

# EPR in a non-OECD Context

## An introduction to research projects on the management of WEEE

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There has been an upsurge of interest in the principle of extended producer responsibility (EPR) among policy makers and scholars in non-OECD countries. The principle has been applied and its impacts studied rather extensively in various OECD countries. However, similar experiences are largely lacking in non-OECD countries. This paper presents some ongoing research and preliminary findings on the management of waste electrical and electronic equipment (WEEE). The research aims to explore both potentials and limitations of EPR under non-OECD conditions. Hitherto, there have been four projects in three countries: India, Thailand, and Argentina. The first project in India in 2007 investigated the specificity of this non-OECD context and the explanatory boundary of the principle. The second phase of the research studies a WEEE policy development in the three countries. At the time of writing, they appear to follow different courses of action. The India Government issued a guideline suggesting an incorporation of WEEE under the existing Hazardous Waste Rules. The Thai Government shows particular interest in economic instruments, such as product fees and deposit-refund system, and has been working on a draft law that would govern the use of these instruments for the management of some WEEE and other used products. In Argentina, a senator proposed a dedicated WEEE framework law based on EPR. Our analysis identifies collection of post-consumer WEEE as a major practical bottleneck particularly when there is a strong presence of the so-called informal sector. EPR can be a driving force for improvements by mobilising resources from producers and channelling them to end-of-life management. In addition, in a long run, it can lead to design changes in products and product systems. However, market anomalies in a non-OECD context such as sizeable black/grey markets for several product groups and/or illegal import of used products can put identifiable legal producers at a disadvantageous position and retard feedback mechanisms in an EPR programme. Thus, the applicability of policy alternatives should be assessed against the conditions of particular contexts. We also discuss the importance of problem definition in policy processes.

### 1. Introduction

Waste electrical and electronic equipment (WEEE) is one of environmental challenges in the modern society. Rapid technological development and high competition has driven up the consumption of electrical and electronic equipment (EEE). For example, the ownership of personal computers and mobile phones among 100 urban households in China increased from 3.7 and 19.5 to 41.5 and 137 respectively only between 2000 and 2005 [25]. The other side of this trend is, however, a growing amount of WEEE. In addition, these products are also getting more complex with a plethora of chemicals used. Without proper handling and control, hazardous substances from WEEE can be released and contaminate the environment causing health and environmental risks. Loss of materials in WEEE including some precious metals is an additional driver for recycling.

Extended producer responsibility (EPR) is an environmental policy principle where “a producer’s responsibility for a product is extended to the post-consumer stage of a product’s life cycle” [27]. It defines waste management not merely as a public health issue but rather part of a product’s life cycle and the design of products and product systems identified as a root cause of the problem [19]. Instead of placing all the responsibilities on the local governments’ and tax payers’ shoulders, it argues for significantly more involvement of a new pair of actors – the producers and the consumers of

products and packaging – who have more say over the design of the products. EPR was first applied to the management of packaging waste with precedents such as the German Packaging Ordinance and the Dutch Packaging Covenant in 1991 and soon spilled over to other waste streams including WEEE. The Organisation for Economic Co-operation and Development (OECD) played an active role in spreading the concept and eventually published a guidance manual for governments [27].

Elements of EPR can be found among various WEEE programmes of the OECD members. The most elaborated examples of such legislation are the WEEE (2002/96/EC) and RoHS (2002/95/EC) Directives of the European Union (EU) and the Swiss and Norwegian Ordinances. This holds producers and distributors of electrical and electronic equipment (EEE) responsible financially and physically for the collection, treatment, and reutilisation of WEEE. They also prescribe some provisions on product design and information releases. In practice, implementation models with single or competing producer responsibility organisations (PROs) dominate [37] allowing producers and distributors to keep the physical responsibilities at their arm’s length. In Japan and South Korea, these upstream actors are more involved in downstream activities with retailers’ take-back schemes and some recycling facilities owned by a producer or a group of producers [6, 17, 29]. On the other

hand, producers in California and Taiwan are obliged only to finance the government-run systems.

There are several studies on the effects of EPR for the management of WEEE in OECD contexts. Examples are Lee et al [17], Gottberg et al [10], Røine and Lee [36], and Tojo [42]. In general, downstream improvements in terms of the amount of WEEE collected and processed in controlled systems were more evident than the effects on design changes. The latter was partly owing to the long-term nature of design changes and its innate limitations (see [12]), but also a result of implementation slippages which watered down much of the design incentives in the WEEE programmes (see [37]).

Recently, the WEEE issue has also been discussed outside the OECD circle. Its rise to a prominence was partly due to the work of transnational movements for environmental justice and some local NGOs which exposed and dramatised malpractices in WEEE recycling and associated health and environmental hazards in less industrialised countries [30, 45]. A landmark document was the Basel Action Network (BAN)'s *Exporting Harm: the High-tech Trash of Asia* (2002) filmed mostly in Guiyu town, Guangdong Province, China. Recent scientific studies have characterised and confirmed elevated levels of pollutions from backyard-recycling activities (see a review on this subject in [50]). The issue was regarded as requiring "urgent attention" in the sixth meeting of the Conference of the Parties (COP 6) to the Basel Convention in 2002 and the Basel Convention Partnership on the Environmentally Sound Management of Electrical and Electronic Wastes for Asia Pacific Region was officially launched at the end of 2005 to carry out inventory studies in 10 Asian countries [38]. A similar project was proposed for South America by the regional centre (BCRC-Argentina) in 2006 [39]. In addition, several non-OECD countries, such as China and Thailand, have been in a process of drafting their national WEEE laws for a few years and a few more might follow suit in a near future. Interestingly, in several occasions, EPR was mentioned as a future policy direction (e.g. [18, 28, 30, 43, 46, 48]). However, it remains unclear on how the principle would address the problems in non-OECD countries, e.g. backyard recycling, and how close the actual policies would come to the concept.

Against this background, our research group at IIEE at Lund University has been executing four projects commissioned by Greenpeace International to investigate the WEEE policies and contexts in India, Thailand, and Argentina. The research started with the first Indian project in 2007 with an emphasis on examining opportunities and challenges in this non-OECD context. In 2008, the other three projects reviewed and analysed the contents and the processes of policy development in the three countries. This paper presents a summary of the first project (for a full account, see [22]) and preliminary findings of the three ongoing projects. Its organisation is the following. The next section provides a brief description of materials and methods employed in the projects, mainly case studies and semi-structured interviews. The third and fourth sections map out key

issues and policy documents in these non-OECD contexts, respectively. The fifth section discusses the importance of problem definition in policy development. The paper ends with conclusions and directions for future research.

## 2. Materials and Methods

This section describes materials and methods employed in the projects. In general, the research was based on documentary research, stakeholder interviews and focus groups, and direct observation, though there were some variations between projects. The research team was able to access policy documents and related studies in India and Thailand in their original languages, English and Thai, respectively. However, most Argentinean texts were available only in Spanish and we had partly to rely on unofficial English translations. The interviews and focus group-like meetings started with key informants in respective cases and were expanded through snowball sampling. For semi-structured interviews, transcripts were sent back to the interviewees for further comments; few commented transcripts were returned. In Argentina meetings were not set up as interviews, but more as general information sharing meetings. Hitherto, there were five field trips in total, where most empirical data were collected as described below. Greenpeace International and local offices were instrumental in organising the trips, arranging the local contacts, and information gathering.

The two Indian projects consisted of three trips to the field. The first was between 13 and 22 April 2007 where the first author carried out most of direct observation in Delhi, Mumbai, and Bangalore and 10 semi-structured, face-to-face, interviews with key informants from trade associations, individual companies, recyclers, governmental agencies, developmental agencies, and NGOs. Greenpeace organised a workshop where all three authors presented the findings of the first project on 21 August 2007, at Indian International Center, Delhi. There were 40 participants (7 from the government, 13 from the EEE sector, 6 from the WEEE recycling industry, 6 from research institutes and developmental agencies, 5 from NGOs, 1 from trade union, 1 from the media and 1 unspecified) in the workshop, which provided a propitious setting to test the validity and reliability of the findings. On 11 April 2008, the first author attended another focus group workshop in Bangalore with 14 EEE companies, who together represent about 60% and 90% of the organised market for personal computers and mobile phones in India, according to the organisers (Manufacturers' Association for Information Technology, MAIT, and Greenpeace India). In addition to the workshops, the first author had opportunities to revisit the fields in Delhi and Bangalore between 16 and 24 August 2007 and 7 and 11 April 2008.

The first author undertook data collection in Thailand between 1 and 7 April and 16 April and 8 May 2008. This included 21 semi-structured interviews (19 face-to-face and 2 emailed) and 8 unstructured interviews (4 face-to-face and 4 by telephone). The interviews covered key informants in four areas: governmental

agencies, decision-supporting units, individual companies, and trade associations. During the period, direct observations were made in Bangkok and vicinity and, to a much lesser extent, in Chiang Mai.

The second author visited Buenos Aires, Argentina, between 20 and 28 May 2008. He had information sharing meetings with various stakeholders including five major producers, two trade associations, one network provider, an authorised recycler, the Cabinet of Secretary of the State, the Environmental Agency of Buenos Aires, the Senate Environmental Committee, and NGOs. He also had an opportunity to observe activities in product market, assembly market, and an authorised treatment facility in Buenos Aires.

### 3. Non-OECD contexts

In the first Indian project, we studied this non-OECD context to see its positive and negative implications for the WEEE policy, in general, and for EPR, in particular. Several characteristics of the context were identified as salient including (1) historically low penetration rates and expanding product markets; (2) numerous small-and-medium producers; (3) relatively longer products' life span through extensive use and reuse; (4) lucrative downstream businesses dominated by informal actors; and (5) underdeveloped municipal solid waste management (MSWM) systems. This section provides a brief and mainly qualitative summary of the findings, a more completed account can be found in [22]. In addition, some reflections on similarities and variations across the three cases are noted.

The share of historical products in non-OECD countries was generally much lower than that in their OECD counterparts. This would imply a shorter transitional period if the distinction between historical and new products were to be made. Such a distinction might be preferable because it enables the use of different financial mechanisms for the two classes of products. From an EPR perspective, individual financial responsibility can deliver an incentive to implement design improvements on new products, but might have limited value when it comes to historical products, which cannot be redesigned retroactively [47]. It is likely that the cost of managing historical products would fall on new products in a pay-as-you-go (PAYG) fashion, thus a main issue is how to divide this historical burden in an economical and "fair" manner. In non-OECD contexts, as a result of low historical share and growing sales of new products, a dual burden on new products in the transitional period would be relatively low.

Looking more closely into the product markets, there were numerous small-and-medium producers who could be *de facto* producers of EEE products. In general, these actors might be at a disadvantage in an EPR programme as they had fewer resources at their disposal to leverage design improvements and might require external supports. In addition, their sheer number might put some stress on the registration and monitoring of the system. However, the most problematic aspect is the fact that some of them reside in a semi- or unregulated sector and

deliver "no-name-branded products". In India, it was estimated that the share of black/grey-market products could be as high as 50-90% for most consumer electronics, except televisions [13]. A parallel line could be drawn regarding assembled desktop computers from small assembly shops, which accounted for 40% of the Indian market in 2006 [23]. Assuming that an EPR programme would be applicable only on identifiable producers, these actors would gain an unfair advantage if they chose to evade extended financial responsibilities. The existence and the extent of a market for assembled desktop computers seem to be similar in Thailand and Argentina. The share of domestic clones in Argentinean computer market was estimated at 43.5% in 2006 [31]. However, from the interviews, black/grey markets for other EEE products exist only marginally (e.g. along the borders) in Thailand, with one exception in the case of counterfeit mobile-phone batteries.

The use phase of EEE products is in general longer in non-OECD countries. This is partly a result of extensive use and reuse, which extend the life span of products beyond what experiences in OECD countries. In addition, one should not forget the "hoarding effect" where appliances are not in use, but still stored. The former is important information for planning and management, for example, in making an inventory for products' stocks and flows. Table I shows estimated life spans of selected products from a field sampling in Thailand. On the other hand, whether the hoarding effect should be accepted as such or if it represents a shortfall of collection mechanisms that should be improved is a policy question.

Table I: Average life spans of selected products in Thailand [16]

Products	Average life span (years)
Television set	18
Refrigerator	14
Washing machine	12
Air conditioner	10
CRT monitor	9
Desktop computer	7

In India, a combined effect of residual values in WEEE, low labour and operating costs, and lax enforcement of health and safety and environmental regulations and standards gave birth to lucrative downstream businesses. The downstream sector was dominated by the informal sector. Toxics Link [44, 45] also documented that considerable imported WEEE flowed illegally to the uncontrolled sector. India was believed to be a main destination of international WEEE trades together with China and some African nations [30]. On the other hand, authorised recyclers were confined to a niche market dealing with WEEE from

major producers and institutional users. In 2007, they processed less than 1% by weight of the estimated WEEE available for recycling [24]. The Thai and Argentinean cases differ with much less involvement of the informal sector in WEEE<sup>1</sup> but are similar regarding the niche nature of the authorised sector. Although collection can be a challenge in the face of the competition from the informal sector, additional resources from producers in an EPR programme can give leverage to the formal sector and provide an incentive for authorisation.

What the three cases have in common is the state of MSWM systems. Municipalities have legal responsibilities over the management of MSW including post-consumer WEEE. The management of mixed waste is still a norm and their capacity for separate collection, treatment, and disposal is rather limited, though source separation has been sporadically promoted with mixed results. In addition, it is not uncommon that they face resource constraints to improve the quality of the service. An EPR programme for WEEE can be a way to shift responsibilities from municipalities to producers (but this does not mean municipalities would have no responsibilities or roles in the system). It can also be a way to advance source separation systematically and formally.

Despite variations, there are some commonalities in non-OECD contexts that present a set of unique challenges, but also opportunities to WEEE programmes, especially the ones based on EPR. How much the challenges would be addressed and opportunities be exploited depends largely on the actual policy development. At the time of writing, the three countries under investigation seem to embark on different courses of development, as will be seen in the next section.

## 4. WEEE Policies

### 4.1 India

In India, the WEEE issue has been discussed under the framework of hazardous-waste policies. Policy documents in the past reflected this point well. In 2006, the Ministry of Environment and Forests (MoEF) with help from the Advisory Services for Environment Management, German Technical Cooperation (ASEM-GTZ) developed a “dummy” draft law, the WEEE (Management and Handling) Rules, 2006, in the light of the National E-Waste Legislation Workshop in May 2006. The contents of the draft were very similar to the existing Hazardous Waste (Management and Handling) Rules (henceforth, HWRs) with some additions that had a flavour of the EU’s WEEE Directive such as the definitions of “EEE” and “producer” and the 10 categories. The draft regulated the waste from the point that EEE became WEEE and focused almost exclusively on defining the responsibilities of governmental agencies,

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<sup>1</sup> This does not mean that the informal sector does not exist there but simply they focus on other (simpler) types of recyclables such as packaging waste.

generators, and downstream actors, and on prescribing monitoring and reporting mechanisms such as registration, manifests, and permits. Interestingly, producers would have virtually no legal obligations and responsibilities under the draft<sup>2</sup>. Although the draft was short-lived, later governmental guidelines follow this WEEE-under-Hazardous-Waste-Rules approach.

The draft Guidelines for Environmentally Sound Management of E-waste (henceforth the CPCB’s draft Guideline) appeared on the website of the Central Pollution Control Board (CPCB), MoEF, in August 2007. The majority of the texts described existing regulations and standards that might be applicable to WEEE and downstream technologies and existing practices in India. It also reviewed definitions of WEEE and compared standards in other countries with an emphasis on the EU and the USA. The recommendations derived from the review were threefold. Firstly, it suggests that WEEE can be brought under existing regimes – hazardous and special waste rules and municipal solid waste rules – by explicitly incorporating different types of WEEE in the definitions of relevant rules. Secondly, it recommends proper technologies for various treatment steps and bans on backyard recycling, i.e. reprocessing of waste materials in the informal sector. Finally, it identifies issues important to the viability of formal/authorised treatment facilities and recommends some fiscal measures to stimulate investment. In sum, the first version of the draft Guideline focused almost exclusively on hazardousness of WEEE and its treatment after the point of collection but not on responsibilities of actors or mechanisms to bring about desirable changes beyond the treatment sector.

The Guidelines for Environmentally Sound Management of E-waste (henceforth, the CPCB’s Guideline) was finalised on 12 March 2008. The Guidelines aim to “provide guidance for identification of various sources of waste electrical and electronic equipment (e-waste) and prescribed procedures for handling e-waste in an environmentally sound manner” and also are “reference document for the management, handling and disposal of e-wastes” [4]. The document follows its predecessor and argues that WEEE might be incorporated explicitly into the HWRs as the provisions of the regulation already cover a way of WEEE disposal from dismantling onwards. Downstream options and technologies are also mapped out in Chapters 5 and 6 and procedures in Chapter 7, which constitute the minimum practice that the administration at the state level might go beyond if necessary. Unlike the draft version, the Guidelines also touch upon EPR and the issue of collection. A textbook definition of EPR is provided and that its concept “can be thought off in the Indian Context”

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<sup>2</sup> Besides in its definition, the word “producer” were mentioned only once that: “The occupier [generating, handling or managing WEEE] or any other person acting on his behalf who intends to give his WEEE back to the producer through ‘Take back Schemes’ should adhere to sub-rule (1-10)” [49].

[4]. More interestingly, the Guidelines discuss the role of a buy back system in the collection of WEEE and recommend that manufacturers should be allowed to charge fee at the point of sales to finance the system. The document also acknowledges that RoHS has been part of WEEE policy package in many countries though no policy direction is mentioned for India in this case.

#### 4.2 Thailand

Policy development in Thailand started as a response to the policy development in the EU. The Department of Foreign Trade, the Ministry of Commerce, led the way informing others about the development and an inter-departmental committee was formed in 2000 to follow the impacts of the EU's policies such as Integrated Product Policy (IPP), the WEEE and RoHS Directives [32]. The interviews revealed that this development activated a few agencies in the Ministry of Natural Resources and Environment (MoNRE) and in the Ministry of Industry (MoI) to look into the WEEE issue in Thailand. Since then, the policy development in Thailand has exhibited a strong interest in applying economic instruments to the management of WEEE.

The initiative to promulgate a law came from the Pollution Control Department (PCD), MoNRE.<sup>3</sup> The draft Act on the Promotion of the Management of Hazardous Waste from Used Products (henceforth the PCD's draft Act) appeared to the public for the first time in March 2005 and was amended at least twice in June 2005 and February 2006. The draft Act proposed a cost-recovery system where surcharges levied on regulated products at the point of sales would be used in the end-of-life management when the products become waste. Although the official list of regulated products had never been developed, it was understood that in the beginning major EEE items such as refrigerators, washing machines, unit-type air conditioners, and TV sets (the big four) would be included (personal communication) together with other product types like tires and batteries. The surcharges would be collected in a similar manner as excise taxes and custom duties. Part of the money would be used to buy back waste items from end users. A governmental fund and a fund committee would be erected under MoNRE to oversee the system. The power of the committee included advising the Ministry in setting the scope of the system and the levels of product surcharges and buy-back rates. Local governments at the provincial level would still be responsible for physical waste management but could get reimbursement from the Fund. Fig. 1 presents a simplified picture of the proposed system.

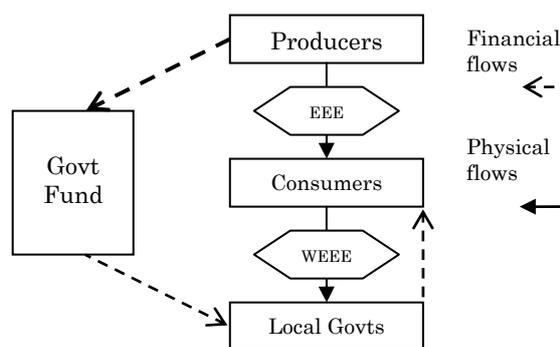


Fig. 1: A proposed system in the PCD's draft Act

A parallel development was an attempt to consolidate a WEEE roadmap, which resulted in the National Integrated Strategy for the Management of Waste Electrical and Electronic Equipment (henceforth, the Thai WEEE Strategy). The Strategy was a product of cooperation between the Office of Industrial Economics (OIE), MoI, and PCD, MoNRE, started in 2003. The Cabinet approved it on 24 July 2007. The Strategy reviewed the evidences, established policy rationales, set objectives and goals, and divided responsibilities among agencies. There were also five sub-strategies in technological development, capacity building and awareness raising, legal development and law enforcement, economic and financial measures, and managerial development. According to the Strategy, the legal framework was expected to be promulgated by 2011.

However, due to a recent policy development, the mechanism proposed by PCD would be re-packaged under the Ministry of Finance (MoF)'s framework instead of being stand-alone legislation. The draft Act on Economic Instrument for Environmental Management (henceforth the FPO's draft Act) drafted by the Fiscal Policy Office (FPO), MoF, would establish a foundation and a fund for the use of not only product surcharges, but also environmental taxes, service charges, performance bonds, tradable permits, subsidies, and other instruments in Thailand. According to the interviews, at the end of 2007, MoF convinced MoNRE to bring its proposal under this framework in the form of a draft Royal Decree to ensure a unity and consistency of the national fiscal policy. Although it is likely that PCD would insist on a combination of product surcharges, a buy-back scheme and downstream subsidies, this re-packaging might lead to some significant changes in terms of the designated fund and its management. A governmental fund would be erected under MoF, not in MoNRE, and the Minister of Finance would chair its committee. The scope of the fund would be even more inclusive covering not only hazardous waste from used products but also all revenues and expenses generated by all economic instruments under the framework.

#### 4.3 Argentina

The policy development in Argentina was still in its early stage. Here, the draft Bill on the management of waste from electronic and electrical equipment

<sup>3</sup> There was another initiative from DIW. However, the DIW draft was short-lived and never made to the public.

(henceforth, the Filmus Bill) put forth by a senator in Senate Environmental Committee, Filmus, will be discussed. The readers should be aware that this draft Bill was not finalized and had not yet gained the level of commitment achieved by the CPCB's Guideline or the Thai WEEE Strategy. At the time of writing, the Buenos Aires City Authorities just issued a law on WEEE, Ley 2807/LCBA/08, 24/0708. To our knowledge it is the first law trying to deal with WEEE at a local level and addressing WEEE generated by the public authorities of the City of Buenos Aires. The law, however, does not explicitly deal with most issues salient to EPR and will not be discussed further in this report.

The Filmus Bill followed the model of the EU's WEEE Directive. It proposed a comprehensive scope including waste from all EEE barring only military equipment and equipment containing radioactive materials. It also explicitly referred to improvements in the design and production of EEE as one of its objectives and had provisions on product design. On one hand, the Bill would introduce a mandatory system where producers would bear several mandatory responsibilities. On the other hand, it did not specify practical implementation details. The government would play the role of referee/enforcer in, for example, approving producers' management systems and financial arrangements but not the system manager. Producers had individual financial responsibility for the management of waste from their products but they were allowed to fulfill the physical responsibility individually or collectively two years after the law promulgated. Another similarity was that consumers would be able to return WEEE free of charge to the producers' systems and to retailers upon acquiring a new product of equivalent type. The Bill also proposed the authorisation of treatment facilities and some minimum technical requirements. Interestingly, it had a chapter on promotion system where tax credit benefits for WEEE and materials from recovery processes were considered.

#### 4.4 Comparison

Table II presents a comparison of WEEE policies in the three countries.

WEEE policies in India and Thailand were nested in the framework of the management of hazardous waste. Concerning WEEE, they also appeared to have selective product scopes. However, they differ in their relationship with the existing hazardous waste regimes. The CPCB's Guideline effectively brought a certain class of WEEE under the existing HWRs. It suggested the assessment of hazardousness in accordance with concentration limits of hazardous substances prescribed in the HWRs as a method to select regulated items [4]. By bringing (some) WEEE under the standards of HWRs, the Guideline might pronounce an end to backyard recycling, providing there is enforcement capacity. However, the compatibility of the HWRs, designed to manage bulk waste from registered point sources, and the management of post-

consumer WEEE is questionable. The only mechanism in the Guideline regarding collection is producers' take/back [4]. But this would be all voluntary. Although our previous analysis [22] shows that continuous flow of resources from producers can level the playing field for the regulated downstream sector, it is not likely that producers would make available the resources voluntarily. In practice, charging fees from consumers discretionally at the point of sales would be a suicide in the market with considerable shares of black/grey sectors.

The Thai policies, on the other hand, can be viewed as an extension of the regime to post-consumer waste and the main focus was precisely on collection. The PCD's draft Act, for example, proposed a mechanism to implement a national buy-back scheme. According to the background study behind the draft Act [40] and our interviews, regulated products might be selected not only because of their hazardousness as such but also due to their amenability to the mechanism, i.e. manageability. (For example, under the discussion used tires, which are by no means hazardous, was a prime target of the selected economic instruments [40]) To finance the scheme, producers of regulated products would have a mandatory financial responsibility. From the interviews, producers agreed with the government on the fairness and leveling-the-playing-field aspects of this mandatory responsibility. The fact that the activities in the black/grey markets were less in Thailand enhanced the acceptability of the measure with an exception of counterfeit mobile-phone batteries.

However, a few producers who implemented their global (physical) take-back policies expressed their concern that the governmental-fund model might discourage producers' involvement and can be inefficient. They argued that responsibilities should come in tandem with control and producers should have an opportunity to use their resources in organising an efficient system, be it individual or collective. It must also be noted that the proposed law was non-EPR and took an approach different from the EU's WEEE Directive, as explicitly mentioned in interviewees with persons involved in the drafting process. They rationalised the dismissal of the EU model with foreseen difficulties in enforcing statutory physical responsibilities of many producers in the market and poor records in the past implementation of administrative instruments such as standards and targets (see also [40]). It was believed that revenue-collecting agencies such as the Excise and Custom Departments were more effective in holding actors to their financial responsibilities. Although design and production of "Green Product" were part of the Thai WEEE Strategy, they were considered at best a (positive) side effect of this waste law and might be encouraged through other means in separate venues. The financial responsibility here was based on a more generic polluter-pays principle [32].

Table II: A comparison of WEEE policies in India, Thailand, and Argentina

	<b>Issue at Focus</b>	<b>Target</b>	<b>Mechanism</b>	<b>Selection of WEEE</b>	<b>Producers' responsibilities</b>
<b>CPCB's Guideline, India</b>	Treatment of hazardous WEEE	Operators of treatment facilities	Authorisation under HWRs	Assessment of hazardousness	Voluntary
<b>PCD's and FPO's draft Acts, Thailand</b>	Collection of used products	Governmental fund	Economic instruments	Hazardousness and manageability	Mandatory but only financially
<b>Filmus Bill, Argentina</b>	Life cycle improvements	Producers of EEE	EPR	Definition of EEE	Mandatory

On the contrary, Argentina is a test case whether a law with a life-cycle thinking will be promulgated in a non-OECD context. The Filmus Bill would introduce an EPR programme with a built-in objective on design improvements for all WEEE. Besides paying for their own waste, producers were expected to arrange the system for environmentally sound treatment and recycling. The involvement in organisational and physical aspects of WEEE management could result in a steeper learning curve for improvements in products and product systems. However, this assumes no implementation slippages. The Bill, unlike the Indian Guideline and the Thai draft acts, only lays down policy direction with intended outcomes and targets but does not elaborate on implementing details. Such an approach might be effective where there is a common understanding between policy makers, implementing agencies and policy targets (producers and other regulated actors). For example, the system in Japan evolved more or less as intended under the Specified Home Appliance Recycling Law (SHARL) [6, 26, 42]. On the other hand, implementation of the WEEE Directive in the 27 Member States was chaotic and players were occupied with means (e.g. how to fulfill the financial responsibility, how to meet the collection and recovery targets) and paid less attention to the initial goals of the Directive [37]. In addition, at this stage, it was unclear how the issues mentioned in Section 3 would be addressed. In our information exchanges with the senator and his team similar concerns were raised, notably over the existence of assembled products and the collection problem. Our contextual analysis will be updated for Argentina in an upcoming report [20].

## 5. Discussion

WEEE was a new issue in the three non-OECD countries. The immaturity of MSWM systems obscured its visibility. The management of mixed waste was (and continues to be) the standard of the day. The coverage and quality of service were in general poor and the record keeping and waste statistics were incomplete. For example, PCD [33] estimates that in Thailand only 36% and 0.5% of MSW generated in urban and rural areas was collected and disposed of at 117 sanitary

sites. In addition, as mentioned above, WEEE might be kept away from the municipal waste stream in these countries by the "hoarding" effect and the work of the informal sector. Thus, MSWM systems as such did not provide any feedbacks in terms of resources (e.g. expenditures, capacity) spent on and environmental problems (e.g. contamination at the disposal sites) arising from WEEE.

The recognition of the issue owed much to the exposure of focus events by NGOs, as mentioned above, but also to a spillover effect and a fact-finding mission. Awareness of policy development elsewhere notably in Europe and in Japan triggered assessments in the non-OECD countries. To our knowledge, material-flow-analysis (MFA) studies were carried out in India and in Thailand for the first time at the end of 2003. Both were the product of external aids – the Swiss State Secretariat for Economic Affairs (seco)'s project and the Japan Government's Green Aid Plan for the Indian and Thai studies, respectively. Similar study was initiated in Argentina under the BCRC-Argentina in 2006. Modelling of the obsolescence of EEE based on past sales invariably showed a considerable increase in the amount of WEEE arising [14, 16]. From the interviews in Thailand, the amount of WEEE in the future was mentioned as the most important driver. The CPCB's Guideline and the Thai WEEE Strategy cite the growth rate of 15% and 12% as one of their rationales [4, 32].

More important than the recognition is how the problem was framed. As Kingdon [15] aptly observes that "[c]onditions become defined as problems when we come to believe that we should do something about them", there are three elements in problem definition: (a) recognised conditions (b) that look troublesome (c) from a certain perspective. The process is undeniably subjective – different problem definitions come with their own set of value and goals.

Ideas are a powerful force in problem definition. In Section 3 we view non-OECD conditions through an EPR lens. EPR constitutes a policy paradigm defining WEEE as a product problem and having design improvements as one of its goals [21]. All policy documents under our review made some references to

EPR and product design when discussing this waste issue. In India and Thailand, its spread was partly owing to the work of bi-lateral developmental agencies. These actors were active not only in problem recognition but also in alternative specification. They are likely to bring experiences from their home country with them in the processes of knowledge transfer and information sharing. Thus, it is not coincident that the interviewees in Thailand paid considerable heed to the issue of product-fee versus end-user-pays (as in SHARL) formats (see also [16]) while in India there was an elaborate discussion about the role of PROs, which are instrumental in Swiss and German WEEE programmes (see [43, 46]). However, their influence was closer to directing the attention than to determining the result of policy processes and there was by no means a paradigm shift in the three cases. As a matter of the fact only one of them endorsed the principle while the others at best recommended it for future consideration.

To a large extent, WEEE was still defined under an existing hazardous waste paradigm. It was most evident in India. This might be the effect of categorisation where a category with high cognitive familiarity was adopted. Though there was no prior WEEE policy in the three countries, they had been dealing with entries A1180 waste electrical and electronic assemblies or scrap and B1110 electronic and electronic assemblies under the Basel Convention to which they are Parties.

Besides ideas, institutions also play its part in problem definition. Specialisation has led to fragmentation in our governmental systems – one agency looks after municipal waste management, another industrial and hazardous waste management, and yet the other oversees product and production policies. On one hand, administrative fragmentation might be at odd with life-cycle thinking, which cuts through conventionally defined ministerial jurisdictions and calls for integrated policies. It is not uncommon in our interviews that, despite acknowledging the role of product design, respondents thought that design and manufacturing should be dealt with under separate policies with a separate set of policy instruments and WEEE policies should focus on the end-of-life management *per se*. In this sense, having producers responsible for the waste management of their products has nothing to do with problem (re)definition. EPR ceases to be policy paradigm and is perceived here only as a mere revenue-raising tool.

On the other hand, this fragmentation can create competition and advance the item in the governmental agenda [15]. The Thai case best illustrates the point. The issue was first detected in the foreign trade circle under the jurisdiction of the Ministry of Commerce. Then, the attention shifted from monitoring the effects of foreign policies to the management of WEEE in the country where the jurisdiction of several ministries overlapped: MoNRE (under the Environmental Quality Protection and Promotion Act), MoI (under the Hazardous Substances Act and the Factory Act), Ministry of Health (under the Public Health Act) and

the Ministry of Interior (under the Decentralization Act). MoNRE and MoI were very active in this turf war. At one point, MoNRE got an upper hand by defining the issue as a problem of hazardous waste from communities (hence, pulling it away from the industrial focus of MoI). With this problem definition, collection of WEEE from non-point sources, which received a passing attention in the Indian Guideline, became central to the PCD's draft Act. However, MoNRE soon found itself entering yet another jurisdictional dispute with powerful MoF when it tried to introduce economic instruments to address the problem and this time it eventually gave in. Regardless of who won and lost, positive consequences were a formation of inter-ministerial committee and the Thai WEEE Strategy.

Argentina provides an interesting case from this perspective. Unlike Thailand and India where hitherto WEEE was contained within the executive branch (though there were some hearing in the parliament on WEEE), the initiative in Argentina came first from a legislator and his staffers. The Filmus Bill is noticeably more integrative with its design provisions and less restrained by the defined ministerial jurisdictions. However, the reception of the executive to the Bill has yet to be seen.

## 6. Conclusion

WEEE became a policy problem in non-OECD countries. Studies show that the waste stream was growing rapidly but its end-of-life fate was by and large unknown prompting a concern over releases of hazardous substances from WEEE. In our three cases – India, Thailand, and Argentina – the existing controlled waste management systems were not equipped to handle post-consumer WEEE. Although it might be possible to ensure safe treatment of WEEE under the existing hazardous waste regimes, as suggested in the CPCB's Guideline, there needs to be a mechanism that enables the system to collect WEEE from non-point sources in the first place. The question of collection was central in the development of Thai policies, which in turn, proposed a national buy-back scheme as an answer. Producers of regulated items would have a responsibility to finance the scheme but its management would be under the governmental fund. The Filmus Bill in Argentina suggested yet another approach. It followed the EPR principle and would give producers of EEE not only more responsibilities but also more control over the organisation of product systems. Our analysis shows that EPR has potential to stimulate the development of WEEE collection and treatment infrastructure and, in the long run, to promote environmentally conscious design of products and product systems. However, it also specifies certain challenging but manageable conditions in the non-OECD contexts that can compromise EPR mechanisms, particularly the sizable share of no-name-branded products.

The research presented here represents only exploratory steps into the WEEE management in non-

OECD countries. Admittedly, our understanding on some important phenomena we identified is far from satisfactory. Questions about behaviours in semi-formal and informal sectors and consumer behaviours, e.g. their cooperation in source separation schemes, remain to be answered. More interesting to policy makers and practitioners are questions about the actual efficacy of policy instruments to bring about desirable changes. For example, a few informants in Thailand doubted the enforceability of standards and targets because without sufficient monitoring capacity their actual efficacy might fall short of theoretical expectations. The same is true for drawing policy lessons from foreign programmes. In our opinion, this underscores the importance of contextual analysis because theories are based on a set of assumptions, which might not hold in a specific context.

## Acknowledgement

The research presented in this paper is from four projects commissioned by Greenpeace International. The opinions expressed are of the authors and do not necessarily reflect the position of Greenpeace International.

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- [1] Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. 1989. I.L.M. 649 (entered into force 25 May 1992).
- [2] Bill: Management of Waste from Electronic and Electrical Equipment (unofficially translated). Argentina.
- [3] Buenos Aires City. La Legislatura de la Ciudad Autónoma de Buenos Aires. Ley 2807/LCBA/08, 24/07/08.
- [4] Central Pollution Control Board (CPCB). 2008. Guidelines for Environmentally Sound Management of E-waste. CPCB, Ministry of Environment & Forests, Delhi, India.
- [5] \_\_\_\_\_. 2007. Draft Guidelines for Environmentally Sound Management of E-Waste. CPCB, Ministry of Environment & Forests, Delhi, India.
- [6] Department of Trade and Industry, UK (DTI). 2005. Waste electrical and electronic equipment (WEEE): innovating novel recovery and recycling technologies in Japan. Report of a DTI Global Watch Mission, September. [Online]. Available: <http://www.cfsd.org.uk/aede/downloads/JapaneseWEE.PDF> [8 July 2008].
- [7] Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. Official Journal of the European Union, L 37, 13/02/2003, pp.19–23.
- [8] Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment. Official Journal of the European Union, L 37, 13/02/2003, pp. 24-39.
- [9] Exporting Harm: the High-tech Trash of Asia. 2002. Edited by J. Puckett and T. Smith. Produced and distributed by Basel Action Network (BAN).
- [10] Gottberg, A., Morris, J., Pollard, S., Mark-Herbert, C., and Cook, M. 2006. Producer responsibility, waste minimisation and the WEEE Directive: Case studies in eco-design from the European lighting sector, *Science of the Total Environment*, 359: 38-56.
- [11] Hazardous Wastes (Management and Handling) Rules, 1989 (as amended on 6/1/2000 and 21/5/2003). The Gazette of India, No. 465, 28/7/1989.
- [12] Herold, M. 2007. A Multinational Perspective to Managing End-of-life Electronics. Doctoral Dissertation. Helsinki University of Technology, Helsinki, Finland.
- [13] 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*, 34(3-4).
- [14] Jain, A. and Sareen, R. 2006. E-waste assessment methodology and validation in India. *Journal of Material Cycles and Waste Management*, 8: 40-5.
- [15] Kingdon, J.W. 2003. *Agendas, Alternatives, and Public Policies*, 2<sup>nd</sup> ed. Longman, New York, USA.
- [16] Kokusai Kogyo. 2004. Raay-ngan cha-bab som-boon kaan-saum-rooj kaan-ting sak-kraung-chai-fai-fah-lae-electronics lae kaan-saum-rooj kaan-ting sak-thro-ra-saab-mae-thae taan-fai-chay lae load-fluorescence [Final Report: A Survey on Disposal of Waste Electrical and Electronic Equipment and A Survey on Disposal of Waste Mobile Phones, Batteries, and Fluorescence Lamps] (in Thai). JETRO, Bangkok, Thailand.
- [17] Lee, J.-C., Song, H.T. and Yoo, J.-M. 2007. Present status of the recycling of waste electrical and electronic equipment in Korea. *Resources, Conservation and Recycling*, 50: 380-97.
- [18] Lin, C.K., Yan, L., and Davis, A.N. 2002. Globalization, extended producer responsibility and the problem of discarded computers in China: an exploratory proposal for environmental protection, *Georgetown International Environmental Law Review*, 14(3): 525-76.
- [19] Lindhqvist, T. 2000. Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmental Improvements of Product Systems. IIIIEE Dissertation 2000:2. IIIIEE, Lund University, Lund, Sweden.
- [20] \_\_\_\_\_, Manomaivibool, P., Tojo, N. forthcoming. Extended Producer Responsibility in the Latin American Context: the Management of Waste Electrical and Electronic Equipment in Argentina.
- [21] Manomaivibool, P. 2008. Network management and environmental effectiveness: the management of end-of-life vehicles in the United Kingdom and in Sweden, *Journal of Cleaner Production*, doi:10.1016/j.jclepro.2008.01.013

- [22] \_\_\_\_\_, Lindhqvist, T., and Tojo, N. 2007. Extended Producer Responsibility in a Non-OECD Context: the Management of Waste Electrical and Electronic Equipment in India. Macula, Boskoop, the Netherlands.
- [23] Manufacturers' Association for Information Technology (MAIT). 2007. IT industry performance annual review: 2006-07. Presented in Press Conference, 19 July 2007, New Delhi, India. [Online]. Available: <http://www.mait.com/industry.jsp> (accessed on 16 January 2008).
- [24] \_\_\_\_\_, 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. [Online]. Available: <http://www.mait.com/pressupdate1.jsp?Id=77> (accessed on 16 January 2008).
- [25] National Bureau of Statistics of China. (2007). *China Statistical Yearbook 2007*. [Online]. Available: <http://www.stats.gov.cn/tjsj/ndsj/2007/indexeh.htm> (accessed on 21 August 2008).
- [26] Ogushi, Y., and Kandlikar, M. (2007). Assessing extended producer responsibility laws in Japan. *Environmental Science & Technology*, July, 4502-8.
- [27] Organisation for Economic Co-operation and Development (OECD). 2001. *Extended Producer Responsibility: A Guidance Manual for Governments*. OECD, Paris, France
- [28] Osibanjo, O. and Nnorom, I.C. 2007. The challenge of electronic waste (e-waste) management in developing country. *Waste Management & Research*, 25: 489-501.
- [29] Park, J.-W. 2007. Extended producer responsibility and e-waste recycling in Korea. *Proceedings of the Fourth NIES Workshop on E-waste*, 21-22 November, Tsukuba, Japan, pp. 211-20
- [30] Pellow, D.N. 2007. *Resisting Global Toxics: Transnational Movements for Environmental Justice*. Massachusetts Institute of Technology, Massachusetts, USA.
- [31] Protomastro, G. F. (2007). Estudio sobre los circuitos formales e informales de gestión de Residuos de Aparatos Eléctricos y Electrónicos en Argentina.
- [32] Pollution Control Department (PCD). 2007. *Yottha-sart kaan-jat-kaan sak-kraung-chai-fai-fah-lae-electronics-chaeng-bu-ra-na-kaan* [National Integrated Strategy for the Management of Waste Electrical and Electronic Equipment], as approved by the Cabinet on 24 July 2007. PCD, MoNRE, Bangkok, Thailand.
- [33] \_\_\_\_\_. 2006. Raay-ngan sa-ta-na-karn mon-la-pit khorngr pra-tet-thai phee 2548 [The State of Pollution in Thailand, 2005] (in Thai). PCD, MoNRE, Bangkok, Thailand.
- [34] Raang phra-raat-cha-ban-yat kraung-mae-thang-set-ta-sart phaer kaan-jat-kaan sing-vad-loom phor sor ... [The draft Act on Economic Instrument for Environmental Management], (16 January 2008). Thailand.
- [35] Raang phra-raat-cha-ban-yat song-serm kaan-jat-kaan khorngr-sia-an-ta-raay jaak pha-lit-ta-phan thii chay-laew phor sor... [The draft Act on the Promotion of the Management of Hazardous Waste from Used Products], (9 March 2006). Thailand.
- [36] Røine, K. and Lee, C.-Y. 2006. With a little help from EPR? Technological change and innovation in the Norwegian plastic packaging and electronics sectors. *Journal of Industrial Ecology*, 10: 217-37.
- [37] Sander, K.; Schiling, S.; Tojo, N.; van Rossem, C.; Vernon, J. and George, C. 2007. *The Producer Responsibility Principle of the WEEE Directive*. DG ENV. Study Contract No. 07010401/2006/449269/MAR/G4.
- [38] Secretariat of the Basel Convention. 2008a. *Environmentally Sound Management of Electronic and Electrical Waste in Asia Pacific*. [Online]. Available: <http://www.basel.int/pub/leaflets/leaflet170806-2.pdf> (accessed on 7 August 2008).
- [39] \_\_\_\_\_. 2008b. *Regional Centres*. [Online]. Available: [http://www.basel.int/centers/proj\\_activ/tctf\\_projects.html](http://www.basel.int/centers/proj_activ/tctf_projects.html) (accessed on 7 August 2008).
- [40] Social Research Institute (SRI). 2004. *Raay-ngan cha-bab som-boon krong-kaan-suk-sa phaer yok-raang-kod-hmay wa-duay kaan-jat-kaan khorngr-sia-an-ta-raay* [Final Report of the Project for Drafting a Law on Hazardous Waste Management]. (in Thai). SRI, Chiang Mai University, Chiang Mai, Thailand.
- [41] Tokutei Kateiyou Kiki Saishouhinka Hou [Specified Home Appliance Recycling Law]. (1998, No. 97). Japan.
- [42] Tojo, N. 2004. *Extended Producer Responsibility as a Driver for Design Change – Utopia or Reality?* IIIIEE Dissertation 2004:2. IIIIEE, Lund University, Lund, Sweden.
- [43] Toxics Link. 2007. *Into the Future: Managing E-waste for Protecting Lives and Livelihoods*. Toxics Link, New Delhi, India.
- [44] \_\_\_\_\_. 2004. *E-waste in Chennai: Time is running out*. Toxics Link, New Delhi, India.
- [45] \_\_\_\_\_. 2003. *Scrapping the Hi-tech Myth: Computer Waste in India*. Toxics Link, New Delhi, India.
- [46] \_\_\_\_\_, GTZ, and EMPA. (2007). *Models for E-Waste Management*.
- [47] Van Rossem, C.; Tojo, N. and Lindhqvist, T. 2006. *Extended Producer Responsibility: An Examination of its Impact on Innovation and Greening Products*. [Online]. Available: <http://www.greenpeace.org/raw/content/international/press/reports/epr.pdf> (accessed on 16 January 2008).
- [48] Widmer, R.; Oswald-Krapf, H.; Sinha-Khetriwal, D.; Schnellmann, M. and Böni, H. 2005. *Global*

perspectives on e-waste, *Environmental Impact Assessment Review*, 25: 436-58.

- [49] WEEE (Management and Handling) Rules, 2006, Draft notification for comments. India.
- [50] Wong, M.H., Wu, S.C., Deng, W.J., Yu, X.Z., Luo, Q., Leung, A.O.W., Wong, C.S.C., Luksemburg,

W.J., and Wong, A.S. 2007. Export of toxic chemicals – a review of the case of uncontrolled electronic-waste recycling. *Environmental Pollution*, 149: 131-40.