



POLICY BRIEF

September 2011

Number 14

EPR Policies for Electronics in Developing Asia: A Phase-in Approach

Main Proposals and Messages

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 Despite the increasing popularity of EPR-based legislation for electronic waste (e-waste) management in developing Asia, there are several challenges to moving from paper to practice. Part of the issue is that many developing countries are trying to apply the EPR model that was developed for and by industrialised countries.
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 In the *phase-in* approach proposed here, the application of EPR should be adjusted to the level of national economic development, capacity for environmental policy enforcement, market structure of products and recyclables, consumer awareness, and relationships among key stakeholders. EPR implementation should progressively go from a basic focus on improved waste management to finally achieving design for environment.
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 Each country should establish a national e-waste expert review (NEWER) panel, active at both planning and implementation stages, to examine the country specific situation, recommend suitable policy tools, advise stakeholders, monitor implementation and assess progress towards performance targets.
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 A platform for regional collaboration is needed for capacity development, but also to address trans-boundary flows of waste. The platform should place more effective controls on the export of e-waste from industrialised to low-capacity, developing countries, thereby helping to ensure that harmful recycling and treatment is avoided.



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Introduction

In the last two decades policies based on extended producer responsibility (EPR) have been implemented for a wide range of products, especially in industrialised economies. Now, an increasing number of Asian economies similarly find themselves facing increasing amounts of difficult-to-treat waste and associated health, social and environmental risks, as well as rising demand for resources. Many have introduced, or are considering, EPR-based legislation, especially

targeting electronic waste (e-waste) management.

Considering the design and implementation challenges in developing Asian countries, how can EPR be effectively employed by the governments? This policy brief examines the current status and obstacles in developing Asia; it then proposes a phase-in approach to implementation for e-waste management.

I A wasteful problem

The amount of post-consumer electrical and electronic waste (e-waste) is rapidly growing in developing Asia. In China and India for example, e-waste generation from old computers is predicted to grow by a factor of 2 to 4 between 2007 and 2020; during this period, discarded mobile phones will increase 7 times in China and 18 times in India (UNEP and UNU, 2009). In many of these countries, e-waste is usually not collected by municipal waste management services but commonly collected informally for its valuable materials. In addition to facing increasing amounts resulting from domestic consumption, many developing Asian countries also import e-waste in the form of mixed metal scrap, or sometimes disguised as second-hand e-products, from industrialised countries.

Recycling of e-waste in developing countries has caused international concern due to socially and environmentally unsound methods. De-soldering and wet chemical leaching of printed circuit boards cause contamination by heavy metals and flame retardants; dioxins and furans are released from open burning. These pollutants contaminate air, water and soil. Exposure to such toxic chemicals is causing skin infections, increased cancer risks and breathing problems among recycling workers and residents. Furthermore, recycling residues and components without economic value are being mixed with municipal solid waste or simply dumped in the environment, leading to pollution and further risks of negative impacts on human health and ecosystems.

2 Extending producer responsibility

EPR is usually conceived as a comprehensive policy package, combining various instruments to achieve three distinct objectives simultaneously:

- Improved waste management and resource recovery: to establish effective collection of end-of-life (EoL) products from consumers, promote environmentally sound treatment and efficient recycling, and reduce the amount of wastes for final disposal;
- Integrating environmental externalities into consumption and production: to transfer the financial burden for waste management from the public sector to the manufacturers;
- Design for the environment: to provide economic incentives for producers to make design changes

towards easier reuse and recycling.

These three objectives, and the comprehensive character of EPR schemes, are emphasised in the work published by the OECD (OECD 2001), which has become a reference model for EPR policy development in advanced countries. Most attempts at adopting EPR in developing Asia have followed the OECD model as a baseline and assume that all above three EPR objectives should be met simultaneously. Consequently, research has found a large gap between the demanding OECD-type EPR model and the limited implementation capacity of developing economies.

Some common policy instruments for EPR

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, utilisation mandates

Economic instruments

- Material/product taxes, subsidies, advance disposal fee systems, deposit-refund systems, upstream combined tax/subsidies, tradable recycling credits

Information-based 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

3 Current status of EPR in Asia

a) Industrialised Economies in Asia: Economies in this category already have functioning EPR systems in place. Japan, the Republic of Korea and Taiwan each have about a decade's experience of applying EPR legislation. Although mechanisms differ from one economy to the next, each has clearly-assigned manufacturers' responsibilities under a legal framework, as well as established monitoring and enforcement activities.

b) Emerging Economies in Asia: For rapidly emerging economies like the People's Republic of China, Malaysia and Thailand, EPR-based legislation is drafted or under development but in most cases not yet fully implemented. It is noticeable in the draft legislation that there are not yet clear references to the physical take-back and recycling responsibilities facing producers in these emerging economies. In practice, the e-waste return function is handled among competing stakeholders, including retailers, itinerant collectors, or through designated collection points; the existence of informal markets of collectors and recyclers of e-waste in these countries makes it difficult to establish a formal collection and recycling scheme.

c) Least Developed Economies in Asia: Though these economies are facing rapidly growing e-waste problems, they are yet to develop EPR-based legislation. Most of these countries, e.g. Lao PDR and Cambodia have expressed active interest in EPR though they remain constrained by insufficient regulatory capacity. LDEs tend to have strong informal waste management sectors and active second-hand markets. In some cases there is draft legislation for general waste management although this is not specific to e-waste.

Industrialised economies tend to have strong state institutions and capacity to implement comprehensive EPR legislations. Least developed and emerging economies might be interested in EPR legislation as an approach to waste management, but they do not necessarily have the capacity to implement it. IGES' research has confirmed the conclusion reached by others that the application of full-fledged EPR legislation is likely to become very challenging for the reasons explored below.

A number of Asian developing countries have recently introduced or are drafting legislations on e-waste, based on EPR:

- China: Rules on the Administration of the Recovery and Disposal of Discarded Electronic and Electrical Products (promulgated in 2009, effective in 2011)
- India: E-waste Management and Handling Rules (promulgated in 2010, effective in 2012)
- Indonesia: specific article on EPR is under preparation under Solid Waste Management Act 2008.
- Malaysia: specific article on take-back and deposit refund in Solid Waste and Public Cleansing Management Act 2007. Draft Regulation on Recycling and Disposal of End-of-life Electrical and Electronic Equipment.
- Thailand: WEEE Strategic Plan in 2007 and Draft Act on Economic Instruments for Environmental Management (under development)
- Viet Nam: Draft regulations on the reclamation and treatment processes for disposal products (under planning: draft was released in 2010)

4 Implementation Challenges for Policy Makers in developing Asia

A major challenge to the functioning of EPR systems in developing economies is the **difficulty of identifying the producer**: non-brand and counterfeit products are common; during product repair, which is very widespread, original components often get replaced with those of other brands or generic parts; some products are smuggled into the country; and producers frequently go out of business. This situation is very different from developed countries and poses serious challenges to an effective implementation of EPR.

Competition with the informal waste management sector. The informal e-waste recycling sector has low operating costs (compared to formal recycling businesses that meet governmental standards of occupational safety and environmental protection) and it can therefore offer households relatively higher cash payments for EoL items. Formal recyclers therefore have difficulties in getting access to the waste they are expected to process.

Poor infrastructure for waste collection and treatment. In most cities, there is no established collection system for recyclables operated by public entities. Households' knowledge about the benefits of source separation is generally low. Existing infrastructure for recycling is often small-scale, based on simple technology, unsafe for workers and environment, and only able to recycle a few of the many materials found

in e-waste. There is also a shortage of technical know-how and skills needed for proper recycling. Under such conditions, substantial investments in physical infrastructure as well as in human and institutional capacity are needed if an EPR system as comprehensive as in industrialised Asia is to be introduced.

Perceptions of e-waste. Post-consumer electronics are generally perceived as a source of valuable resources rather than as hazardous waste; households therefore generally expect collectors to pay for EoL items. Public awareness of chemical hazards and other environmental issues relating to e-waste also tends to be low; this is generally coupled with poverty and lack of alternative employment opportunities.

Poor international governance of import and export of e-waste. Although exact figures of transboundary movement of e-waste are not available, it is estimated that most of the e-waste generated globally is exported to Asia. Since it is difficult to distinguish between usable second-hand electronics and e-waste (from which valuable metals can be extracted), trade of e-waste disguised as non-hazardous mixed metal scrap and second-hand electronic products is considered to be a major loophole in the existing governance system for transboundary movements of e-waste (most notably the Basel Convention). The absence of effective monitoring systems, in exporting countries as well as in

countries that import, is an urgent problem. EPR systems for both industrialised and developing countries

would therefore need to be designed taking the strong economic drivers for international trade into account.

5 A Phase-in Approach to EPR in Developing Asia

As is evident in the analyses above, the application of EPR in a country should be adjusted to its stage of economic development, capacity for environmental policy design and enforcement, market structure of products and recyclables, and relationship among stakeholders (central and local government, private sectors, community, and the informal sector). As the above challenges highlight, although EPR-based policies have had positive effects in OECD countries, the practical interpretation does not necessarily provide a suitable template to be copied by developing countries. An EPR system has several subcomponents addressing different issues, it requires physical infrastructure and complying behaviour, and adequate institutions and capacity to enforce regulations at all levels, including the municipal level. It would take considerable time and resources to get all of these components in place and to make them work as intended. Getting the right policy instrument to deliver expected

Although EPR systems may vary, a few basics apply consistently. Based on industrialised economies' experiences, some core lessons can be drawn as prerequisites for effective EPR systems. Each system needs to have clear objectives and a corresponding set of policies to deliver them; involve and develop clear roles for each key stakeholder; include an incentive mechanism for compliance and penalties for non-compliance; have appropriate institutional and regulatory capacity and a system to regularly review the progress of implementation.

results is also a matter of context. While charging recycling fees for home appliances at time of disposal may work in one country, such a system is not likely to work in developing countries, since, instead of paying

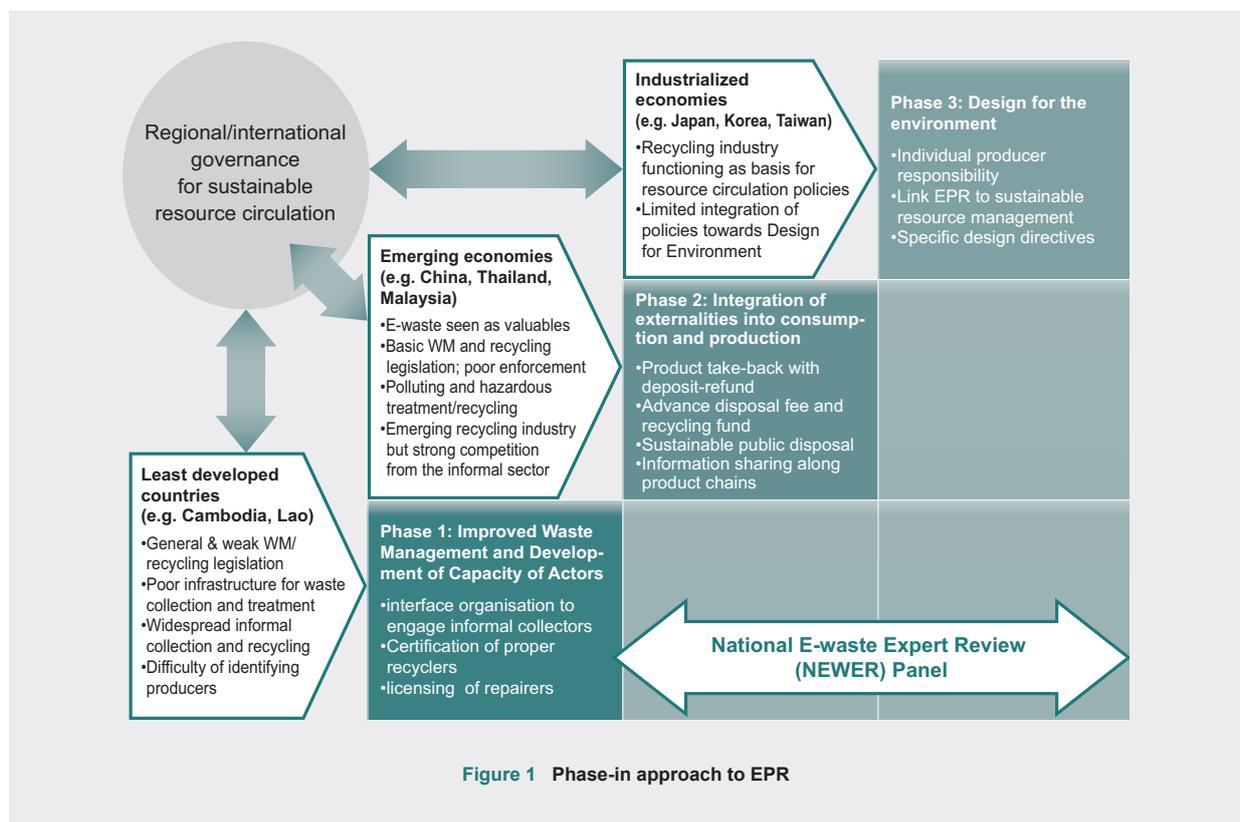


Figure 1 Phase-in approach to EPR

a disposal fee, many households might resort to open dumping. Asian countries must therefore evaluate their capacity against the resource needs and set priorities in keeping with the local and national situation.

This policy brief proposes a **phase-in approach to EPR implementation**. Accordingly, components for each of three major objectives of EPR would be introduced in phases, starting with the most basic elements and moving on as institutional capacity develops: EPR in the country would progressively move from the first phase, focused on improved waste management and resource recovery (the 3Rs), to the second phase, in which environmental externalities are integrated into consumption and production, and then to the third phase aimed at achieving design for the environment (DfE) of the product and product systems. Such progressive implementation has been observed in successful Asian case studies. For example, in the mid 1990s Japan gradually raised awareness of waste as a resource through various voluntary industrial activities for recycling; it established zero-waste factories to minimise amounts leaving manufacturing facilities for landfills. Then, through progressively introducing sound material management laws, Japan shifted its policy focus from proper collection and treatment of wastes to socio-economic reform for efficient resource use.

In this policy brief, each phase of implementation is broken down as a set of components and policy tools, and roles and responsibilities of stakeholders. Phasing in, however, does not necessarily suggest a strict step-by-step approach. For example, although improved waste management and resource recovery can be a priority for Indonesia, this does not prevent it from launching pilot projects to integrate environmental externalities into consumption and production.

In addition to the three phases outlined, two other implementation elements are crucial. The first is creation of a national platform on electronics, to be active during the planning phase and throughout implementation; the other is continuing integration, through all phases, of national EPR approaches into international collaboration efforts to solve the e-waste problem.

Achieving the objectives of EPR is not just a matter of passing a national legislation; the system needs to be buttressed by adaptive policy tools, it needs effective mechanisms for monitoring and evaluation, and – not least – it needs to engage stakeholders at local, national and international levels in a progressive process.

Process Planning: NEWER Panel

We recommend that each country, rather than following generic recommendations, should start its EPR policy design process by setting up a multi-stakeholder panel, which can be in the form of a **national e-waste expert review (NEWER) panel**. This national platform would consist of national, municipal and local policy-makers, researchers, relevant industrial associations, and consumer groups. A review panel for the purpose of implementing EPR has already been proposed by Akenji and Bengtsson (2010) for the case of packaging. Such a panel should provide an opportunity to examine country-specific situations and develop or adapt any of the tools and instruments available for shifting towards better e-waste management. It would also more objectively, and with a researched understanding, advise the government on priorities and feasible policies for achieving its objectives of using EPR. While a NEWER panel would be especially timely for countries in the planning stage for EPR, it would also be very useful to (emerging) economies that have yet to enter the implementation phase or are currently reviewing their recently-introduced systems.

In the planning phase the panel would review the national situation regarding e-waste, compare to and extract lessons from experiences of other countries, but also identify unique aspects to the country. It would also evaluate national infrastructure for e-waste management, related policies already existing, new ones needed, existing voluntary activities, and the overall capacity to implement EPR-based policies. Furthermore, the panel would consult with various e-waste stakeholder groups to be affected by an EPR system, including informal waste collectors and recyclers, brand owners, importers, distributors, retailers, and municipal authorities responsible for waste management. The panel could also liaise among the

governmental departments related with electronic products and e-waste.

The NEWER panel would make recommendations to the government on what kind of EPR system would be most suitable for the country, as well as on the components of such a system, e.g. stakeholder responsibilities, collection schemes, performance standards, targets, etc. The government would then use the recommendations to formulate clear objectives, standards and draft policies, which it should then take to stakeholders for consultation.

The NEWER panel could be even more instrumental in later phases of implementation. The panel could be a focal point, working with related agencies in monitoring and evaluation. This could include reviewing the progress of policy implementation and performance targets, ensuring early detection of unintended effects, and reforming the incentive system for stakeholders. It would also identify areas where there is need to liaise actions to regional and international collaborative efforts for e-waste management.

Phase One: Focus on improved waste management and resource recovery

In this early phase, policy attention should be given to environmental, health and social concerns from improper recycling activities, dumping of residues, and poverty issues associated with the informal sector. The following are examples of possible policy tools at this stage.

i. Establish an interface organisation to mediate with the informal sector, to link informal collectors or dismantlers with more formal resource recovery facilities. This would avoid e-waste being directed to hazardous recycling activities by informal resource recovery operations. An “interface organisation” would buy recyclables containing hazardous substances, such as scrap circuit boards, from informal dismantlers and sell them to formal integrated metal refineries. There are successful precedents in Peru where such an organisation has been created, and pilot projects have been conducted in India. Depending on market conditions, the interface

organisation could be financially self-sustained or in need of public subsidies.

ii. Certification of proper recyclers. For improved resource recovery and environmental protection, it is important to be able to identify and nurture good recyclers; a certification scheme would be instrumental in this respect. This can be started as a voluntary mechanism, for example by an association of recyclers or industrial association of electronic producers. In a more regulated scenario, certified recyclers would have appropriate technology, produce recycled material of a defined minimum quality, and operate under established health and environmental standards. The informal sector could be incorporated into such a system by strengthening the capacity of some of the already operating informal recycling schemes, upgrading their technical know-how as well as their infrastructure. Such a certification scheme requires some policy intervention, for example the provision of financial incentives. (A recycling fund is proposed in Phase Two of this brief.)

iii. Licensed repairers. Given the prevalence of e-product repair, a system is needed to ensure a minimum quality standard for repaired products and it is worth considering bringing this mostly informal activity under the formalised EPR system. A possible scenario is through an association of repairers with a government-supported voluntary scheme for quality assurance of repaired goods. This could be identified using a designated sticker as proof that a product has been repaired by a qualified and licensed repairer. Where feasible, the repairer licensing system could be complemented with **certified recycling centres**. Under the supervision of producers or their subsidiaries, such centres would repair, refurbish or remanufacture products for reuse. Such products, with certified labels, could then be re-issued short-term warranties.

Phase Two: Focus on integration of externalities into consumption and production

Once sound waste management and resource recovery policies are being implemented, the next step should be establishing a mechanism for integrating environmental externalities into consumption and

production. Here, the country can start to consider how to share the financial burden for waste treatment and resource recovery among stakeholders. Policy priority should be given to development of economic instruments and a financial mechanism. A possible first step for this phase is a pilot or voluntary initiative of take-back and recycling by relatively large producers or retailers. This may be even more effective if industrial associations, large retailers, and importers of electronics and electric appliances were included in the national e-waste expert review (NEWER) panel. The following are examples of possible policy tools in this phase.

i. Product take-back. In most developing countries, used and obsolete electronics and electric appliances are considered to be valuables. One way to ensure used products going to good recyclers is through the introduction of a deposit-refund scheme. A deposit-refund scheme can be more easily applied to new products; with a little more complication in the system (e.g. the introduction of a warranty system), it can also be applied to second-hand products. It is inevitable that the fund would have to absorb some of the costs of orphaned second-hand or poorly repaired products at the beginning. One way of introducing a take-back scheme is to introduce some sort of price reduction for new e-products bought to replace old ones, provided that the obsolete ones are disposed of at designated collection points. China has already introduced such a product renewal policy to increase the flow of EoL products going to proper recyclers.

ii. Recycling Fund. Made of financial contributions from producers and importers, the fund will cover e-waste management costs (and, as is the case of China, product renewal subsidies) incurred under the EPR system. The recycling fund can be linked to enable certified recyclers, as proposed above, to benefit from its subsidy programme. This will ensure capacity development (like acquisition of proper technology and training) and that recyclers meet minimum health, safety and environmental standards, as well as guaranteeing the quality of recycled material. The experiences of Taiwan and Switzerland are instructive to economies creating

either a governmental or third-party recycling fund.

iii. Sustainable public disposal. At the tail end of (sustainable) procurement, we propose sustainable public disposal: a sustainable channelling and management of obsolete products by public institutions and other large institutions and businesses. Given the volume of e-products purchased and disposed of by such organisations compared to households, the aforementioned parties should be mandated to dispose of their e-waste using the collection and recycling infrastructure set up under the EPR system. For this, Japan's experience in zero-waste factories by beer producers, food processing companies, and electronics makers in the 1990s may be instructive.

Phase Three: Focus on design for the environment (DfE)

Under a fully fledged EPR scheme, Design for the Environment towards easier and safer dismantling and resource recovery should be promoted in countries with large e-product manufacturing sectors. This stage is also applicable to industrialised countries with EPR systems already in place. The following are examples of possible policy tools.

i. Individual Producer Responsibility (IPR). A system of shared responsibility among producers creates weak incentives for product redesign since the per-item recycling costs are the same for all producers, regardless of whether their products are easy to recycle or not. In contrast, a system where each producer covers the recycling costs only for its own products (Individual Producer Responsibility, IPR) provide incentives to continuously improve the design of products to make them less harmful to the environment, and easier to dismantle and recycle. One example of IPR is the voluntary initiative being practiced by Fuji Xerox Corporation (maker of photocopiers, printers and other e-products). The company established a centralised recycling facility in Thailand to which its obsolete branded electronic products are shipped from all over the Asia-Pacific region. These products are designed for easy disassembly and recycling or reconfiguration for reuse. Fuji Xerox has also introduced a tracking system to prevent illegal dumping. While IPR might be more

easily applied to large corporations, there will be more challenges regarding the inclusion of SMEs in the scheme. As such, considerable care should be taken to ensure that SMEs' responsibilities are covered. An additional aspect to ensure successful IPR is information sharing. Each producer is responsible for sharing information on safe, environmentally-friendly, and efficient treatment of its EoL products by recyclers.

ii. Encouraging innovative business approaches.

Public policy could encourage innovative approaches, such as leasing instead of sales of some e-products. A leasing company can keep better track of its products. At the end of the lease, producers can ensure that their products are collected and taken for reuse by a new client, to a licensed repairer, or to a certified recycler. DfE can also be encouraged by showing recognition of best practices, for example by giving awards for innovative approaches or for the most resource efficient electronics. Public recognition is often used to promote corporate social responsibility.

iii. Linking EPR with sustainable resource management.

Faced with the increasingly limited supply of several metals and other resources, and given expected increases in demand for e-products, policies for sustainable resource management should be developed to give incentives to producers to innovate towards reduced total material use and switching to more readily-available and renewable resources.

Piloting and Phasing in

Complementary to the phase-in approach, countries can benefit from running systematically designed and properly evaluated pilot projects. This allows governments to test tools and phases, thus learning lessons and gaining more practical experience before moving to full-scale implementation. In the Republic of Korea, for example, a pilot project was launched prior to implementation of the producer responsibility system. The Ministry of Environment entered into a voluntary agreement with three major producers who, over a two-year period would construct nation-wide recycling infrastructure. Similarly, in 2003, the National Development and Reform Commission of the People's

Republic of China selected Qingdao City along with Hangzhou, a major producer of electrical appliances in China, as a pilot area for waste home appliance collection and reuse/recycling. The case of Qingdao has had only limited success, as not enough e-waste could successfully be directed to meet the operational capacity of the recycling facilities. This has provided lessons for China, one of which is that it must improve its waste collection systems.

To ensure that EPR objectives are being met, performance targets need to be reviewed and adjusted at regular intervals, taking into consideration achievements made, newly-available technologies, and also external factors such as world market prices of natural resources. Well-functioning NEWER panels would be particularly useful for such reviews and contextual adaptation.

Regional/international collaboration towards better governance for resource circulation

The three phases outlined above are within the scope of national policy; a more holistic phase-in approach would need to have an international dimension. Addressing the full scope of e-waste management in developing countries would also need better governance of international trade. With standards for second-hand e-products loosely defined, the (sometimes illegal) flow of e-waste from industrialised to developing countries remains a problem. Even if well designed, national EPR systems in developing countries can be easily overwhelmed and rendered ineffective by the sheer volume and complexity of imported e-waste. There is therefore a need to strengthen international collaboration towards dealing with e-waste.

The Basel convention is an example of an existing international initiative for e-waste management. Within the Secretariat of the Convention is an initiative on the "Environmentally sound management of E-waste in the Asia-Pacific region". There are also advocacy initiatives, an example of which is StEP (Solving the E-waste Problem), initiated by United Nations University and United Nations Environmental Programme. Existing and new international mechanisms need to be reconfigured, in view of the growing

complexities and pressures relating both to e-waste and its trans-boundary flows. Given the strong relation between national capacity and problems related to waste management, particularly worth considering are initiatives to: severely restrict (or ban) the export of e-waste from industrialised to low-capacity developing economies; complementarily, transfer responsibility for monitoring and enforcement of such legislation to industrialised countries, since they have better capacity to monitor their borders.

International collaboration is also needed for the successful implementation of Phase One above. Least developed countries in particular lack the financial resources needed for establishing appropriate technical infrastructure for e-waste recycling and for strengthening the capacity of institutions related to

EoL electronics. The major existing global financing mechanisms (most prominently the GEF) emphasise climate change, POPs and biodiversity, and are not well suited to meet countries' needs related with e-waste. A strengthening of international funding mechanisms available for Sustainable Materials Management, including safe e-waste recycling, would be beneficial. With such funding, low-income countries could lay a foundation for a sound treatment system by nurturing proper recycling businesses. As these good recycling practices become established, the competition from hazardous informal activities weakens, and the government improves its capacity, producers can be made to carry a larger share of the financial burden and public co-funding can gradually be phased out.

6 Conclusion

This brief introduces a progressive, adaptive approach of phasing in EPR and recommends that developing countries avoid going directly for a fully-fledged EPR scheme similar to that adopted by advanced countries. A developing country needs to take its own policy priorities as the starting point and adjust the implementation to its stage of economic development, degree of environmental policy development, institutional and administrative capacity for law enforcement, market structure of products and recyclables, and relationship of e-waste stakeholders – paying particular attention to producer identification and role played by the informal sector.

To strengthen the success of EPR-based policies in developing Asian economies, more region-specific characteristics will have to be incorporated. Most analysis on EPR application has been done in the context of industrialised countries and there is limited researched understanding and shared experience on implementation in developing countries – despite the fact that EPR has become a guiding principle for a wave of recently passed legislation in Asian countries. There is an OECD guideline for implementing EPR in OECD countries, but hardly any corresponding guidance for developing countries. This policy brief is intended as an initial attempt to fill that gap

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■ Acknowledgement

Parts of this policy brief are edited from a previously published journal article by same authors (Akenji et al. 2011). This policy brief is based on Asia Resource Circulation Policy Research, conducted by IGES and funded by the Ministry of the Environment of Japan as part of the project "Aija Shigen Junkan Kenkyu Suishin Gyomu" (Asia Resource Circulation Research Promotion) between FY 2009 and FY 2011.

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