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REVIEW

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- Risk management under REACH
- Key priorities of NGOs on REACH
- Definitions of waste, recycling and recovery
- The UK Government's Ship Recycling Strategy
- Legislating e-waste management
- Exemptions under Article 5 (1) (b) RoHS Directive
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Legislating e-waste management: progress from various countries

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Ray Lombard, Lene Ecoignard

Abstract

Electrical and electronic equipment pervades modern lifestyles and its usage is growing rapidly around the world. Quick obsolescence and newer functionalities are resulting in huge quantities of these products become waste. This fast growing waste stream has been subject to regulations based on the concept of extended producer responsibility in several countries, mainly in Europe. This paper looks at the progress of legislating this particular waste stream with special emphasis on the three countries, namely China, India and South Africa, within the framework of the Swiss global e-waste programme, after looking briefly at the status of transposing the WEEE Directive (waste electrical and electronic equipment) in Europe.

1 Introduction

The rapid growth in the market of electrical and electronic equipment (EEE) is largely driven by electronics becoming affordable for mass consumption. As affordability has increased, so has the replacement rate, with the speed of technological innovation offering more functionalities, smaller sizes and newer designs. As consumers increase their use of electrical and electronic products, larger volumes of such products are finding their way into the waste stream. Waste electrical and electronic equipment (WEEE) or ‘e-waste’ for short is therefore also one of the fastest growing waste streams – growing at almost 3 % per annum¹, accounting for almost 8 % of the municipal solid waste in Europe². Because e-waste is categorized as hazardous waste (see section 2 below), being composed as it is, of substances like lead, cadmium and mercury among others, which, if incorrectly disposed, can result in serious damage to human health and the environment³, it is necessary to have a suitable collection and disposal mechanism for it. Governments in many countries have realized that the existing municipal machinery for solid waste management would be unable to cater to the specific needs for the collection and disposal of e-waste. Therefore, there is increasing pressure on the manufacturers to

take responsibility of their products, beyond just the point of sale, to the end-of-life.

To tackle this growing and global issue of e-waste management, legislations have been introduced or legislative initiatives have been launched and a growing number thereof are currently underway to be adopted. The European WEEE Directive, based on the concept of an extended producer responsibility (EPR) as an environmental policy, has set the global pace and standard in regulating e-waste management - this is discussed in the section 1 and 2. Emerging economies such as China, India and South Africa, being rapidly integrated in the global economy, necessarily should comply with these new rules in order to gain or keep access to the European market and are thus forced to react – this is discussed in the sections 3 to 5. The paper ends with some conclusions for policy makers and suggestions for further research.

1.1 Definitions of e-waste

‘e-Waste’ is a generic term embracing various forms of electric and electronic equipment that have ceased to be of any value to their owners. There is, as yet, no standard definition. Table 1 lists selected definitions and Table 2 the various categories of electronic and electrical appliances that are considered as contribution to e-waste. In this article, we will use the term “e-waste” in accordance to the EU WEEE Directive⁴.

⁴ EU Directive 2002/96/EC of the European parliament and of the council of 27 January 2003 on waste electrical and electronic equipment (WEEE) — joint declaration of the European parliament, the council and the commission relating to article 9. Official Journal L 3724-39 [http://europa.eu.int/eur-lex/pr/en/oj/dat/2003/l_037/l_03720030213en00240038.pdf].

¹ OECD, Extended Producer Responsibility: A Guidance Manual for Governments, Paris, OECD (2001).

² “Recycling old computers” The Economist, January 27, 2005, p. 56.

³ European Commission. Recovery of WEEE: Economic and Environmental Impacts. European Commission (1997).

Table 1: Overview of selected e-waste definitions⁵

Reference	Definition
EU WEEE Directive ⁶	"Electrical or electronic equipment which is waste ⁷ ... including all components, sub-assemblies and consumables, which are part of the product at the time of discarding". Directive 2002/96/EC of the European Parliament and of the Council (January 2003), defines ten categories.
Basel Action Network ⁸	"E-waste encompasses a broad and growing range of electronic devices ranging from large household devices such as refrigerators, air conditioners, cell phones, personal stereos, and consumer electronics to computers which have been discarded by their users."
OECD ⁹	"Any appliance using an electric power supply that has reached its end-of-life."
SINHA ¹⁰	"An electrically powered appliance that no longer satisfies the current owner for its original purpose."
StEP ¹¹	E-Waste refers to "...the reverse supply chain which collects products no longer desired by a given consumer and refurbishes for other consumers, recycles, or otherwise processes wastes."

Table 2: e-waste categories according to the EU directive on e-waste

No	Category
1	Large household appliances (eg. Washing machines, dryers, etc)
2	Small household appliances (eg. Hair dryers, toasters etc)
3	IT and telecommunications equipment (eg. PCs, Mobiles, Faxes etc)
4	Consumer equipment (eg. TVs, DVDs, Music Players etc)
5	Lighting equipment (eg. Tubelights, Bulbs etc)
6	Electrical and electronic tools (with the exception of large-scale stationary industrial tools)
7	Toys, leisure and sports equipment
8	Medical devices (with the exception of all implanted and infected products)
9	Monitoring and control instruments
10	Automatic dispensers

2 E-waste legislations

2.1 Basel Convention

The transboundary movement of hazardous wastes and their disposal is regulated by the Basel Convention, in force since 1992, under which signatories to the convention commit to reduce the generation of hazardous waste to a minimum, ensure that it is managed in a manner that will protect human health and the environment from its adverse impacts and reduce the transboundary movement of such wastes, making their illegal traffic a criminal offence¹². List A of Annex VIII (A1180) characterizes 'waste electrical and electronic assemblies or scrap containing components such as accumulators and other batteries, mercury switches, glass from cathode-ray tubes, PCB-capacitors, or contaminated with constituents (eg. polychlorinated biphenyl, compounds of cadmium, mercury, lead, beryllium, hexavalent chromium, arsenic)' as hazardous substances and therefore under the jurisdiction of the Basel Convention. For most practical purposes, any kind of e-waste would fall under the Basel Convention, given the hundred of parts and materials that most electronics are made of.

However, e-waste also contains valuable substances such as gold and copper. Recovering these metals from e-waste has become a profitable business, resulting in a global, transboundary trade in e-

⁵ Widmer, R. et al. *Global perspectives on e-waste*. Environmental Impact Assessment Review, Vol. 25, pp 436–458, (2005).

⁶ European Union WEEE Directive 2002/96/EC of 27 January 2003 on Waste Electrical and Electronic Equipment (WEEE). *Official Journal of the European Union*. No.L37, p: 24-39.

⁷ Directive 75/442/EEC, Article 1(a) defines "waste" as: any substance or object which the holder disposes of or is required to dispose of pursuant to the provisions of national law in force.

⁸ Puckett, J. & Smith, T. *Exporting Harm: The High-Tech Trashing Of Asia*. The Basel Action Network, Seattle: Silicon Valley Toxics Coalition, (2002).

⁹ OECD, *Extended Producer Responsibility: A Guidance Manual for Governments*, Paris, OECD. (2001).

¹⁰ Sinha D. *The management of electronic waste: a comparative study on India and Switzerland*. St. Gallen, University of St. Gallen. Master Thesis (2004).

¹¹ StEP. *Solving the e-waste problem: a synthetic approach (StEP)*, Draft Project Document; 2005. <http://work.step-initiative.org>.

¹² Basel Convention full text available at: www.basel.int

waste. An amendment to the Convention, popularly called the Basel Ban, proposes that the transboundary movement of hazardous wastes, and thus also e-waste, from developed countries to developing countries be banned completely. However, this amendment is yet to be ratified by several large developed countries and therefore is as yet not in force.

The Bamako Convention¹³ on the ban of import into Africa and the control of transboundary movement and management of hazardous wastes within Africa, an African Union Convention, was adopted in 1991, which imposes a total ban of hazardous wastes to parties. To date the Bamako Convention has 22 parties and 29 signatories (out of a total of 53 countries in Africa).

2.2 Legislation in Europe

While the Basel Convention's focus is the control and monitoring of the flows of e-waste as one type of hazardous waste, several countries, mostly in Europe, have specific legislation for the collection and disposal of e-waste. In 1991 the European Union designated e-waste a priority waste stream and began the process of drafting legislation for better e-waste management. However, it was only in August 2004 that the Waste Electrical and Electronic Equipment (WEEE) Directive¹⁴ came into force. The legal basis for the WEEE Directive is article 175 of the treaty establishing the European Community (EC Treaty) which is concerned with measures for the protection of the environment. Cooper¹⁵ writes that the legislation represents a highly significant advance in environmental policy, provided there is effective implementation. It is noteworthy because waste-related environmental costs would be internalized into the price of electrical and electronic products.

A sister directive with the WEEE is the RoHS Directive¹⁶ which aims at reducing the environmental impact of EEE, by forbidding certain quantities of specified hazardous material in certain products. While the WEEE Directive targets the end-of-pipe the RoHS Directive clearly targets the beginning-of-pipe of the EEE life cycle.

Even though the EU's WEEE Directive came into force only in 2004, towards the late-nineties already, several countries had started introducing e-waste specific legislation as seen in Table 3 below.

Table 3: e-waste legislation in Europe (selected countries, status as of July 2006)

Country	Legislation	Responsibility	In force since
Switzerland	Ordinance on the Return, Taking back and Disposal of Electrical and Electronic Equipment. (ORDEE) ¹⁷	Manufacturer/ Importer	July 1998
Denmark	Statutory Order from the Ministry of Environment and Energy No. 1067 ¹⁸	Local Govt.	December 1999
Netherlands	Disposal of White and Brown Goods Decree ¹⁹	Manufacturer/ Importer	January 1999
Norway	Regulations regarding Scrapped Electrical and Electronic Products ²⁰	Manufacturer/ Importer	July 1999
Belgium	Environmental Policy Agreements on the take-back obligation for waste from electrical and electronic equipment ²¹	Manufacturer/ Importer	March 2001
Sweden	The Producer Responsibility for Electrical and Electronic Products Ordinance (SFS 2000:208) ²²	Manufacturer/ Importer	July 2001

¹⁷ Full text available at: http://www.umwelt-schweiz.ch/imperia/md/content/abfall/vreg_2004_e.pdf

¹⁸ Full text available at: <http://www.mst.dk/rules/Ministerial%20Orders%20in%20force/Waste%20and%20soil%20in%20force/02071600.doc>

¹⁹ Full text available at: <http://international.vrom.nl/Docs/internationaal/Decree.pdf>

²⁰ Full text available at: <http://odin.dep.no/md/english/doc/regelverk/acts/022001-200002/dok-bn.html>

²¹ Full text available at: <http://www.recupel.be/recupel/handleidingnew/consumers.pdf>

²² Full text available at: <http://www.internat.envron.se/documents/issues/technic/pdfdok/sfs.pdf>

¹³ See: www.ban.org/library/bamako_treaty.html for the full text.

¹⁴ DIRECTIVE 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on Waste Electrical and Electronic Equipment (WEEE).

¹⁵ Cooper, T. WEEE, WEEE, WEEE, WEEE, all the way home? An evaluation of proposed electrical and electronic waste legislation. *European Environment*, Vol. 10, 121-130 (2000).

¹⁶ 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 (RoHS).

Country	Legislation	Responsibility	In force since
Finland	Ordinance on Electrical and Electronic Waste ²³	Manufacturer/ Importer	September 2004
Germany	Act Governing the Sale, Return and Environmentally Sound Disposal of Electrical and Electronic Equipment (ElektroG) ²⁴	Manufacturer/ Importer	March 2005
Ireland	SI 340 Waste Management ((Waste Electrical And Electronic Equipment) Regulations ²⁵	Manufacturer/ Importer	July 2005
Austria	Electro Ordinance (EAG-Verordnung) ²⁶	Manufacturer/ Importer	August 2005

The European Council has recognized the need to have harmonized national policies on the management of e-waste to ensure policy effectiveness. However, despite the essential criteria in a common WEEE Directive that applies uniformly to all member states, the transposition of the directive into national law is anything but uniform. There are several issues, such as scope, range and type of producer responsibility, funding mechanisms, registration and monitoring, that are not specifically stipulated by the Directive, and therefore open for interpretation in national legislations.

In it's programme "A strategy for the simplification of the regulatory environment"²⁷ the European Commission plans a review of the WEEE Directive. This indicates that the EC recognizes that the Directive might be of complex nature with need of improvement. In addition Article 5 (5) of the Directive provides that new mandatory targets shall be established by the end of 2008. Thus the objective of the review is to give a thorough evaluation of the impacts, efficacy and efficiency of the WEEE Direc-

tive by evaluating the current implementation and analyse potential options for improvement, further development and simplification.

2.3 Legislation outside Europe

E-waste specific legislation, though not as widespread in the rest of the world as in Europe, has also been implemented in few countries in Asia and America, though limited to the OECD countries.

Table 4: e-waste legislation in selected OECD countries / states

Country/ State	Legislation	Responsibility	In force since
Taiwan	Taiwan Waste Disposal Act ²⁸	Manufacturer/ Importer	March 1998
Japan	Specified Home Appliances Recycling Law (SHAR) ²⁹	Manufacturer/ Importer	April 2001
South Korea	Extended Producer Responsibility System (EPRS) ³⁰	Manufacturer/ Importer	January 2003
California	Solid Waste: Hazardous Electronic Waste (SB50, Sher)	Manufacturer/ Importer	September, 2004

2.4 Upcoming legislation

As the need for streamlined 'green' channels for e-waste grows, there is pressure on more governments, in developed as well as developing countries, to formulate similar policy and legislation guidelines towards this end. Several countries in the European Union such as the United Kingdom, as mandated by the European Commission, are in the consultation process of formally transposing the WEEE Directive to their national legislations. Countries even outside the EU, such as Canada, Australia, China, India and several states in the United States of America have also started discussions to introduce e-waste specific legislation.

In the next sections, we present case studies on the development of the legislative process in the three countries China, India and South Africa which

²³ Full text available at:
<http://www.environment.fi/download.asp?contentid=35670&lan=en>

²⁴ Full text available at:
http://www.bmu.de/files/pdfs/allgemein/application/pdf/elektrog_uk.pdf

²⁵ Full text available at:
[http://www.environ.ie/DOEI/DOEIPol.nsf/0/93a86f2137a4a2f380256f0f003bc84c/\\$FILE/SI%20340-2005%20WEEE.pdf](http://www.environ.ie/DOEI/DOEIPol.nsf/0/93a86f2137a4a2f380256f0f003bc84c/$FILE/SI%20340-2005%20WEEE.pdf)

²⁶ The EAG superseded the Lamp Ordinance & Refrigerator Ordinance which covered a subset of WEEE products, and were in force since 1992. The full text is available at:
<http://www.umweltnet.at/article/archive/6932>

²⁷ http://ec.europa.eu/enterprise/regulation/better_regulation/simplification.htm

²⁸ More information available at:
http://ivy2.epa.gov.tw/out_web/english/EPM/issue9801.doc

²⁹ Full text available at:
<http://www.meti.go.jp/english/information/data/cReHAppre.html>

³⁰ More information available at:
http://eng.me.go.kr/docs/common/common_view.html?dx=51&av_pg=1&mcode=10&classno=12

resulted from the Swiss global e-waste programme "Knowledge Partnerships in e-Waste Recycling"³¹.

The seco (Swiss State Secretariat for Economic Affairs) funded programme, implemented by EMPA (Swiss Federal Institute of Material Science and Technology) has been working in three countries to understand the current scenario in these countries regarding e-waste and to provide inputs for the improvement of their e-waste management systems. Field studies in India, China and South Africa provided some startling insights, indicating that each country has unique characteristics of their existing e-waste recycling systems, and therefore any legislation would have to consider these ground realities, to overcome the challenges they pose as well as build on the opportunities they provide.

3 Status of e-waste legislation in China

3.1 E-waste legislation

China has emerged as not only the world's manufacturer of electrical and electronic products, but also the hub for the end-of-life disposal of these products. Following investigations by NGOs, there is greater awareness on the need for national legislation to improve the e-waste management practices currently employed. China is a signatory to both the Basel Convention as well as the Basel Ban Amendment, and has officially banned the import of e-waste. However, as yet there is no comprehensive e-waste legislation in China, though stipulations on e-waste management can be found in national legislations, such as the Solid Waste Pollution Prevention and Control Law, and the Cleaner Production Promotion Law. These interrelated laws define the basic waste management principles for municipal and industrial solid wastes and formulate the concepts of pollution reduction and circular economy. Both laws remain quite general and no specific stipulations on the implementation of an e-waste management system are in place yet.

³¹ For more information on the Swiss global e-waste programme see: <http://www.e-waste.ch>

Table 5: Legislation in China with impact on e-waste management³²

Law or Regulation	Major Content	Status /date
Solid Waste Pollution Prevention and Control Law (NPC)	Stipulations on the management of solid waste pollution, not limited to e-waste. Disposal of municipal and industrial solid waste, reuse and recycle of solid waste.	Effective from April 1, 1996
Cleaner Production Promotion Law (NPC)	Pollution prevention and reduction in the whole life cycle of products	Effective from January 1, 2003
Notification on the Import of the Seventh Category of Waste (SEPA)	Ban on the import of the seventh category of waste. Some specific e-waste is not included.	Effective from February 1, 2000
Notice on Strengthening the Environmental Management of e-Waste (SEPA)	Calls for strengthening the environmental management of e-waste to ensure environmental sound practices in waste collection and treatment	Issued August 26, 2003
Ordinance on the Management of Waste Household Electrical and Electronic Products (NDRC)	Responsibilities of different parties in waste household electrical and electronic products collection and treatment.	Incorporated in the 2006 legislation plan of the State Council
Measures for the Administration of Prevention and Treatment of Pollution by Electronic Information Products (MII)	Restrictions on the use of hazardous substances; 'green' product design; provision of information on the components, hazardous substances and recycling.	Issued early 2006; will be enforced since March 1, 2007
Waste Home Electronic Appliance and Electrical Pollution Prevention and Control Technical Policy (SEPA)	Technical policies for pollution prevention and control on home electronic appliance and electrical waste	Under drafting
Technical Standards for the Treatment of e-Waste (SEPA)	Technical standards for the collection, transportation, storage, dismantling, treatment and disposal of e-waste	Under drafting

3.2 Current development

Imports of e-waste are banned by the Notification on the Import of the Seventh Category of Waste

³² Hicks, C., Dietmar, R., Eugster, M. The recycling and disposal of electrical and electronic waste in China – legislative and market responses. *Environmental Impact Assessment Review*, vol. 25, pp. 459– 471. (2005)

issued by the State Environmental Protection Administration (SEPA) since 2000. In 2003, SEPA issued the Notice on Strengthening the Environmental Management of e-waste with the goal to reduce the overall volume of e-waste, to increase the reutilization rate and to reduce negative environmental impacts.

Since then, various national regulations, policies and standards related to e-waste management are under drafting. The Ordinance on the Management of Waste Household Electrical and Electronic Products was drafted in 2004 by the National Development and Reform Commission (NDRC) and submitted for approval to the State Council in early 2005. The goal of the ordinance is to define roles of different actors in the recycling system, to regulate the financing of the system, to encourage the establishment of e-waste recycling enterprises and to implement the concept of EPR. The ordinance would come into effect only after the ongoing consultations with the affected actors is completed.

The Measures for the Administration of Prevention and Treatment of Pollution by Electronic Information Products was issued in early 2006 by the Ministry of Information Industry (MII), NDRC and five other ministries and is expected to be enacted in March 2007. The goal of this regulation is to control the flow of e-waste and reduce its pollution. It covers all electronic information products in the Chinese market, including imported products. Key stipulations are: (1) environmentally friendly production methods shall be applied in the design and production of electronic information products; (2) the toxic and hazardous materials content and relevant reuse/recycle information shall be labelled on electronic information products entering the market; (3) for those products listed in the Pollution Control List of Key Electronic Information Products, the usage of six kinds of toxic and hazardous materials³³ shall be prohibited or restricted.

SEPA is also drafting the Waste Home Electronic Appliance and Electrical Pollution Prevention and Control Technical Policy and the China Electronics Engineering and Design Institute (CEEDI) is drafting on behalf of SEPA the Technical Standards for the Treatment of e-Waste³⁴. In early 2006 the Environmental Protection and Resource Conservation Committee (EPRCC) of the National People's Congress (NPC) began drafting a national e-waste law.

The drafting process is supported by the Swiss Programme "Knowledge Partnerships in e-Waste Recycling". This law will regulate the behavior of producers and consumers, as well as the administrators on e-waste production, collection, recycle and disposal.

4 Status of e-waste legislation in India

4.1 E-waste legislation

Toxics Link, in association with the Basel Action Network, published the landmark report in February 2003, on the transboundary movement of e-waste from the developed countries to India and the hazardous practices associated with recycling e-waste³⁵, especially highlighting the need for legislation to ban the import of e-waste as well as ensure environmentally sound disposal of the domestically generated e-waste. Even though India is a signatory of the Basel Convention, there is no specific legislation regulating the import/ export or the collection and treatment of e-waste in India as yet (in 2006). There are however several existing environmental legislations which are of importance and useful in the context of e-waste.

³⁵ Toxics Link, *Scrapping the hi-tech myth: Computer waste in India*, see: <http://www.toxicslink.org/>

³³ Restriction on the use of six hazardous substance in electronic and electric products: lead, mercury, cadmium, hexavalent chrome, polybrominated biphenyl (PBB), polybrominated diphenyl ether (PBDE).

³⁴ The Formulation of Chinese Technical Standards for Treatment of e-Waste is supported by Swiss Programme Knowledge Partnerships in e-Waste Recycling since 2004. The drafting process will be completed end of 2006.

Table 4: Legislation in India with impact on e-waste management

Law or Regulation	Major Content	Status /date
Environment (Protection) Act 1986 (Amendment 1991) ³⁶	An umbrella legislation that empowers the central government to take measures to protect and improve environmental quality, control and reduce pollution from all sources.	Effective from November 19, 1986
Hazardous Wastes (Management and Handling) Rules, 1989 (Amendments 2000/2003) ³⁷	Provides stipulations on the management and disposal of municipal and industrial solid waste of hazardous nature (encompassing provisions of the Basel Convention).	Effective from July 28, 1989
Municipal Solid Wastes (Management and Handling) Rules, 2000 ³⁸	Provides compliance criteria to municipalities for the collection, segregation, storage, transportation and disposal of municipal solid wastes.	Effective from September 25, 2000
Batteries (Management and Handling) Rules, 2001 ³⁹	Confers responsibility for the safe disposal & recycling of used lead acid batteries on the manufacturers/ assemblers/ importers.	Effective from May 16, 2001
The Public Liability Insurance Act, 1991 ⁴⁰	Covers accidents involving hazardous substances and insurance coverage for these.	Effective from January 23, 1991
The National Environmental Tribunal Act, 1995 ⁴¹	Provides strict liability for damages arising out of any accident occurring while handling any hazardous substance.	Effective from June 17, 1995

³⁶ Environment Protection Act full text available at: <http://www.envfor.nic.in/legis/env/env1.html>

³⁷ Hazardous Waste Handling & Management Rules full text available at: <http://www.envfor.nic.in/legis/hsm/hsm1.html>

³⁸ Municipal Solid Waste Rules full text available at: <http://www.envfor.nic.in/legis/hsm/mswmhr.html>

³⁹ Batteries Rules full text available at: <http://www.envfor.nic.in/legis/hsm/leadbat.html>

⁴⁰ Public Liability Insurance Act full text available at: <http://www.envfor.nic.in/legis/public/public1.html>

⁴¹ National Environmental Tribunal Act full text available at: <http://www.envfor.nic.in/legis/others/tribunal.html>

4.2 Current development

The Swiss programme “Knowledge Partnerships in e-Waste Recycling”, launched in India in August 2003, started with a rapid assessment of current state of e-waste management in Delhi. The assessment mapped the hot spots in and around Delhi, discovering a large e-waste recycling industry engaged in everything from collecting and dismantling to re-manufacturing and material recovery. The entire business was found to take place in the informal sector - within small units with low-skilled, mainly migrant, labour.

The Central Pollution Control Board (CPCB), an autonomous body under the Ministry of Environment and Forests (MoEF) and the nodal body involved in developing draft legislations as well as providing technical inputs at the national as well as state levels took the lead in hosting a national workshop wherein the first results of the assessment were presented. The workshop concluded with the formation of a National WEEE Workgroup and a guideline, the ‘Way Forward’, was proposed which included a national level study and to focus on specific areas by setting up five specialized task forces (i) Policy & Legislation, (ii) WEEE Baseline Studies, (iii) Extended Producer Responsibility, (iv) Recycling Technologies, (v) Awareness Building.

The Policy & Legislation task force was mandated to study the feasibility and format of a legislation on the handling and recycling of e-waste, not only as an environmental protection measure, but also to keep pace with international legislations such as the WEEE Directive in the EU. The scope of the task force covered issues such as developing national guidelines that would allow formal recycling operations, developing ‘WEEE Rules’, formulating standards and licensing procedures, etc.

The framework of the ‘Battery Rules’, regulating the end-of-life management of lead acid batteries and the first and only legislation currently in India with elements of EPR, was taken as the basis to be modified and developed further to suit the peculiarities of e-waste. A draft was circulated for discussion among various stakeholders including industry representatives, NGOs and policy makers. The formation of the E-Waste Agency (EWA) in Bangalore⁴², a non-for-profit association gathering different stakeholders involved in EEE life cycle into an institutional framework, served as a platform for further discussion and refinement of the e-waste legislation. However, given the delays in the discussion of the draft and lacking the lead initially taken by the CPCB, the legislative process was slowed

⁴² EWA – The E-Waste Agency, Bangalore. <http://www.ewa.co.in>.

down considerably. The MoEF decision to revive the discussion on the e-waste legislation was given a fresh impetus with the appointment of a consultant to provide a draft, which then became the basis for a national level workshop on e-waste guidelines, involving stakeholders from across the country (May 2006, Bangalore). The results of this workshop are currently analysed by the MoEF and form the basis for further development.

5 Status of e-waste legislation in South Africa

5.1 E-waste legislation

There is no specific legislation that deals with e-waste in South Africa. However, various legislations can be read to impact on e-waste (see Table 6). A sustainable approach to waste management in general, echoed in both the National Waste Management Strategy (NWMS) of South Africa and the Polokwane Declaration⁴³, moves towards reducing the waste stream.

The NWMS was initiated in 1997 by the Department of Environmental Affairs and Tourism (DEAT) and the Department of Water Affairs and Forestry (DWAF), with financial support from the Danish Co-operation for Environment and Development (DANCED) organisation. The overall objective of the NWMS is to reduce the generation and environmental impact of all forms of waste and to ensure that the health of the people and the quality of environmental resources are no longer significantly affected. In line with the Integrated Pollution and Waste Management (IP&WM) approach, the NWMS addresses all elements in the waste management hierarchy. E-Waste is now considered as a priority waste stream by DEAT as part of the NWMS.

⁴³ The goal is to reduce waste generation and disposal by 50% and 25% respectively by 2012 and develop a plan for ZERO WASTE by 2022. The declaration was signed by representatives of government at national, provincial and local level, civil society and the business community, participating in the first South African National Waste Summit, in 2001. (http://www.environment.gov.za/ProjProg/WasteMgmt/Polokwane_declaration.htm).

Table 6: Legislation in South Africa with impact on e-waste management (Widmer & Lombard 2004⁴⁴)

Law or Regulation	Major Content
Constitution	Deals with basic environmental rights (including access to information). Sets out the allocation of powers for different levels of government. While provinces set the standards of environmental control within a national framework, local authorities are expected to administer the legislation, supplementing it with by-laws where necessary.
The National Environmental Management Act (Act 107 of 1998) (NEMA)	Amongst other things, NEMA lays out principles for waste management. These include avoidance or minimization, and the "remediation of pollution". Waste reduction, re-use, recycling and proper disposal, as well as the 'polluter pays' and 'cradle to grave' principles are emphasized.
The Municipal Services Act (Act 32 of 2000)	Includes principles for effective local governance.
The Occupational Health and Safety Act (Act 85 of 1993)	Deals with health and safety in the workplace.
The Environment Conservation Act (ECA)	Deals with the protection and controlled utilization of the environment. The ECA makes provision for an Environmental Impact Assessment (EIA) which is needed for any waste disposal activities. An amendment delegates the administration of waste disposal to the Department of Environmental Affairs and Tourism (DEAT). The permitting of waste disposal sites is guided by a series of documents dealing with minimum requirements.
The White Paper on Integrated Pollution and Waste Management	Deals with the allocation of environment and waste management functions and powers. Has also included the development of the National Waste Management Strategy, which is a Danish-funded joint venture between the DEAT and the Department of Water Affairs and Forestry. The emphasis is on "holistic waste and pollution management" (Lombard, 2004). Recycling is one of the short-term priority areas identified.
The Health Act	Promotes healthy living and working conditions. Relevant to the potential health risk implications of e-waste.
The Hazardous Substances Act	Regulates the management of hazardous substances and hazardous waste.

5.2 Current development

⁴⁴ Widmer R. and Lombard R., *E-Waste assessment in South Africa – a case study of the Gauteng province*. Swiss Knowledge Partnerships in e-Waste Recycling, Swiss Federal Laboratories for Materials Testing and Research (Empa), St.Gallen/Switzerland, supported by the Swiss States Secretary of Economic Affairs (seco), Bern/Switzerland.

Supported by the Swiss programme “Knowledge Partnerships in e-Waste Recycling” the e-Waste Association South Africa (eWASA) was founded in 2005 and is led by industry and non-governmental organizations⁴⁵. The eWASA board represents the IT industry, recyclers, government and non-governmental/private interest groups. The eWASA intends to develop an industry driven national e-waste management strategy, which will include the creation of a national consumer label which guarantees safe disposal and an adequate financing mechanism. The industry initiative is backed by the Information Technology Association South Africa⁴⁶, which set e-waste as one of three priorities in 2006/07 and appointed a special e-waste subcommittee in July 2006. ITA and eWASA respectively ultimately intend to facilitate a national e-waste take-back and recycling system based on a robust legal framework.

Parallel to the development of a national e-waste management strategy, the Swiss project supports the establishment of local so called “Green e-Waste Channels” in the provinces of Western Cape, Gauteng and Durban/Ethekwini. The intention of the “Green e-Waste Channels” is to pilot the establishment of infrastructure for a take-back and recycling system in communities. The focus is to create business links between existing service providers in order to minimise landfilling and maximise job opportunities. The result should be that private households and corporate consumers can dispose off e-waste safely in the “Green e-Waste Channels”. In an iterative process, the experience gained in the local Green e-Waste Channel pilot projects is used to inform the establishment of a national e-waste strategy by eWASA.

As of mid 2006, the governmental departments responsible for legislating on e-waste have yet to start the drafting and consultation process. However governmental organizations are represented in official eWASA meetings on the national level as well as at the local level in Western Cape and Gauteng provinces. There is increasing interest from the government to participate more actively in the development of the clean e-waste channel and there have been separate meetings between ITA/eWASA and the Department of Environmental Affairs and Tourism (DEAT) and the Department of Trade and Industry (DTI) respectively. On the one hand, DEAT is considering adding an e-waste regulation within the framework of the hazardous waste regu-

lations which are currently in the process of drafting. On the other hand, DTI has concerns with having to comply with export driven controls relative to the European e-waste related regulations (see chapter 2.2 about the WEEE¹⁴ and the RoHS¹⁶ Directives on page 29) in its main trading partner countries, when there was no corresponding regulation in South Africa.

6 Conclusion

E-Waste is an emerging problem as well as a business opportunity of increasing significance, given the volumes of e-waste being generated and the content of both toxic and valuable materials in them. Hischier et. al.⁴⁷, comparing the environmental impacts of the baseline scenario of incineration of all e-waste and primary production of raw materials to a scenario of e-waste recycling, found that e-waste recycling proves to be clearly advantageous from an environmental perspective. However, to maximize the value of the recycling, the entire system needs a strong reverse supply chain and secured financing, coupled with a robust monitoring and compliance system. Bok et al⁴⁸ assert that the two decisive factors in determining what end-of-life systems look like are *legislation* and *market forces*. Without legislative pressure the market forces are ‘left alone’ to deal with end-of-life products. Therefore, it is imminent that more and more governments will have to deliberate on e-waste specific legislation.

From the case studies of the legislative processes above, it can be seen that policy makers are struggling to find suitable solutions. From our experiences from the progress of the legislative process in the three countries, the five question clusters listed below, while by no means the only issues that a policymaker needs to consider, are some of the fundamental questions that need to be answered at the very beginning of a discussion on e-waste legislation.

1. Defining the scope of the products covered:
Which products are considered e-waste?
Should business and household electronics be treated separately?
2. Allocating producer responsibility:
Who is the producer?

⁴⁵ eWASA, 2006: e-Waste Association South Africa, <http://www.e-waste.org.za>

⁴⁶ ITA, 2006: Information Technology Association South Africa, see: <http://www.ita.org.za/>

⁴⁷ Hischier, R., Wäger, P., Gauglehofer, J. Does WEEE recycling make sense from an environmental perspective? The environmental impacts of the Swiss take-back and recycling systems for waste electrical and electronic equipment (WEEE). *Environmental Impact Assessment Review*, vol. 25, pp 525–539. (2005)

⁴⁸ Bok, C. Nilsson, J. Masui, K. Suzuki, K. Rose, C. Lee, B.H. An international comparison of product end-of-life scenarios and legislation for consumer electronics, *Electronics and the Environment*, 1998. ISEE-1998. Proceedings of the 1998 IEEE International Symposium.

- Should producers be responsible? If yes, how – individually, collectively or both?
3. Treating historical and orphan products: How should they be disposed off and who should pay for their disposal?
 4. Setting collection and recycling targets: Should there be any? If so, how should they be measured and calculated?
 5. Monitoring and compliance – Who should be the competent authority?

We believe that these five issues encapsulate the most relevant questions and provide a broad framework upon which further discussions for a successful legislative process can be based on. So far, there is not much relevant research to answer these questions, especially in the context of emerging economies. Therefore, these questions also provide a research agenda for further investigation on e-waste legislation.

Challenges for eco-design, energy efficiency and waste treatment of electrical and electronic products against the background of requests for exemptions following requirements of Article 5 (1) (b) RoHS Directive

Stéphanie Zangl and Carl-Otto Gensch

Abstract

The EU Directive 2002/96/EC on restriction of use of certain hazardous substances in electrical and electronic equipment (RoHS Directive) stipulates that from 1st July 2006 onwards new electrical and electronic equipment put on the market will not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE). This restriction shall not apply to applications listed in the Directive's Annex.

Article 5 (1) (b) contains criteria for exempting materials and components from the above-mentioned restriction in order to adapt the Annex to scientific and technical progress. Stakeholders have been invited to apply for exemptions from restriction of use according to the criteria in Article 5 (1) (b) against the background of adaptation of the Annex to scientific and technical progress. Prior to an amendment of the Annex, a public stakeholder consultation has to take place.

Öko-Institut e.V. (the Institute for Applied Ecology) and Fraunhofer IZM (the Institute for Reliability and Microintegration) have been appointed by the European Commission to review the requests. The experience gained during this work will be introduced in this paper, i.e. it will be outlined how the requirements of the RoHS Directive affect eco-design, energy efficiency and waste treatment of domestic appliances and lighting (DAL) and what opportunities and drawbacks could arise as a consequence thereof.

1 The RoHS Directive and its implications on DAL

Domestic appliances and lighting equipment are part of the product category headed “electrical and electronic equipment (EEE)”. This product category has been the subject of recently-implemented environmental EU legislation: on the one hand, the framework for dealing with these products at their end-of-life has been set by the so-called WEEE Directive¹. On the other hand, the use of certain substances in these products has been restricted by the so-called RoHS Directive².

The WEEE Directive is valid for products that are part of one of the 10 product categories listed in its Annexes I A and B. Domestic appliances fall under the following categories “1). Large household appliances”, “2). Small household appliances”, “3). IT and telecommunications equipment” and “4). Consumer equipment”. Lighting equipment is accorded its own product category (no. 5). The RoHS Directive is also valid for these product categories, but specifies that its regulations on lighting equipment only apply to electric light bulbs and luminaries in households.

The RoHS legal framework outlined above carries the following implications for DAL:

¹ Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment, OJ L 37/24.

² Directive 2002/95/EC of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, OJ L 37/19.

The Öko-Institut (Institut für angewandte Ökologie - Institute for Applied Ecology, a registered non-profit-association) was founded in 1977. Its founding was closely connected to the conflict over the building of the nuclear power plant in Wyhl (on the Rhine near the city of Freiburg, the seat of the Institute). The objective of the Institute was and is environmental research independent of government and industry, for the benefit of society. The results of our research are made available of the public.

The institute's mission is to analyse and evaluate current and future environmental problems, to point out risks, and to develop and implement problem-solving strategies and measures. In doing so, the Öko-Institut follows the guiding principle of sustainable development.

The institute's activities are organized in Divisions - Chemistry, Energy & Climate Protection, Genetic Engineering, Sustainable Products & Material Flows, Nuclear Engineering & Plant Safety, and Environmental Law.

The Environmental Law Division of the Öko-Institut:

The Environmental Law Division covers a broad spectrum of environmental law elaborating scientific studies for public and private clients, consulting governments and public authorities, participating in law drafting processes and mediating stakeholder dialogues. Lawyers of the Division work on international, EU and national environmental law, concentrating on waste management, emission control, energy and climate protection, nuclear, aviation and planning law.

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The University of Applied Sciences in Bingen was founded in 1897. It is a practiceorientated academic institution and runs courses in electrical engineering, computer science for engineering, mechanical engineering, business management for engineering, process engineering, biotechnology, agriculture, international agricultural trade and in environmental engineering.

The *Institute for Environmental Studies and Applied Research* (I.E.S.A.R.) was founded in 2003 as an integrated institution of the University of Applied Sciences of Bingen. I.E.S.A.R. carries out applied research projects and advisory services mainly in the areas of environmental law and economy, environmental management and international cooperation for development at the University of Applied Sciences and presents itself as an interdisciplinary institution.

The Institute fulfils its assignments particularly by:

- Undertaking projects in developing countries
- Realization of seminars in the areas of environment and development
- Research for European Institutions
- Advisory service for companies and know-how-transfer

Main areas of research:

- **European environmental policy**
 - Research on implementation of European law
 - Effectiveness of legal and economic instruments
 - European governance
- **Environmental advice in developing countries**
 - Advice for legislation and institution development
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- **Companies and environment**
 - Environmental management
 - Risk management

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The Society for Institutional Analysis was established in 1998. It is located at the University of Applied Sciences in Darmstadt and the University of Göttingen, both Germany.

The sofia research group aims to support regulatory choice at every level of public legislative bodies (EC, national or regional). It also analyses and improves the strategy of public and private organizations.

The sofia team is multidisciplinary: Lawyers and economists are collaborating with engineers as well as social and natural scientists. The theoretical basis is the interdisciplinary behaviour model of *homo oeconomicus institutionalis*, considering the formal (e.g. laws and contracts) and informal (e.g. rules of fairness) institutional context of individual behaviour.

The areas of research cover

- Product policy/REACH
- Land use strategies
- Role of standardization bodies
- Biodiversity and nature conservation
- Water and energy management
- Electronic public participation
- Economic opportunities deriving from environmental legislation
- Self responsibility

sofia is working on behalf of the

- VolkswagenStiftung
- German Federal Ministry of Education and Research
- Hessian Ministry of Economics
- German Institute for Standardization (DIN)
- German Federal Environmental Agency (UBA)
- German Federal Agency for Nature Conservation (BfN)
- Federal Ministry of Consumer Protection, Food and Agriculture

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elni

In many countries lawyers are working on aspects of environmental law often with environmental initiatives and organisations or as legislators, but have limited contact with other lawyers abroad, although such contact and communication is vital for the successful and effective implementation of environmental law.

In 1990 a group of lawyers from various countries therefore decided to initiate the Environmental Law Network International (elni) to promote international communication and cooperation worldwide. Since then elni has grown to a network of about 350 individuals and organisations from throughout the world.

Since 2005 elni is a registered non-profit association under German Law.

elni coordinates a number of different activities:

Coordinating Bureau

The Coordinating Bureau was originally set up at and financed by the Öko-Institut in Darmstadt, Germany, a non-governmental, non-profit making research institute. The Bureau is currently hosted by the University of Applied Sciences in Bingen. The Bureau acts as an information centre where members can obtain information about others working in certain areas thus promoting the development of international projects and cooperation.

elni Review

The elni Coordinating Bureau produces and sends to each member the elni Review twice a year containing members' reports on projects, legal cases and developments in environmental law. elni therefore encourages its members to submit such articles to be published in the Review in order to allow the exchange and sharing of experiences with other members.

elni Conferences and Fora

elni conferences and Fora are a core element of the network. They provide scientific input and the possibility for discussion on a relevant subject of environmental law and policy for international experts. The aim is to bring together scientists, policy makers and young researchers, giving the opportunity to exchange views and information as well as developing new perspectives.

Publication Series

The elni publications series contains 12 volumes on different topics of environmental law.

- Environmental Law and Policy at the Turn to the 21st Century, Liber amicorum, Betty Gebers, Ormond/Führ/Barth (eds.) Lexxion 2006.
- Access to Justice in Environmental Matters and the Role of NGOs, de

Sadeleer/Roller/Dross, Europa Law Publishing 2005.

- Environmental Law Principles in Practice, Sheridan/Lavrysen (eds.), Bruylant 2002.
- Voluntary Agreements - The Role of Environmental Agreements, elni (ed.), Cameron May Ltd., London 1998.
- Environmental Impact Assessment - European and Comparative; Law and Practical Experience, elni (ed.), Cameron May Ltd. London 1997.
- Environmental Rights: Law, Litigation and Access to Justice, Deimann / Dyssli (eds.), Cameron May Ltd. London 1995.
- Environmental Control of Products and Substances: Legal Concepts in Europe and the United States, Gebers/Jendroska (eds.), Peter Lang, 1994.
- Dynamic International Regimes: Institutions of International Environmental Governance, Thomas Gehring; Peter Lang, 1994.
- Environmentally Sound Waste Management? Current Legal Situation and Practical Experience in Europe, Sander/ Küppers (eds.), P. Lang, 1993
- Licensing Procedures for Industrial Plants and the Influence of EC Directives, Gebers/Robensin (eds.), P. Lang, 1993.
- Civil Liability for Waste, v. Wil-mowsky/Roller, P. Lang 1992.
- Participation and Litigation Rights of Environmental Associations in Europe, Führ/ Roller (eds.), P. Lang, 1991.

elni Website: elni.org

The elni website at <http://www.elni.org> contains news about the network and an index of elni articles, gives an overview of elni activities, and informs about elni publications. Internships for young lawyers/law students at the Öko-Instituts environmental law division are also offered on the web.