

Section III

Current EPR Policies in Developing Asia





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



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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 (SO₂) 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.

References

- China Household Electric Appliance Research Institute. 2006. *The Development of Household Electric Appliance Industry in China and E-waste Reuse/Recycle*.
- Feng, Huo. 2007, 15 March. *Circular Economy in Tsingtao*. Tsingtao News Net.
- Kummer, Katharina. 2007. *Review of E-waste Legislation in China*. Report prepared for the National People's Congress of PRC.
- Sifeng, Zhang and Lu Jing. 2005. *Discussion on the Legislation on EPR*. China Environmental Law Net.
- State Environmental Protection Administration (SEPA). 2007. *Environmental Status Report of China – 2006*.
- Tao, Hu and Wu Yuping. 2007, 9 January. Interview by Beijing Morning Post.
- Xisheng, Huang and Zhang Guopeng. 2005. *An Introduction to the EPR Mechanism*. Paper Presented at the Workshop on Environment and Resource Law in China. Beijing.
- Wang, Xuejun. 2007. *Investigation of E-waste at Local Level in China*. Report prepared for the National People's Congress of PRC.
- Zhang Tianzhu, et al. 2007a. *Circular Economy Legislation Study*. World Bank Report
- Zhang Chunxia. 2007b. *CE Pilot Project Progress and Mode Study in Iron & Steel Industry*. World Bank Report.
- Zheng Shurong, 2007. *Pollution Caused by E-waste and Relevant Mitigation Measures*. Digital Communication World, 1: 52-54.



6. Applicability of EPR Mechanisms in Thailand



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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.

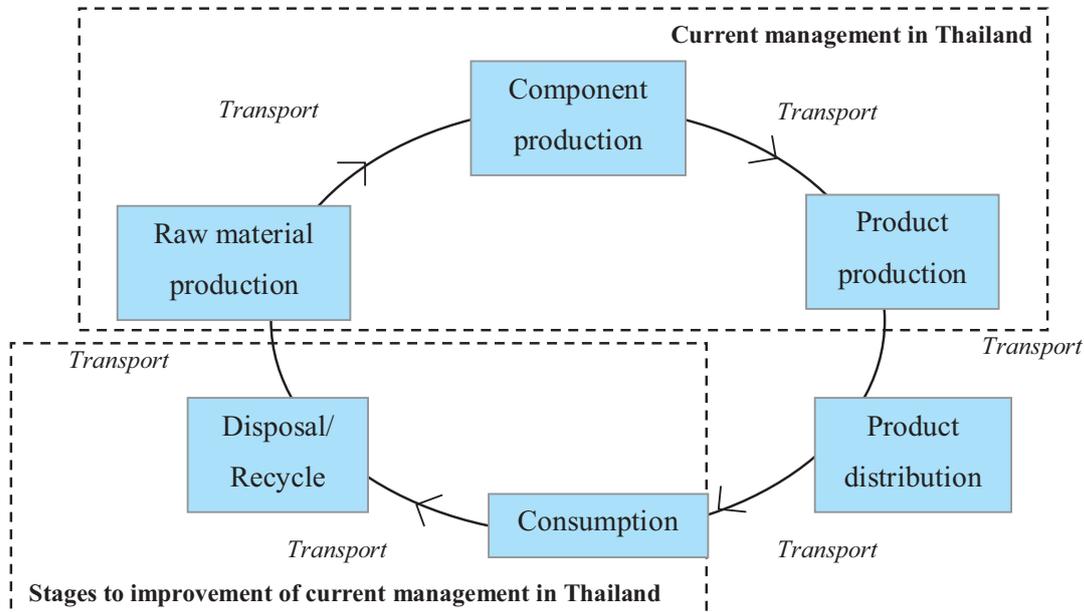


Figure 6-1: Product life cycle in Thailand

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	<ul style="list-style-type: none"> ◦ 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	<ul style="list-style-type: none"> ◦ Cradle to cradle concept ◦ Addresses minimizing waste generation, increasing waste segregation, and enhancing waste utilization 	Approved in 2003
Strategic Plan on E-Wastes	<ul style="list-style-type: none"> ◦ 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	<ul style="list-style-type: none"> ◦ 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	<ul style="list-style-type: none"> ◦ 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 Labels²¹ (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 widened.

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 Convention²².

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.

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

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

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.

References

- Bangchak Petroleum (Public) Company, Limited. 2008a. *Products and Services* (in Thai). <http://www.bangchak.co.th/th/productFuelDetail.asp?id=192> (Accessed on 3 August 2008)
- Bangchak Petroleum (Public) Company, Limited. 2008b. *Corporate Social Responsibility* (in Thai). <http://www.bangchak.co.th/th/csrProjectDetail.asp?id=22> (Accessed on 3 August 2008)
- Lifset, L. and T. Lindhqvist. 2008. Producer Responsibility at a Turning Point. *Journal of Industrial Ecology*. 12(2): pp.144-147.
- Siam Cement Group. 2008. *Sustainability Report 2007* (in Thai). Bangkok, Thailand.
- Pollution Control Department (PCD). Information Center for Environmental Friendly Products and Services. http://ptech.pcd.go.th/gp/main/about_project.php (Accessed on 10 December 2009)
- Thailand Environment Institute (TEI). 2008. *List of Green Label Products* (in Thai). http://www.tei.or.th/greenlabel/pdf/TGL_Name_apr2008.pdf (Accessed on 3 August 2008)
- Thailand Environment Institute. 2007a. Biodegradable Packaging for Better Environment. *Business for Energy and Environment Journal* (in Thai). Issue 6: April to June 2007. Nonthaburi, Thailand.
- Thailand Environment Institute. 2007b. Useful Knowledge with Mr. Soksak. *Business for Energy and Environment Journal* (in Thai). Issue 5: January to March 2007. Nonthaburi, Thailand.
- Thailand Environment Institute. 2006. *New Business Paradigm: Corporate Social Responsibility* (in Thai). Bangkok: Pantrarin Co. Ltd., Thailand.
- Thailand Environment Institute. 2004. *Green Label Criteria for Passenger Car* (in Thai). http://www.tei.or.th/greenlabel/pdf/TGL_33_04.pdf (Accessed on 3 August 2008).



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	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	No Activity	No Activity
Element 2: Resource flows										
- Money			Mandatory	Mandatory	Substantial Voluntary Activity	Substantial Voluntary Activity	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	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	No Activity	Substantial Voluntary Activity
Element 3: Monitoring and reporting mechanism	Mandatory		Mandatory	Mandatory	Substantial Voluntary Activity	Substantial Voluntary Activity	No 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 products²³ 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 entities.
- 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.

References

- Agrawal A, K.K. Sahu, and B.D. Pandey. 2004. Solid Waste Management in Non-Ferrous Industries in India, Resources. *Conservation and Recycling* 42 (2004) pp.99-120. Elsevier Publications.
- Central Pollution Control Board (CPCB), Ministry of Environment and Forests. 2008. *Guidelines for Environmentally Sound Management of E-Waste*. Delhi, India.
- Panate Manomaivibool. 2009. Extended producer responsibility in a non-OECD context: The management of waste electrical and electronic equipment in India. *Resources, Conservation and Recycling* 53. pp.136–144.
- Hazardous Wastes (Management and Handling) Rules (as amended on 6/1/2000,21/5/2003 and 2008). *The Gazette of India*, No. 465, 28/7/1989, 1989.
- Information, Planning & Analysis Group of Department of Information Technology (IPAG of DoIT). 2006. Eleventh Five Year Plan (2007–2012): Information Technology Sector (Part II), Electronics Information & Planning 2006; 34(3–4).
- Lal, Banwari and Reddy MRVP. 2005. Chapter 5 on *Industrial Solid Waste, Wealth from Waste, Second Edition* published by The Energy Research Institute, Delhi, India. (ISBN # 81-7993-067-X).
- Lindhqvist T. 2000. *Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmental Improvements of Product Systems*. IIIIEE Dissertation. 2000:2. The International Institute for Industrial Environmental Economics, (IIIIEE), Lund University. Lund, Sweden.
- Manomaivibool P, T. Lindhqvist, and N. Tojo. 2007. *Extended producer responsibility in a non- OECD context: the management of waste electrical and electronic equipment in India*. Report Commissioned by Greenpeace International Macula, Boskoop, the Netherlands. August (ISBN : 987-91-88902-41-2)
- Manufacturers' Association for Information Technology (MAIT). 2007. *IT industry performance annual review: 2006–07*. Presented in Press Conference. 19 July 2007. New Delhi, India. <http://www.mait.com/industry.jsp>
- Manufacturers' Association for Information Technology (MAIT). 2006. *IT industry performance: mid-year review 2005–06*. Presented in Press Conference. 5 January. New Delhi, India. 2006. <http://www.mait.com/industry.jsp>
- Manufacturers' Association for Information Technology (MAIT) and Deutsche Gesellschaft fuer Technische Zusammenarbeit (GTZ). 2007. *E-waste assessment in India: a quantitative understanding of generation, disposal & recycling of electronic waste in India*. Presented in Press Release. 13 December 2007. New Delhi, India. <http://www.mait.com/pressupdate1.jsp?Id=77>
- Ministry of Environment and Forests. 2006. Country Questionnaire Prior to the Senior Officials Meeting on the 3R Initiative, India.
- Ministry of Environment and Forests, Government of India. 2006. Presentation at Senior Officials Meetings on 3R Initiatives. Tokyo, Japan, March 6-8.
- Organisation for Economic Co-operation and Development (OECD). 2001. *Extended producer responsibility: a guidance manual for governments*. OECD. Paris, France.
- Toxics Link. 2004. *E-waste in Chennai: Time Is Running Out, New Delhi*, India: Toxics Link. http://www.toxicslink.org/docs/06033_reptchen.pdf