bottles, the same mechanism is applied to boost the sales of new products. This discount is obtained by

deducting the salvage value of the waste product from the retail price of the new product.

In the case of e-waste, there is no take-back mechanism, but consumers can receive the salvage value of the waste item from e-waste collectors. However, the money flow from retailer/e-waste waste collector to dismantler and finally recycler first passes through the formal sector and then finally to the informal sector.

The informal sector is intimately linked at every step of the material flow chain for the four types of waste. However, the extent of their involvement varies for different types of waste. Money also flows from the formal to informal sector and falls out of the purview of regulations (taxes) the moment it enters the informal sector. Therefore, the informal sector controls both material and money flows to a large extent and offers a major constraint in the implementation of an EPR system.

Table 7-2: Elements of EPR programs in India

Elements in EPR Programs	Element 2: Resource Flows from Producers for Downstream Activities							
	E-WASTE		Waste Batteries		Waste Pet bottles		Waste Automobile	
	ATF	Collection & transportation system	ATF	Collection & transportation system	ATF	Collection & transportation system	ATF	Collection & transportation system
Element 1: Controlled Downstream Activities	Mandatory	Minor Voluntary Activity	Mandatory	Mandatory	Substantial Voluntary Activity	Substantial Voluntary Activity	No Activity	No Activity
Element 2: Resource flows								
- Money			Mandatory	Mandatory	Substantial Voluntary Activity	Substantial Voluntary Activity	Substantial Voluntary Activity	Substantial Voluntary Activity
- End-of-life information of products to consumers and downstream actors			Substantial Voluntary Activity	Substantial Voluntary Activity	Substantial Voluntary Activity	Substantial Voluntary Activity	No Activity	No Activity
- Physical involvement in downstream activities by the producers themselves	No Activity	Minor Voluntary Activity	Mandatory	Mandatory	No Activity	Substantial Voluntary Activity	No Activity	Substantial Voluntary Activity
Element 3: Monitoring and reporting mechanism	Mandatory		Mandatory	Mandatory	Substantial Voluntary Activity	Substantial Voluntary Activity	No Activity	Minor Voluntary Activity

End-of-Life Information: "End-of-Life" information is provided to consumers for waste batteries and PET bottles (in the form of a logo indicating the recyclability of the product) but not for electronic items and cars. Similarly, end-of-life information is restricted only to retailers of waste batteries, waste PET bottles and waste automobiles that participate in take-back schemes. However, very limited information is available to collectors, dismantlers and recyclers, and all four types of waste are sold/auctioned to them based on an "as it were" basis. This indicates that collectors/dismantlers/recyclers apply their judgment with respect to the recyclability and price while purchasing a particular waste item. This also shows that there is a vast difference between the specifications of a new product and specifications of the same product when it becomes obsolete, thereby affecting the recyclability and cost economics.

Physical Involvement in Downstream Activities: For waste batteries and waste PET bottles, producers are physically involved in downstream activities especially with collection and transportation. As part of their mandatory responsibility for collection and transportation of waste batteries, producers have designated collection centers and preferred vendors for transportation. Similar arrangements are in place for waste PET bottles as part of the implementation of a voluntary EMS.

Monitoring and Reporting: A mandatory monitoring and reporting mechanism exists for e-waste at the ATF level and for waste batteries at both the ATF and collection and transport level. For waste PET bottles, there is a voluntary monitoring and reporting mechanism both at the ATF and collection and transportation levels as part of an EMS for major operators in the market. No mandatory or voluntary monitoring and reporting mechanism exists for waste automobiles.

The application of EPR requires an assessment of the supply and consumption of the consumer products. Supply side assessment should include tracking the waste back to its producers and identifying the source and type of market of the waste products. Consumption assessment includes identifying a product's users during its lifetime, including storage. Table 7-3 shows the existing status of sources and markets of the four main waste products considered in this paper. The type of market includes products sourced from the organized market, assembly market and grey market. This will assist in identifying the producer and whether the product is branded or unbranded. This will also help to identify the place of sale of the product.

Table 7-3: Source and market of four items

Waste Products	Organized Market	Assembly Market	Grey Market
E-Waste	Minor	Major	Major
Waste Batteries	Major	Minor	Minor
Waste PET Bottles	Major	Nil	Nil
Waste Automobiles	Major	Minor	Minor

Note: Major – Above 70%; Minor – Below 30%

Table 7-3 indicates that the market and source of these products is heterogeneous in nature. Further, it shows that the major market and source for batteries, PET bottles and automobiles is the organized market, while for electronics and electrical products it is assembly and grey market.

The Information, Planning & Analysis Group of the Department of Information Technology, Government of India (IPAG of DoIT 2006) has estimated that 50 to 90 percent of nearly all consumer electronics (with the exception of color televisions) come from the grey market. This is mainly because retailers try to evade taxes and duties. Assembly markets, dominant in the case of computers, are partially legal and mainly involve registered businesses.

According to the Manufacturers' Association for Information Technology (MAIT 2006 and 2007), the market share of assembled products peaked at over 50 percent in 2003 and was around 40 percent in 2006 (with respect to the total installed base in each year). In absolute terms, shipments of assembled desktop computers increased to over one million units for the first time in 2006. Due to their size, scale, and the nature of their business, these assembling shops constitute hard-to-identify producers.

Other important factors in introducing EPR include conducting an assessment of historical stock of waste products and determining the extent of orphaned products[23] at the time of their introduction. These activities will help set the responsibility of recycling of both historical and orphaned waste products to the appropriate stakeholders at the time of that EPR program is introduced. Table 7-4 shows the type of consumption by different users of electronics, batteries, PET bottles and automobiles. It indicates that individual consumption for all items is high except for e-waste, where institutional consumption is high and historical stocks are medium.

[23] Orphan products are products whose producers are no longer in operating business.

Table 7-4: Consumption pattern of four consumer products

Waste Products	Historical Stock*	Institutional consumption	Individual uses
E-Waste	Medium	High	Low
Waste Batteries	Low	Low	High
Waste PET Bottles	Nil	Low	High
Waste Automobile	Low	Low	High

Note: Medium- 40% to 60%, High – Above 60%, Low – Below 40%
* Historical stock describes waste which is either stored or yet to arrive in the dismantling and recycling market.

Table 7-4 further indicates that greater efficiency in EPR implementation in the area of e-waste is expected due to high institutional consumption, in which the collection of the end-of-life products is relatively easier. However, this advantage gets eroded due to medium level of historical products.

The source and market description leads to the classification of waste products as "identifiable" and "unidentifiable" in terms of its "producer". An unidentifiable product can be considered as an "orphaned" product, which can help in the design of the EPR program. The fewer orphaned waste products, the greater the efficiency of EPR implementation and the lesser the problem of "leakage" to the informal sector. The status of the four waste items as "identifiable" and "unidentifiable" in India as of the year 2008 is given in Table 7-5.

Table 7-5 indicates that the majority of waste batteries, waste PET bottles and waste automobiles are identifiable, i.e. their ownership can be tracked down. The majority of E-waste that comes to dismantlers and recyclers falls in the category of "unidentifiable". This indicates that EPR implementation in the e-waste sector will be highly constrained on account of the unidentifiable nature of the product.

Table 7-5: Identifiable and unidentifiable waste products

Products put in the market	Identifiable	Unidentifiable
E-Waste	Minor	50-90%
Waste Batteries	Major	Minor
Waste PET Bottles	Major	Minor
Waste Automobile	Major	Minor

Note: Major – Above 70%; Minor – Below 30%

The existing domestic market is augmented by legal and illegal imports. The status of imports of each of these items in India categorized as either "used/ waste" or as "scrap", is summarized in Table 7-6.

Table 7-6: Status of Imports of waste items

Products	Imported as used/waste	Imported as Scrap
E-Waste	✓	✓
Waste Batteries		
Waste Pet Bottles	✓	✓
Waste Automobile		✓

Ideally, imports should follow legal procedures under domestic laws/rules, as well as the "Basel Convention". Furthermore, on October 14, 2003, the Supreme Court of India ruled that imports of e-waste to India are illegal. However, it has been reported that e-waste is imported into India through illegal channels. A recent study (MAIT and GTZ 2007) estimates that around 50,000 metric tons of e-waste is imported into India every year. A common practice is to import it under the pretext of "reusable" products, "mixed metal scrap" or "mixed cable scrap" (Toxics Link 2004).

In India, plastic consumption will exceed 12.3 million ton per annum by 2010, registering a growth rate of 14 percent from the base year 2005. Currently, polyolefin accounts for 60 percent of total plastic consumption in India.

About 47 percent of the plastic waste generated in India is recycled. Since the local supply of waste is often inadequate, the industry is largely dependent on waste imports. Waste automobiles after refurbishment are not imported in India for reuse.

India is the world's largest recycler of plastics and metal wastes. Recycling is driven both by markets for reprocessed goods and socio-economic conditions (Agrawal, et al. 2004 and Banwari and Reddy 2005). The recycling markets for both metals and plastics are growing at around 12-15 percent annually, driven more by individual initiatives than by legislative and consumer pressure groups prevalent in developed countries. The status of the recycling industry in India with respect to the four items is given in table 7-7.

Table 7-7: Status of recycling

Products	Formal	Informal
E-Waste	✓ (Minor)	✓ (Major)
Waste Batteries	✓ (Minor)	✓ (Major)
Waste pet bottles (Plastic)	✓ (Medium)	✓ (Medium)
Waste Automobile	X (Nil)	✓ (Major)

E-waste, waste batteries and waste automobiles are mainly recycled in the informal sector. Currently, e-waste recyclers can handle up to 40 percent of e-waste generation in the country, with the major quantities of waste being recycled in the informal sector. Waste battery recycling in the formal sector is below average. There are more than 40,000 units engaged in plastic product manufacturing, out of which 12 percent are in the formal sector and the remaining 88 percent are in the small-scale informal sector.

Future Trends

Future trends for implementing EPR were assessed by analyzing the rationale, opportunities, weakness and challenges to the existing situation.

Rationale

- India has growing amounts of domestic waste, with a very small formal infrastructure for collection and recycling. India also imports waste from developed countries, either as a scrap or as used items. These imports end their lives in places with no formal recycling facilities and are subsequently recycled in very primitive conditions.
- "End-of-Life" consumer products have to be decontaminated to enable safe recycling. Since it is the producers that select the raw material inputs into the design and manufacturing of their products, only they can make the switch to safer materials. Making producers responsible for the waste generated by their products creates an incentive to design out the costs of dealing with toxic/ hazardous waste.
- In the absence of EPR regulations and lack of responsible recycling in the country, global companies end up selling their waste to the informal sector in India. Although several global companies are trying to address this situation by starting voluntary take-back and recycling programs, their less responsible competitors are free to continue business-as-usual practices without the costs of treating the waste from their discarded products. EPR regulations would provide a level playing field for the different sectors in line with global industry.
- Major industry associations representing electrical and electronic equipments are demanding EPR regulation for managing E-waste.

Opportunities

- The dominance of "identifiable" products from the organized market, where producers can be tracked and identified.
- A relatively low to medium stock of domestic historical products due to low sales in the past but increasing current sales. This means that incorporating the cost of dealing with historical waste into the price of new products would not increase their retail price dramatically.
- The large share of corporate users, especially for electronics, can help smooth the transition to an EPR system.
- Recycling systems required by an EPR program can be built on existing lucrative downstream businesses by formalising and upgrading the informal recycling

sector.

- An EPR system would support the existing infrastructure of municipalities and reduce their existing loads to treat municipal waste.
- Existing business practices, such as retailers' trade-in programs and producers' voluntary take-back initiatives can form the building blocks for a future EPR program.
- Learning from the experiences and mistakes of existing EPR programs in developed countries, India could harmonise with international standards (like the EU's RoHS-type product requirements) and adopt best practice in controlling the legal import of electronic products for reuse.
- Prepare industry for ROHS compliant manufacturing and EPR regulation.

Weakness and Challenges

- Three missing components that are essential to any EPR program are: 1) a formal recycling sector comprising authorized treatment facilities; 2) additional financial flows from (identifiable) producers to formal recyclers; and 3) a monitoring and reporting infrastructure. All three elements are either non-existent or very weak in India.
- The absence of a formal recycling sector comprising authorised treatment facilities (ATFs), weak collection and transportation networks, and a lack of authorisation system to ensure strict monitoring and reporting.
- The formal recycling sector receives stiff competition from the informal recycling sector. Informal recyclers can pay more for waste products because they avoid the costs of proper treatment by externalising the costs of worker health problems and environmental damage.
- An ATF can never compete financially with the informal sector if they cannot get access to the waste and charge more for a higher standard of recycling. Therefore, more money has to flow to ATFs via recycling subsidies coming from producers, proportional to the amount of waste the ATF collects.
- Strict monitoring and reporting mechanisms, especially auditing and certification mechanisms, have to be set up to ensure that the correct amount of subsidies reach the right entitities.
- Lack of strict guidelines to allow custom authorities to stop imports and impose a blanket ban on all imports of used electronics.
- Lack of research and development support to small and medium-sized manufacturers (SMEs) to compete on the basis of ecodesign.

Conclusions

India presents some distinctive features that must be considered if an EPR program is to be developed. These features include: the presence of unidentified/no-name branded products; lucrative reuse markets for some product groups; a considerable inflow of imported used products; and an informal recycling sector.

Comprehensive legislation based on EPR will go a long way in addressing the issue of waste

management. In the absence of legislation, there is no incentive for an enterprise to offer take-back to its customers or to design products that are conducive to recycling. Therefore, in order to solve the problems faced by formal recyclers (e.g. poor availability of recyclable waste due to collection by informal recyclers), the enforcement of pollution control regulations and the regulation of monetary transactions between informal recyclers and waste generators need to be strengthened. Providing increased financial support to formal recyclers to improve their collection systems would be an added advantage.

The Central Pollution Control Board (CPCB) has recently come out with guidelines for environmentally-sound management of e-waste (CPCB 2008). A draft WEEE/E-waste Act based on EPR is currently under preparation by the industry association and is likely to evolve into a separate law in future. EPR based regulations for waste automobiles and PET bottles are expected to follow. While this legislation is imperative in solving the issue of waste, it is heartening to see that industry and industry associations are taking positive steps to address waste from these products.

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Section IV

EPR Policy and International Resource Circulation

8. Internationalization of Waste and Recycling Related Issues and Its Implications for EPR-based Recycling Policy[24]

Yasuhiko Hotta
Mark Elder

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 necessary 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 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

[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.

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 2001[27];
- 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 China[28] 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 Persistant 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)

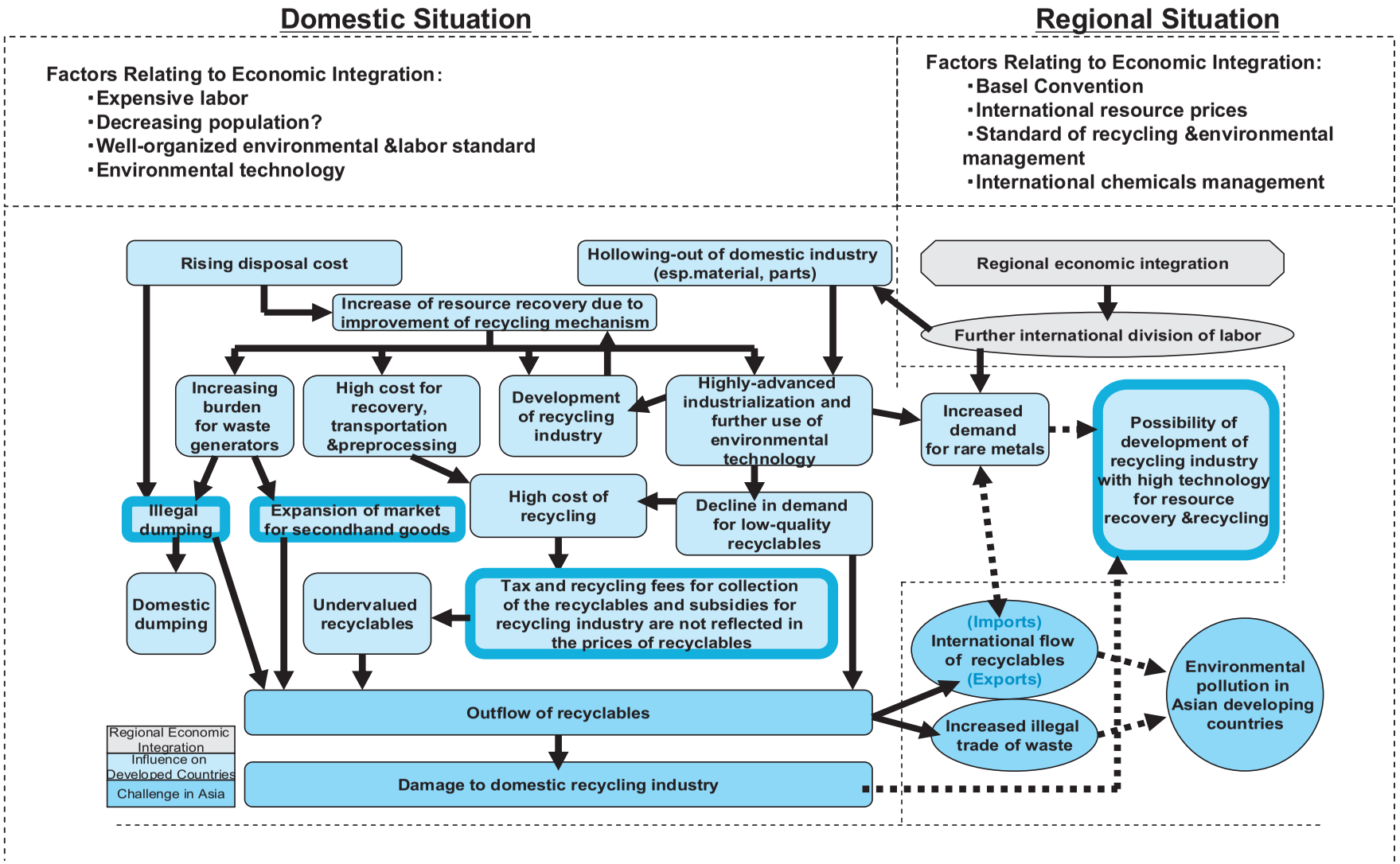

Figure 8-1: Causality Analysis of the effect of economic globalization EPR-based recycling mechanism

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.

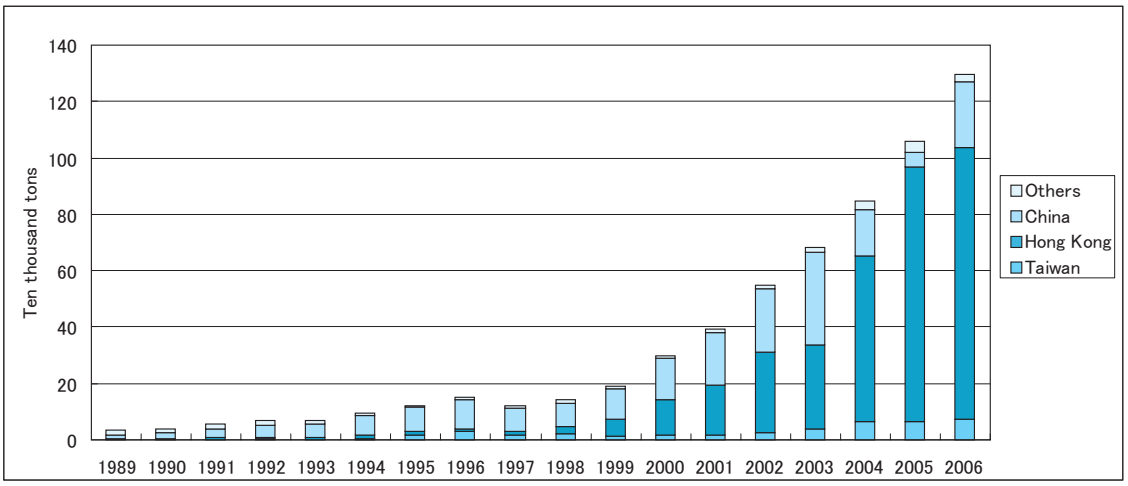

Figure 8-2: Export of scrap plastics from Japan

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)

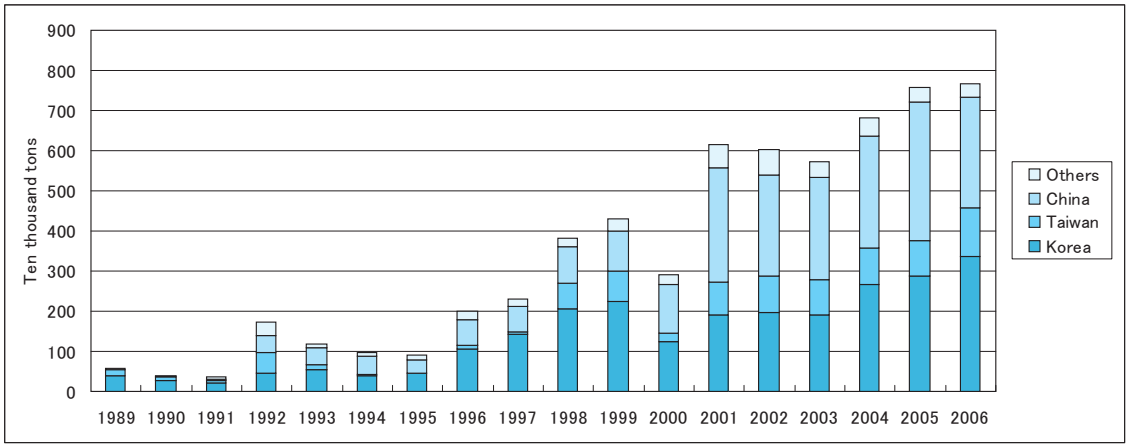

Figure 8-3: Export of Ferrous metal from Japan

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)

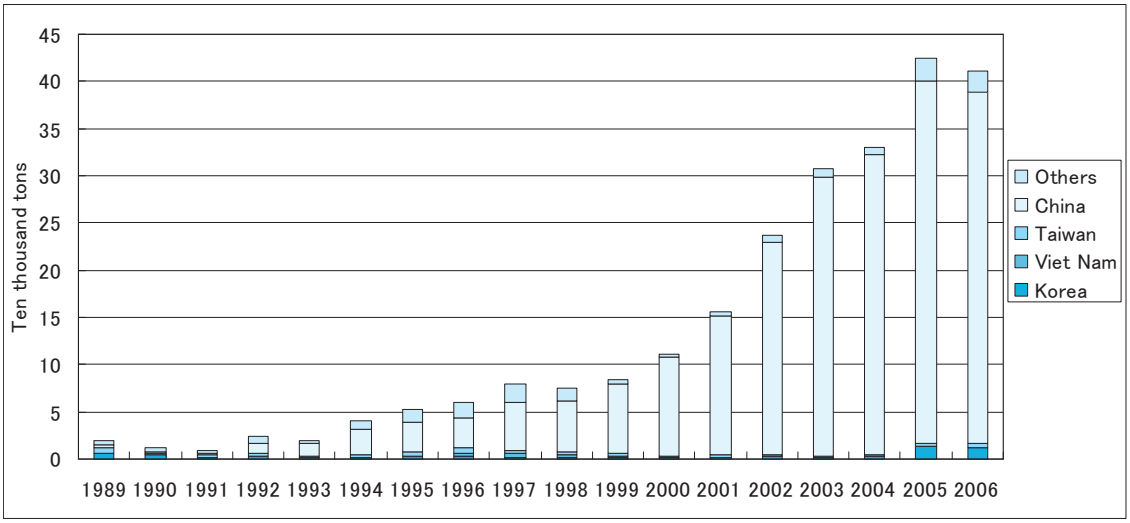

Figure 8-4: Export of scrap copper from Japan

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.

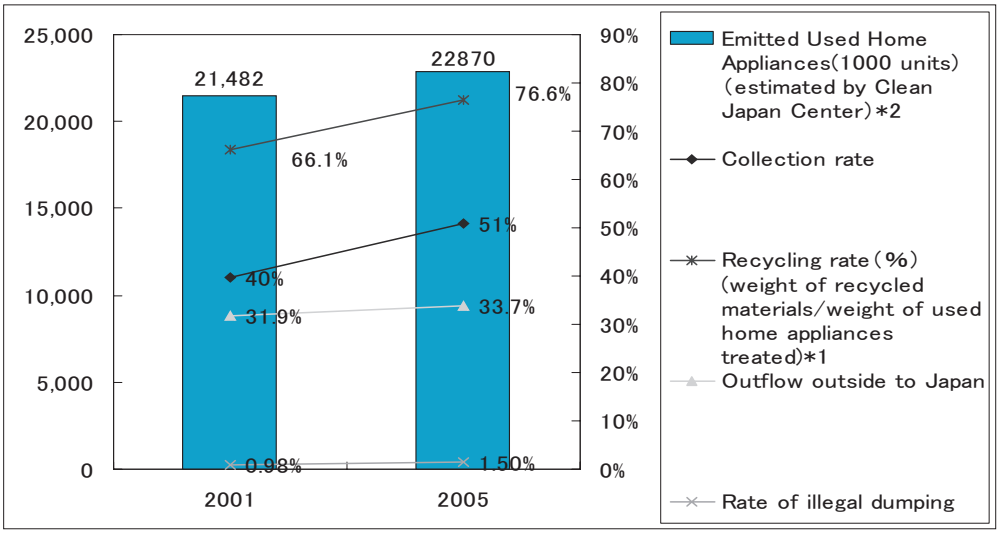

Figure 8-5: Emission, collection rate, recycling rate, outflow rate, rate of illegal dumping of used home appliances in Japan in 2001 and 2005

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 estimate[31] 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 goods[32]. 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.

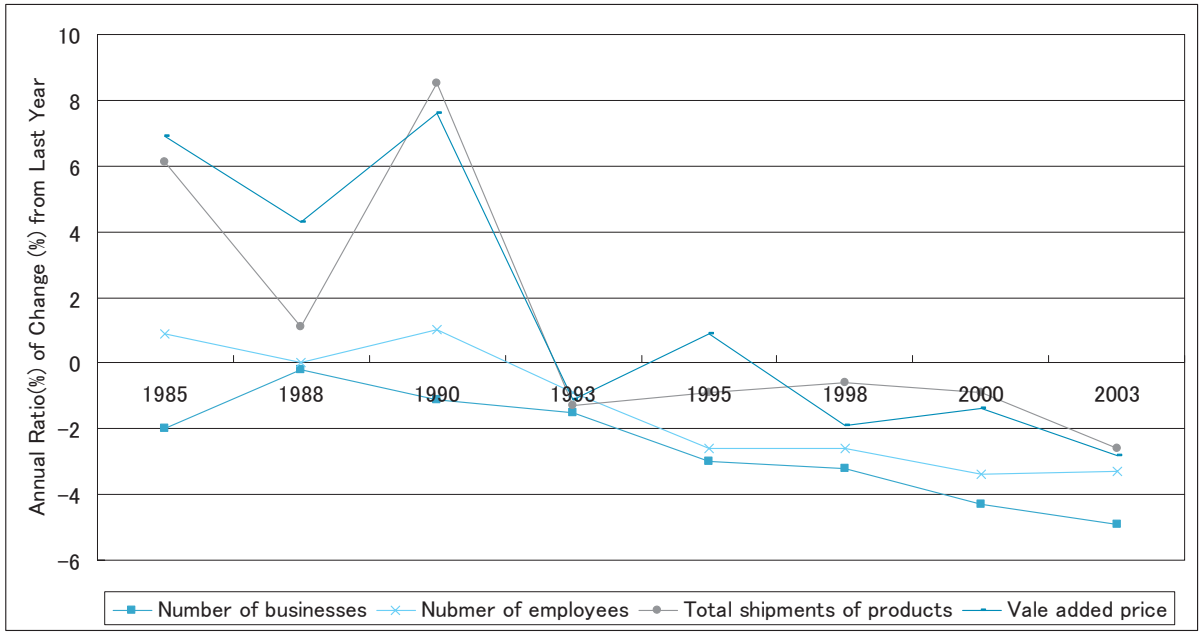

Figure 8-6: Changes in annual ratio of increase/decrease in number of businesses/ employees/ total shipments/ and total value added price in Japan's industrial sector

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

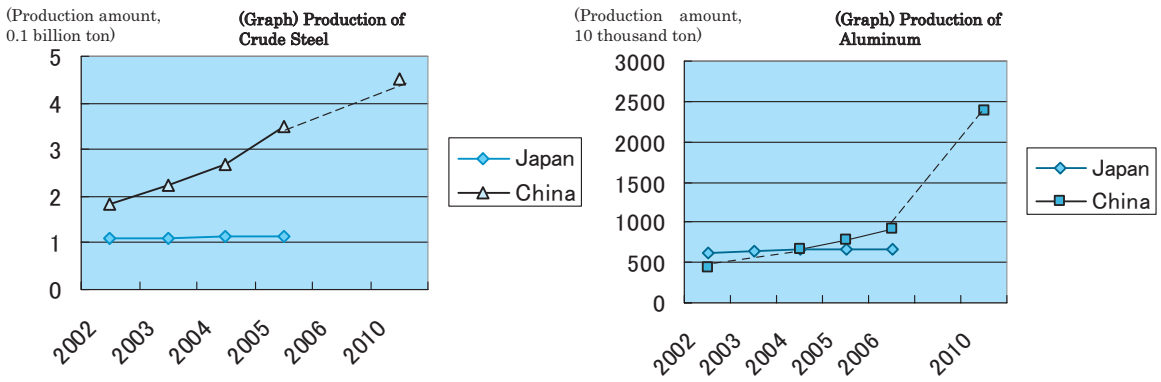

Figure 8-7: Production of crude steel and aluminum in Japan and China

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.gscc-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 refining[33].

[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 management[34], 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 country[35]. Admittedly, this will not be easy given the difficultly 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

Chika Aoki-Suzuki
Magnus Bengtsson
Yasuhiko Hotta

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 products[36], 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.

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,

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

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.

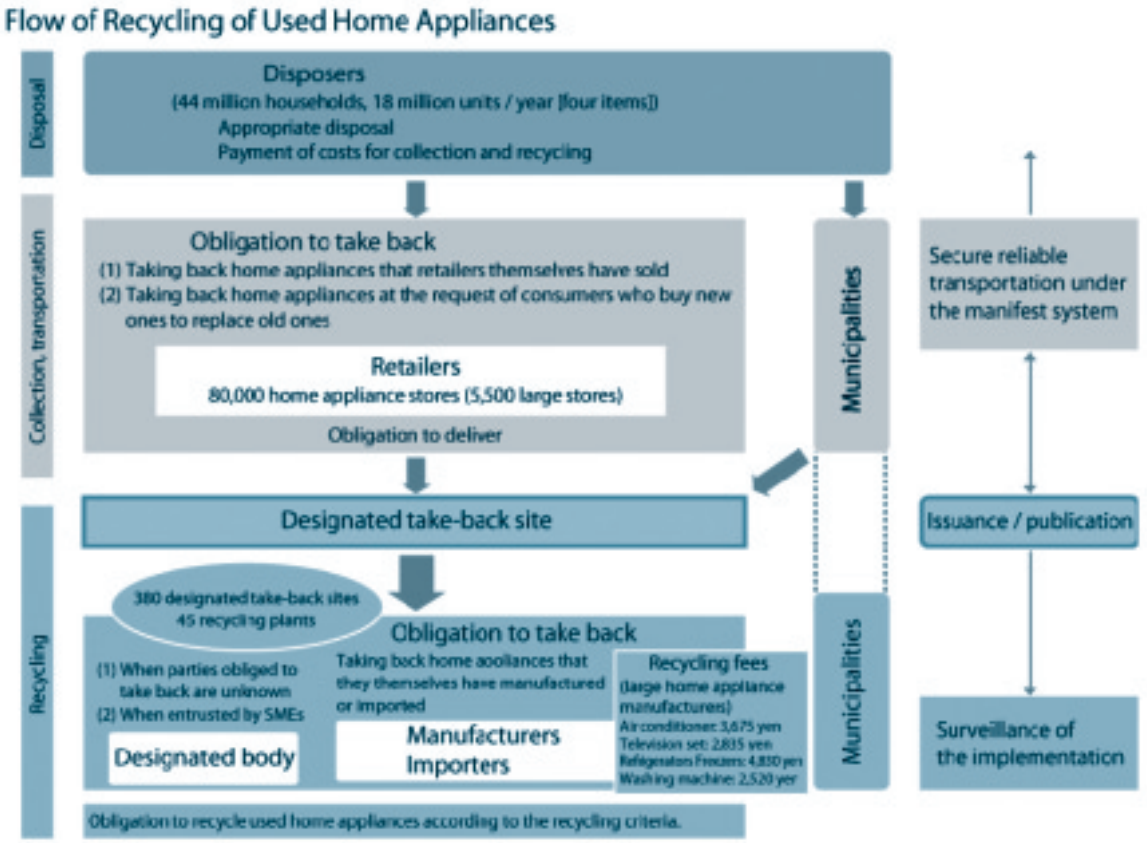

Figure 9-1: Roles and responsibilities of actors under the Japanese Home Appliances Recycling Law

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 brokers[38].

[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 exported[39].

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

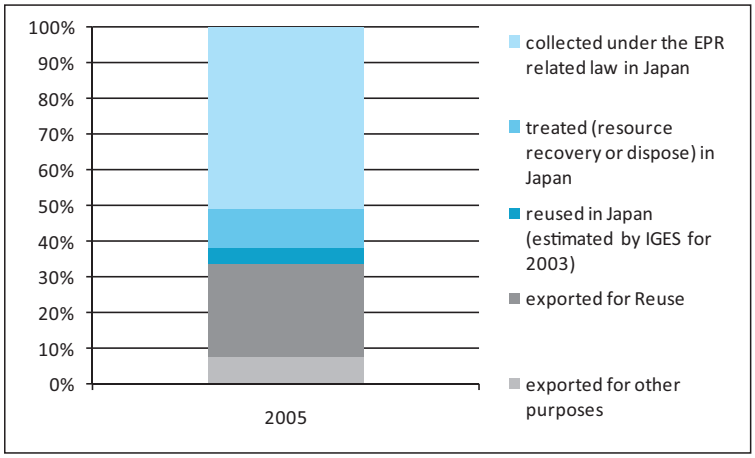

Figure 9-2: Fate of discarded home appliance (televisions, air conditioners, refrigerators and washing machines) in Japan (2005)

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 law[40]. 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)

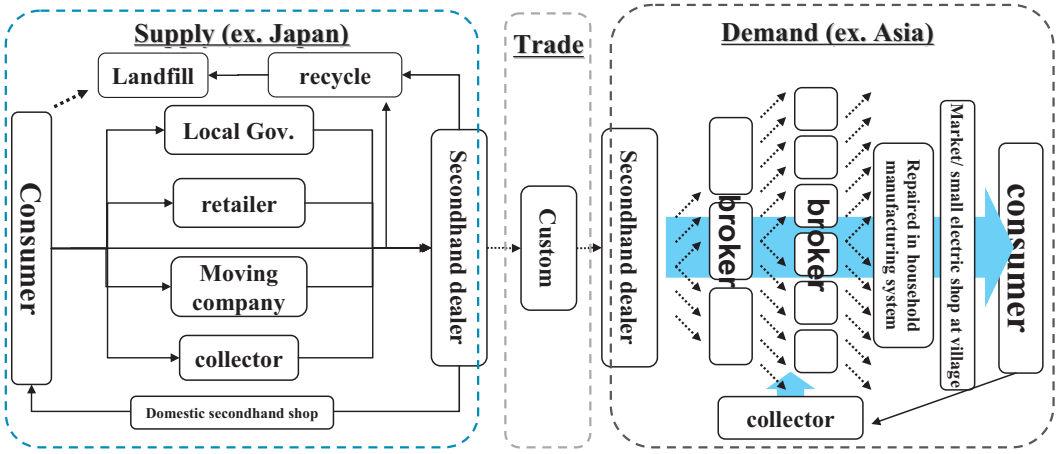

Figure 9-3: Actors involved in the trade of used EEE (simplified)

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 change 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 documents[41]. 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 2008[43]. 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
Consumers	No obligation to pay recycling fee		To sell to illegal actor
Retailers	Profit from reselling		To resell to illegal actor
Producers (Recyclers)	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 popular[44]. 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 countries[45]. 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

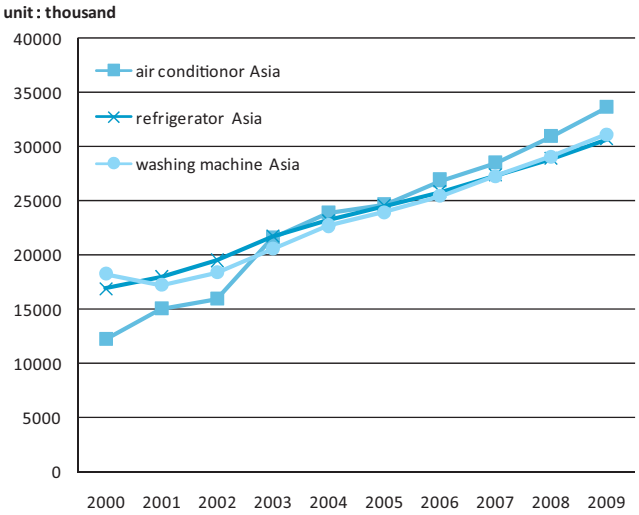

Figure 9-4: Estimation of demand for EEE in 14 Asian countries, not including Japan.
Source: compiled by IGES based on data provided by JEMA (2006)

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.

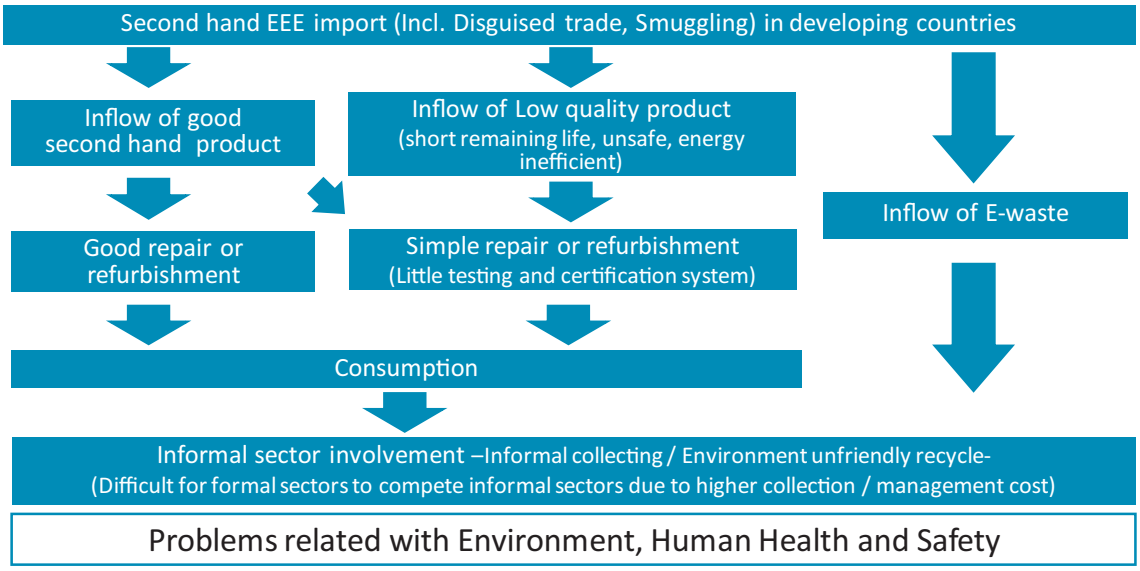

Figure 9-6: Problem dynamics of Second-hand EEE trade in importing countries
Source: compiled by IGES

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 EEE[46].

[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, Refrigirator, washing machine, micro-wave, PC, Copier, LCDTV
China	main land	ban	CRTTV, AC, Refrigirator, washing machine, micro-wave, PC, Copier, LCDTV, Printed Circuit Board, mobile phone
	Hong Kong	permit	CRTTV, AC, Refrigirator, washing machine, micro-wave, PC, Copier, LCDTV, Printed Circuit Board, mobile phone
Canbodia		no-control	
Indonesia		permit	CRTTV, AC, Refrigirator, washing machine, micro-wave, PC, Copier, LCDTV, Printed Circuit Board, mobile phone (CRTTV, AC, Refrigirator, washing machine, micro wave and mobile phone is banned)
Malaysia		no-control	
Philippines		permit	CRTTV, AC, Refrigirator, washing machine, micro-wave, PC, Copier, LCDTV, Printed Circuit Board, mobile phone
Srilanka		permit	AC, Refrigirator,
Thailand		permit	CRTTV, AC, Refrigirator, washing machine, micro-wave, PC, Copier, LCDTV, Printed Circuit Board, mobile phone
Viet nam		ban	CRTTV, AC, Refrigirator, 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 9-3[48].

[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

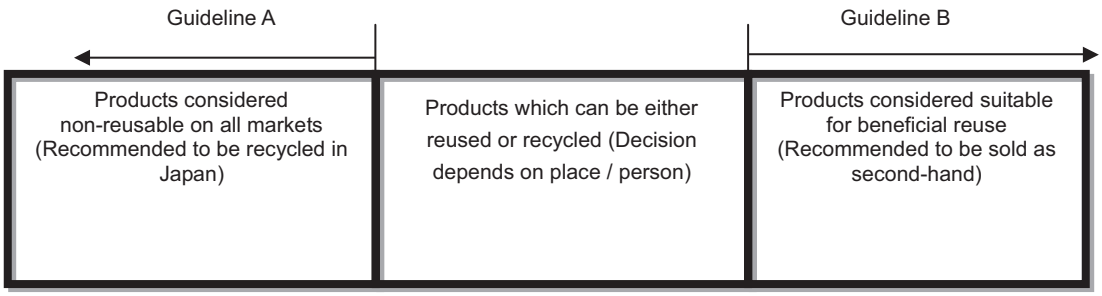

Figure 9-7: Structure of the Japanese guidelines on recycling and reuse

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. ISO[53] 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 Convention[54] 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 Wastes[56]. 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 country[57] and how to promote better e-waste collection systems with the involvement of producers in Asia[58].

[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
	Governments	Promoting reuse, Raising transparency of secondhand products flow (Trade statistics and etc..), Capacity building on customs	Basel convention, WTO, 3R initiatives
Import / Demand	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 products[59]. The EPR-based recycling system in China[60] 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 things[61].

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 county 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 Xerox[62]

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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 serous 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.

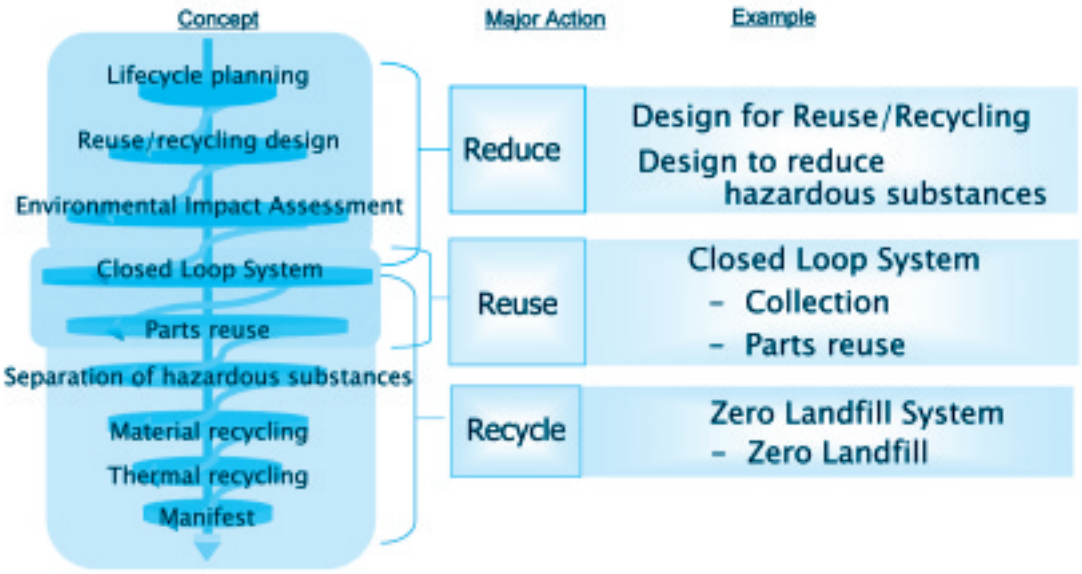

Figure 10-1: Conceptual diagram of Fuji Xerox's integrated resource recycling system

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

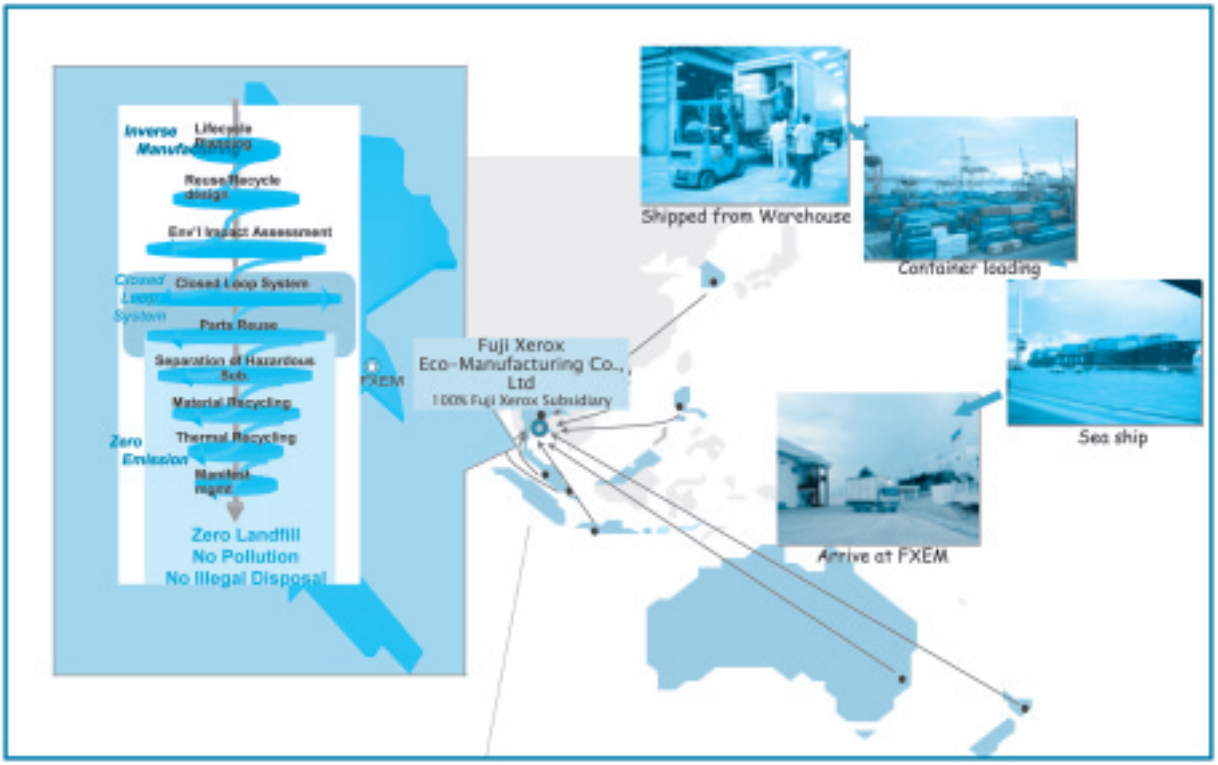

Figure 10-2: Image of Fuji Xerox's IRRS

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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Section V

Conclusion

11. Conclusions: Toward an Extended Producer Responsibility Policy with International Considerations

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As reflected in the title, this report focuses on extended producer responsibility (EPR) in Asia. Most of the existing literature on EPR deals with how this concept has been applied to policy development in Europe over the past two decades. Despite a growing interest in EPR among policymakers and stakeholders in Asia, there is still not much written on the experiences gained so far in this region and on the specific considerations that need to be taken when applying the EPR concept in developing countries in Asia. This report hopes to fill some of those gaps. This final section summarizes the key findings presented in the preceding chapters and identifies some common themes. This is done with the view to provide recommendations and advice specifically concerning EPR implementation in developing Asian countries. The section is divided into four parts discussing, in turn: (i) the general nature of the EPR concept and related policies; (ii) specific challenges met when applying EPR in the context of developing Asian countries; (iii) relationships between EPR and international trade; and (iv) the need for international collaboration to strengthen EPR implementation.

EPR – a flexible policy approach

The report clearly demonstrates that EPR is a general policy principle rather than a well-defined policy tool. In order to implement EPR effectively, policymakers first have to define what problems they are trying to address and develop a clear image of how EPR would be adopted to address those problems. Without a clear understanding of the problems and without a proper analysis of how EPR would contribute to solving those problems, the new policies are not likely to be of much benefit. In this process, it is necessary to define in detail what kind of EPR is needed (see more details below). Finally, policymakers need to devise a package of regulations and supporting policy tools, suitable to country-specific conditions, which assign clear responsibilities to all key actors and facilitate their compliance by providing appropriate incentives.

The chapters of this report illustrate the multi-faceted characteristics of EPR and show how

the concept has been interpreted in different countries and how it has been applied to different products. This review identifies a number of key questions that policymakers must consider if they are planning to develop EPR-based policies. These questions include the following:

- Should the EPR scheme focus only on the recycling of end-of-life products or should it have a broader scope, including the greening of supply chains and product life-cycles?
- In order for the EPR scheme to be effective, what kinds of responsibilities should be assigned to other actors, such as consumers, local authorities and waste hauling companies, in addition to producers?
- What kinds of responsibilities should be required of the producer (e.g. financial or physical responsibility for end-of-life treatment of products, liability for accidents or nuisance cased by products, responsibility to provide correct and adequate information to users and other actors handling the products)?
- Should the EPR scheme be based on voluntary initiatives and agreements between the government and the industry or based on proper legislation?
- Who should be considered the producer – the brand-owner, the manufacturer or the importer? In the case of packaging, who should be held responsible – the producer of the packaging materials or the manufacturer of the packaged goods (the filling company)?
- Should the scheme be based on an individual producer responsibility where each producer takes responsibility for their own products or should all companies in an industrial sector have a shared responsibility and be allowed to form a joint organizations in order to meet their obligations?
- How should the financing mechanism be designed? This question includes issues such as: Who should be paying? At what stage of the life-cycle should payments be made? Who should collect the payments? What principle should be used to determine the amount to be paid? And how should the collected resources be allocated and used?

Policymakers may be interested in EPR for different reasons and it is important to realize that specific forms of EPR are more suitable for meeting certain objectives than others. For example, a common objective of EPR is to reduce municipal costs for waste treatment. This could be achieved through a system where producers have a shared financial responsibility for the end-of-life treatment of their products. However, such a system creates weak incentives for product redesign, which is another commonly stated objective of EPR policies. In order to create incentives for producers to redesign their products for easy recycling, a system based on strict individual product take-back is likely to be more effective. Such an EPR scheme, on the other hand, is more difficult to implement and the overall costs (at least in the short run) are likely to be higher. This discussion illustrates the trade-offs that need to be made when considering different forms of EPR and the need to be clear about what problems the EPR system is expected to solve.

For EPR systems to work as intended, it is important to consider the economic incentives or disincentives for all actors concerned. An EPR system implies additional obligations and costs for certain actors, and it can be expected that at least some of them will try to avoid this

extra burden if possible. Policymakers need to anticipate such illegal behavior and prevent any loopholes to allow actors to escape their responsibilities. This manual indicates the need for additional supporting policies for the system to function properly. It also shows the importance of evaluating the performance of the EPR system at regular intervals in order to discover such weaknesses and to take appropriate remedial action.

However, it is equally important to try to reduce the overall costs of the EPR system. For certain functions of the system, such as collection from households, it might seem efficient to create monopolies. However, the influence of such decisions on the costs needs to be carefully considered. Similarly, if producers are allowed to charge a recycling fee to consumers, they may not have a strong incentive to try to reduce the costs of recycling by way of product redesign or through innovation in the recycling process.

Effective implementation of EPR requires a set of coordinated policies. Especially crucial are regulations of environmental and health impacts of recycling and waste treatment and policies to facilitate the effective collection of end-of-life products from households and other users. EPR by itself does not contribute to improved end-of-life treatment. Producers will seek to meet their responsibility at the lowest possible cost; therefore, there is a need to introduce strict standards specifying in detail what kind of end-of-life treatment they are responsible for and what environmental standards this treatment must comply with. It is the role of government to regulate the quality of the recycling, based on its knowledge of best available technologies, and it is the role of producers and recycling companies to try to meet those standards at the lowest possible costs. However, recycling standards need to be regularly revised and updated in order to reflect technological advances.

In the collection stage, special supporting policies are also necessary. Under some EPR schemes, producers are made responsible for collecting end-of-life products directly from households. However, producers typically have no experience in setting up an efficient collection system, and they do not have any control over how household waste is disposed. This kind of collection system usually becomes costly and it can for several reasons be infeasible to require producers to develop a completely separate collection infrastructure just for one product category. Therefore, systems based on existing waste collection schemes handled by local authorities or contracted waste haulers seem to provide a more feasible solution. In such cases, an organization collecting the items covered by the EPR would be responsible for bringing the concerned waste to collection points, where the producers or their contractors can take care of them. Another common solution, especially for household appliances, is to give retailers the obligation to take back end-of-life items and transport them to designated collection points, from where the producers can take over the responsibility. Additional mechanisms, such as deposit-refund systems, can help secure a high recovery rate.

It is important to understand that EPR is neither a panacea for product-related environmental problems, nor a straightforward policy blueprint that can easily be copied and implemented. As

shown in the report, successful implementation requires careful consideration of local/national conditions and needs, the characteristics of the product in question, and the related actor network. Typically, a comprehensive package of coordinated policies is needed to make the system function as intended. In developing such a policy package, as discussed above, economic aspects are key, so appropriate incentives need to be carefully designed. It is also important for the government to play a continuous and active role in revising related policies and regulations if needed. This can be facilitated through monitoring and evaluating the effectiveness of the system, including the costs borne by different stakeholders.

EPR implementation in developing Asian countries

Most of the literature on EPR discusses European experiences and how this policy approach can be used in the context of OECD countries. This body of evidence shows that EPR has been successful to some extent, but it also indicates that effective implementation of EPR-based policies is challenging. The chapters in this report show that many of the challenges met in Europe apply also to Asia; they also show that the situation in developing Asian countries is in many ways different from OECD countries and this is expected to affect how EPR should be implemented.

In most countries where EPR legislation has been introduced – mainly in OECD countries – there was already a waste collection system in place, most often operated or commissioned by municipalities. In some cases, separate collection of certain waste items has been practiced and a recycling industry has been developed to handle these items. These end-of-life treatment services were typically paid for by citizens through taxes and waste collections fees. Under such conditions, introducing EPR systems mainly implied a shift of the financial burden from taxpayers to producers.

However, the current situation in developing countries is drastically different. Physical infrastructure for environmentally-appropriate recycling is not well developed, households' environmental awareness and knowledge about the benefits of source separation is low, there is a shortage of technical know-how and trained staff needed for proper recycling, governing institutions are weak or lacking, and waste collection and transportation systems are insufficient. Under such conditions, substantial investments are needed before an EPR system can become operational. The management and financing needed to improve capacity requires additional resources, which might be too high to be generated from the EPR scheme itself. Thus, financial support from the government would typically be required to establish an EPR system

In some countries, a new EPR collection system for end-of-life products would compete with an established informal sector operating at low costs. Such informal collection activities are commonly connected with polluting and hazardous, but profitable, recycling operations. Income from these practices, most of which are considered illegal, makes it possible for the informal sector to offer households cash payment for end-of-life items. With such a system widely established, and with households expecting to

be paid for their discarded products, new formal collection schemes developed as a part of the EPR system will face strong competition and may have to involve paying households in order to get access to their end-of life products. These payments naturally make the operation of the whole EPR system more costly.

An effective EPR system requires clear identification of the producer of products concerned. This is the reason why some EPR-based legislation, such as the WEEE Directive, mandate that the producer's name be clearly marked on the products. However, consumer goods in developing countries often lack brands or are sold under brand names that cannot be traced back to any producer. Counterfeit products are also common. In addition, there is an abundance of reassembled products composed of parts from different brands and manufacturers. This practice is common for electronic articles, but in some countries also for vehicles. Finally, there are a relatively large number of old products where the manufacturer has gone out of business. In such conditions, an EPR system cannot be easily introduced. Large and well-established producers are likely to resist having to pay for the treatment of these anonymous products. This means that costs for end-of-life treatment for such products will most likely have to be borne by local or national governments through taxes.

It can be concluded that there are a number of challenges related to the application of EPR in developing Asian countries. This does not mean that EPR is not suitable for this region. Rather, it implies that policymakers need to be extra careful about how an EPR system is designed for proper implementation and that close monitoring of the system's progress and gradual modification of related policies and regulations are particularly important. Voluntary action by industry, described in a couple of chapters in this report, may also have a role to play, and governments can try to facilitate such initiatives as a complementary approach to strict regulations. For certain products, though, voluntary approaches may be more feasible to implement.

EPR and international trade

The third aspect to be discussed in this concluding chapter is the relationship between EPR and international trade, mainly in used products and wastes. The chapters have shown how introducing EPR systems can influence such trade, but also how international trade in secondary products affects conditions for successful implementation of EPR.

Over the last few decades it has become a common practice for developed countries to ship waste and recyclable materials to developing countries for treatment. Differences in labour costs, and possibly in environmental regulations, create economic drivers for this trade. Strong demand for raw materials in rapidly industrializing economies contributes further to these drivers. Some of the end-of-life treatment in developing countries is carried out with simple methods and without basic environmental protection measures. As a result, these operations expose workers and residents living near the facilities to serious environmental hazards.

Introducing EPR in developed countries has inadvertently stimulated export of used products

and wastes. There are several reasons behind this. Increasing separate collection makes more used products and waste available for trade, and stricter standards increases the costs for recycling and waste treatment. This then provides actors handling regulated items an incentive to avoid the responsibilities under the EPR system by exporting used products. Both European and Japanese experiences show that policymakers have had difficulties in closing such loopholes in their EPR systems.

The outflow of used products and wastes is not only contributing to pollution and hazards in developing countries, but also causing other problems. The recycling industry in developed countries is facing difficulties due to decreasing amounts of waste for domestic recycling. Many companies invested in recycling facilities, expecting that the EPR system would create good business opportunities, but some of these have met economic difficulties when the markets turned out to be smaller than expected.

Another negative effect is a weakening of incentives for producers to promote design for the environment. Because of the outflow from the EPR system, producers only have to pay for the end-of-life treatment of only certain products – those items that remain in the country – and not for the whole volume of goods put on the market. This reduces the effect of the EPR system in those cases where product redesign was among the objectives of the EPR system.

In order to deal with these problems, new policy mechanisms are needed. Some of the chapters in this report discuss what kinds of measures are available and likely to be effective. Some of the ideas discussed are:

- Mechanisms to strengthen the governance structure in developing countries and to establish appropriate infrastructure for end-of-life treatment,
- Measures that aim to reduce export of products covered by EPR legislation, and
- An extension of producers' responsibility to cover exported products.

International collaboration for strengthened EPR implementation

The chapters in this report show some of the major challenges met by national governments trying to implement EPR-based systems and illustrate the need for international collaboration to strengthen such efforts. From the analyses presented, it is also clear that effective implementation of EPR requires more than developing legislation and establishing physical infrastructure. Broad capacity development, including training and education, and the establishment of appropriate institutions are also needed. International collaborative initiatives need to reflect this finding and include soft measures such as capacity development, in addition to technology transfer.

While bilateral collaboration in the form of official development assistance remains essential for capacity development, multilateral initiatives and regional collaboration are expected to play increasingly important roles. This is especially true for capacity building efforts mentioned above, as the exchange of experiences among developing countries can be as important as the transfer of

technology from North to South.

A conclusion of this report is that EPR comes in many forms and that there is no right or wrong way to implement it. This observation points to the need for countries to learn from each others' experiences, including successful approaches as well as initiatives that for some reason have fallen short of delivering expected outcomes. Regional policy platforms on waste management and resource efficiency can be suitable forums for mutual learning for improved implementation of EPR.

The need for international collaboration was also noted in the preceding section on issues related to national EPR systems and transboundary trade. A regional policy platform could be instrumental in addressing some of those issues. For example, such a platform may be able to work out regional agreements that can make EPR-based policies more effective in dealing with products and end-of-life items that are shipped across borders. Such regional policy development can be regarded as complementary to the Basel Convention, making it easier to reach the objectives of that international agreement while at the same time promoting more sustainable utilization of natural resources.

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