

Scoping Exercise on E-waste Management in South Asia

Introduction

Waste Management was identified as a priority issue in the work programme of SACEP by the 9th Governing Council meeting held in August 2005 at Thimphu, Bhutan and also at the 10th Governing Council of SACEP held in January 2007 in Kathmandu, Nepal.

Electronic products nearing the end of their useful life are called as e-waste. They mostly contain non-degradable components and chemicals that are harmful to the environment and contribute largely in pollution of air, water and land.

South Asia faces major difficulties in recycling this e-waste and finding dumping sites for such waste. Countries in this region also have the problem of becoming dumping sites of such waste for the developed countries.

SACEP's Activities

SACEP signed a MoU with Development Alternatives for a Scoping Exercise on E-waste management in South Asia in February 2007. The objective of this MoU is to develop a strategy to reduce environmental and health impacts through scientific e-waste management in South Asia while demonstrating benefits and ensuring multi stakeholder participation.

A position paper based on current status of e-waste management in the computer and mobile phone industry in South Asia was drafted and circulated to all the Focal Points for the comments (Annex I).

SACEP in collaboration with the Development Alternative (DA) organized a workshop for E-waste Management in South Asia in September 2007 at New Delhi, India. The main objectives of this workshop were to establish contacts with stakeholders, including governments and private sector, finalize the position paper which included the on going practices and status of the initiatives at various levels (regional, national and local) under taken by the different agencies and to develop project proposals in consultation with stakeholders for the consideration of funding agencies, for promoting environmentally sound management of e-waste in South Asia.

The Workshop was attended by representatives from India, Nepal and Sri Lanka. Representatives from the leading manufactures and also the representatives from the international organizations were also present.

A Panel discussion was held on the aspect of e-waste management at the workshop.

It was identified that capacity building in areas like Coordination for a better technology transfer, exchange of information and for the legal and policy development are needed both at the country and the regional levels.

More awareness is needed for the region on e-waste management and its best practices and enhancement of technology. The draft position paper on e-waste management in South Asia was reviewed the comments from the member countries were incorporated.

SACEP in collaboration with DA will identify the main issues from the position paper and develop an action plan including some project proposals in consultation with stakeholders for the consideration of funding agencies for promoting environmentally sound management of e-waste in South Asia.

Task Force for E-waste management

It was discussed to formulate a Task Force comprising a forum of regional experts on e-waste management to meet periodically to exchange views and to update knowledge (i.e. training projects, overseas exchange visits, etc). SACEP will act as the secretariat for this Task Force. Procedure to formulate this Task Force has been discussed with DA.

Promotion of collaborative actions at the sub-regional level

With the growing demand for the electronic products and materials in the region e-waste generation is increasing rapidly. Collaborative programmes within the region to control imports and exports of e-waste and also for the information and technology transfer to be developed.

POSITION PAPER ON e-WASTE MANAGEMENT IN SOUTH ASIA



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ABBREVIATIONS USED

ASEM – Advisory Services in Environment Management
BAN – Basel Action Network
BCRC – Basel Convention Regional Centre
COP – Conference of Parties
CPCB – Central Pollution Control Board, Government of India
CRT – Cathode Ray Tube
DA – Development Alternatives, India
DGFT – Directorate General for Foreign Trade, Government of India
EEE – Electrical & Electronic Equipment
EMPA – Swiss Federal Laboratories for Materials Testing and Research
EMS – Environment Management System
EPR – Extended Producer Responsibility
ESM – Environmentally Sound Management
EU – European Union
EWA – e-waste Agency
EXIM – Export & Import
GoI – Government of India
GTZ – German Technical Cooperation
ICT – Information Communication Technology
IFC – International Finance Corporation
IT – Information Technology
PCBs – Printed Circuit Boards
PCs – Personal Computers
PIC – Prior Informed Consent
PRF – Prepaid Recycling Fee
MoEF – Ministry of Environment & Forests, Government of India
MPCB – Maharashtra State Pollution Control Board, Government of India
MPPI – Mobile Phone Partnership Initiative
NASSCOM – National Association of Software & Services Companies, India
NGOs – Non-governmental Organizations
RoHS – Directive on Restriction of the use of certain Hazardous Substances
SAARC – South Asian Association for Regional Cooperation
SACEP – South Asia Cooperative Environment Programme
SBC – Secretariat for Basel Convention
SCOPE – Society for Conservation & Protection of the Environment, Karachi, Pakistan

seco – Swiss State Secretariat for Economic Affairs
SEPD – Sub-regional Environmental Policy Dialogue
SPCBs – State Pollution Control Boards, Government of India
SteP – Solving the e-waste Problem project
SVTC – Silicon Valley Toxics Coalition
T/month – Tons per month
TNSPCB – Tamil Nadu state Pollution Control Board, India
TVs – Televisions
UNEP – United Nations Environment Programme
US – United States
US\$ - US Dollars
OECD – Organization for Economic Cooperation & Development
WEEE – Waste Electrical & Electronic Equipment
WTO – World Trade Organization

1.0 Overview of the e-waste Problem

1.1 Background

The advancement of science and technology has made an array of electrical and electronic goods affordable to people, both in the developed and developing countries. The manufacture of electronic equipment has emerged to be one of the fastest growing industries. The industry thrives on rapid technology change leading to accelerated discards of the older models, since it is often cheaper to buy new equipments rather than to repair or upgrade the broken or obsolete products. Hence the proper management of the equipments at the end of their useful life has posed to be a growing challenge. The OECD as well as UNEP's Expert Advisory Group meeting on the 10-year Framework on Sustainable Consumption & Production (The Marrakech Process) has identified e-waste as a priority waste stream. Mr Achim Steiner, Under-Secretary of UNEP, reiterated the challenges of managing e-waste (see Box 1).

Electronic waste or e-waste, for short, 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 of e-waste. *Table 1* below lists a few accepted definitions.

Table 1: Definitions of e-waste¹

EU WEEE Directive (EU, 2002a)	Electrical or electronic equipment which is waste... including all components, sub-assemblies and consumables, which are part of the product at the time of discarding. 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.
Basel Action Network (Puckett and Smith, 2002)	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 (2001)	Any appliance using an electric power supply that has reached its end-of-life.
SINHA (2004)	An electrically powered appliance that no longer satisfies the current owner for its original purpose.
StEP (2005)	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.

¹ Global Perspectives of e-waste. R. Widmer et al. / Environmental Impact Assessment Review 25 (2005) 436–458

As e-waste comprises of diverse type of materials, it is difficult to generalize the material composition of the entire waste stream. However, examinations of the contents have revealed presence of 5 broad categories of materials: ferrous metals, non-ferrous metals, glass, plastics and others. An estimate of the composition of waste electrical and electronic equipments (WEEE) conducted by the European Topic Centre on Resource and Waste Management² is shown in Figure 1. Iron and steel are the most common

Box 1: Challenges of e-waste management

In the opening speech of the 8th Conference of the Parties to the Basel Convention in November 2006 Mr Achim Steiner, UN Under-Secretary General and Executive Director of the United Nations Environment Programme (UNEP) reiterated that

- ❖ Accelerating trade in goods and materials across borders and across continents is one of the defining features of the early 21st century.
- ❖ The globalized phenomenon of consumerism and what one might call ‘built in obsolescence’— the relative cheapness of high technology products like mobile phones and computers — the way fashion is driving the purchasing and discarding of products in a way unknown a generation ago.
- ❖ Consumerism is driving economies but also drives a growing mountain of e-waste not only from North to the South but South—South waste with a wide range of pollutants from heavy metals to chlorine compounds.
- ❖ One of the great challenges of our time is to collectively agree on what is waste and what are second-hand products—this question extends to end-of-life ships as much as to electronic goods.
- ❖ Europe once talked about the ‘cradle to grave’ approach for handling consumer goods. But we know that we have to look beyond this. Japan is pioneering the 3R’s—reduce, reuse and recycle. China is pioneering the Circular Economy—a concept that at its centre hold that nothing is waste, everything is a raw material for another process be it the by-products of a chemical factory or the heat from a power station.

materials found in electrical and electronic equipment (EEE) and account for almost half of the total weight of WEEE. Plastics are the second largest component by weight representing approximately 21% of WEEE. Non-ferrous metals including precious metals represent approximately 13% of the total weight of WEEE and glass around 5%. Recovering these metals and valuables from e-waste has emerged to be a profitable business, resulting in global transboundary trade in e-waste.

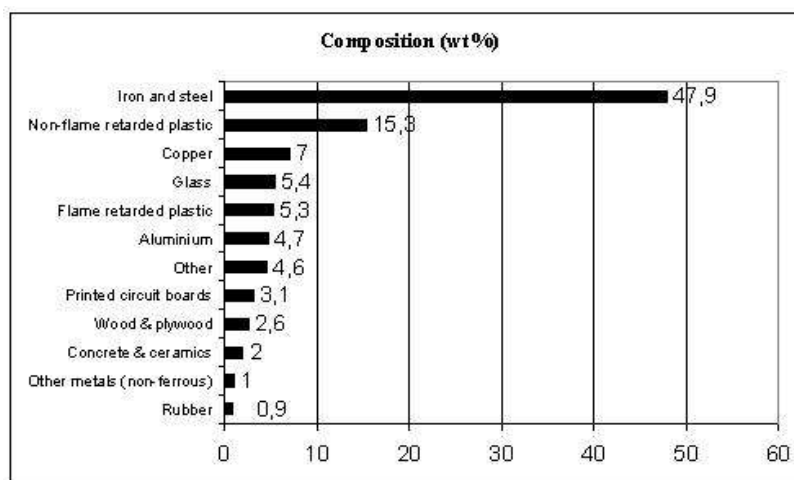


Fig 1. Composition of WFFF in weight %

² European Topic Centre on Resource & Waste Management <http://waste.eionet.europa.eu/waste/6>

1.2 Concerns of e-Waste Management in South-Asia

Uncontrolled movement of e-waste

Strict domestic laws and higher recycling and/or disposal costs has resulted in transportation of the e-waste from the developed nations to the developing countries in Asia and Africa. Till 1992, Africa was the favourite dumping ground for the Western world. However with the enforcement of the Basel Convention³ by all the African countries, South Asia has become the favorite dumping ground, despite all South Asian countries being signatories to the Convention. Investigations by UNEP and Basel Action Network (BAN)⁴ confirm that trade and dumping of e-waste occurs.

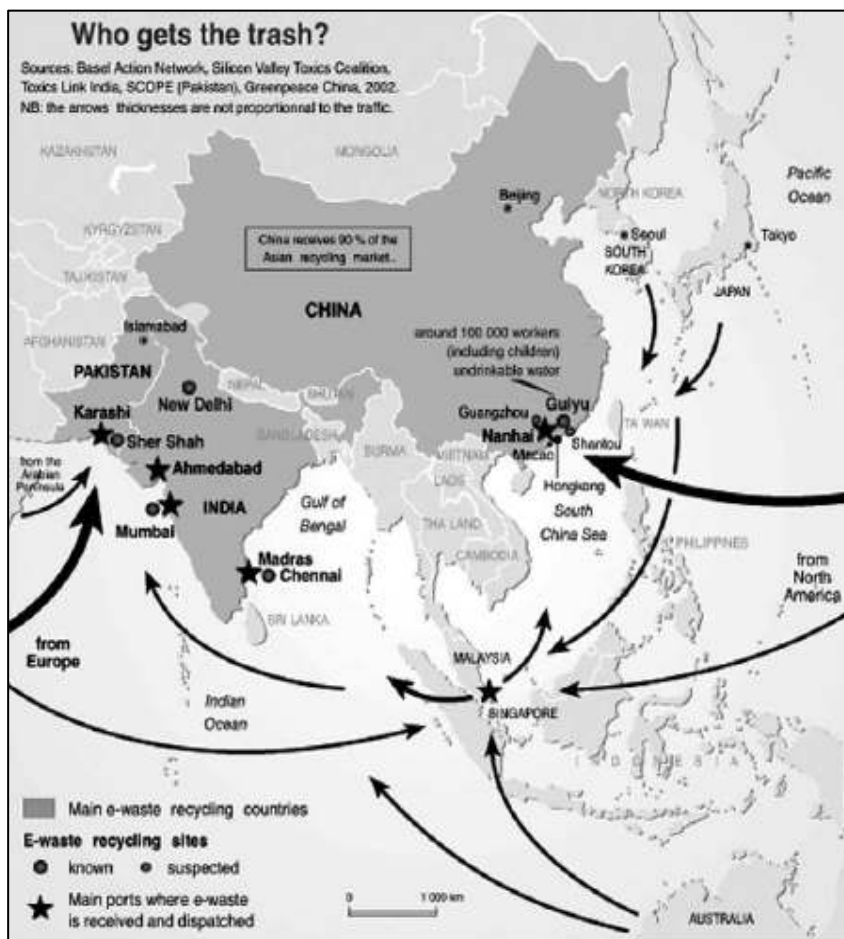


Fig. 2. Asian e-waste traffic (Schwarzer et al., 2005).

Fig 2 depicts the main traffic routes in Asia. Government records suggest that from January to July, 1993 waste dumping increased by 97.3% in India, 125% in Pakistan and 37% in Bangladesh. Today India, Philippines, Hong Kong, Indonesia, Pakistan, Sri Lanka, Bangladesh and Malaysia are among the favourite global destinations of waste products.

In 2002, the Basel Action Network (BAN) along with the SVTC found that 50 to 80 percent of e-waste collected in the western U.S. for recycling is actually exported to countries like China, India, and Pakistan. Transboundary movement still occurs due to economic profits on both sides of developed and developing countries; while the developed countries escape from the strict regulations on the disposal of hazardous waste in domestic area and increase its economic profits, the developing countries create more job opportunities for their working population though it may entail a poor work environment.

³ Refer Section 2.1 for more details

⁴ Schwarzer S, et al. e-waste, The Hidden Side of IT equipment's manufacturing and use. Available on: http://www.grid.unep.ch/product/publication/download/ew_e-waste.pdf

Increased consumption in developing countries

The South Asian countries are also emerging as generators of e-waste in their own right. The growing consumption rates of EEE in the developing countries make it obvious that large quantities of domestically generated e-waste will become part of their waste streams in near future.

Lack of regulatory mechanisms

The lack of national regulation and/or lax enforcement of existing laws are promoting the growth of an informal economy in the developing countries. An entire new economic sector is evolving around trading, repairing and recovering materials from redundant electronic devices. While it is a source of livelihood for the urban and rural poor, it often causes severe risks to humans and the local environment. Most of the participants in this sector are not aware of the risks, do not know of better practices, or have no access to investment capital to finance profitable improvements. As the informal sector plays a major role in recycling activities, there is a definite challenge to evaluate the role of informal recycling and determine modes to collaborate with these activities.

Methods of recycling & recovery

One major problem related to e-waste is that of disposal and recycling. Importing countries try to earn significant income from refurbishing used PCs and disassembling obsolete PCs, monitors, and circuit boards and then recovering the gold, copper and other precious metals.

Parts of EEE such as the CRTs, printer circuit boards, printer wire boards, semiconductors, transistors etc. contain precious materials viz. gold, silver, copper, platinum, lead, cadmium and mercury. Recovery of these valuables from the electronic scrap involves use of acids and other hazardous chemicals often accompanied with methods, without protection to the environment or health.

Though the waste imports offer a business opportunity to retrieve valuable metals and supply cheaper second-hand EEE for the emerging economies in Asia, the negative impacts on the environment and the human health due to disposal or recycling of e-waste without safeguards should be considered.

Huge amounts of wastes, both hazardous and solid, are burned or dumped in the rice fields, irrigation canals and along waterways. The open burning and toxic dumping not only pollute the land, air and water but also exposes men, women and children to poisonous emissions and effluents. The health and economic costs of this trade are neither borne by the developed countries nor by the waste brokers who benefit from the transaction.

2.0 Endeavours to tackle the e-waste Problem

2.1 Global Initiatives

Mandatory measures: International Agreements

The most prominent initiative to tackle the concerns of e-waste management is the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (in force since 1992). Apart from Afghanistan, Haiti, and the United States of America all 164 signatory countries have ratified the Convention.

The most obvious “trade barrier” to the international flow in “goods and materials for recycling” (known as “wastes” in international law) is the Basel Convention. The so-called “trade barriers” found in the Basel Convention and the Basel Ban Amendment were agreed by the international community, despite the strong opposition of the United States and Japan. The barriers were erected intentionally to protect developing countries

from the free market's propensity to exploit weaker economies, desperate laborers, and disproportionately burden the global poor with pollution and poison⁵. The Convention puts an onus on exporting countries to ensure that hazardous wastes are managed in an environmentally sound manner in the country of import (see box 2).

Mandatory measures: Legislative Frameworks

In 2002 the European Union (EU) drafted two Directives *viz.* Waste from Electrical and Electronic Equipment (the WEEE Directive) based on the concept of Extended Producer Responsibility and the Directive on Restriction of the use of certain Hazardous

Box 2. Provisions of e-Waste in Basel Convention

At the international level activities has been initiated under the Basel Convention, which deals with hazardous wastes. Most of the countries in the region have ratified the convention. Some kinds of e-waste or some substances in e-waste are subject to control under the Basel Convention. e-waste related substances covered under the convention include:

- ❖ Annex I: Y45, organohalogen compounds e.g. CFCs.
- ❖ Annex III:
 - A1010: Metal wastes and waste consisting of alloys of specific metals e.g. Cd, Pb, Hg, etc.
 - A1170: Unsorted waste batteries
 - A1180 waste electrical and electronic assemblies or scrap containing components such as accumulators and other batteries included on list A (A1170), mercury switches, glass from CRTs and other activated glass and PCB-capacitors, or contaminated with Annex I constituents(e.g. Cd, Hg, Pb, PCB)
 - A2010: Glass waste from CRTs and other activated glasses.

Substances (RoHS Directive). These are good examples of legal measures at international level.

The WEEE Directive is mainly concerned with the collection and treatment of EEE by introducing the Extended Producer Responsibility (EPR). The principle of EPR consists in attributing the physical or financial responsibility for the environmental impact of a product to its producer. The RoHS Directive aims at reducing the environmental impact of EEE, by forbidding certain quantities of specified hazardous material in certain products. By doing so, the European legislator is applying the precautionary principle. It is important to note, that especially the RoHS Directive has a remarkable impact on European and Non-European industry, since the products, even when produced in a Non-EU country, must be conform to it, thus impeding their access to the European market.

Countries such as California and Switzerland have established good systems for e-waste management. California is implementing a landmark legislation Electronic Waste Recycling Act of 2003, some of the key elements includes:

- ❖ Reduction in hazardous substances used in certain electronic products sold in California
- ❖ Collection of an electronic waste recycling fee at the point of sale of certain products.

⁵ Briefing Paper 9. BAN April 2006. The 3R Initiative: A Mask for Toxic Trade

- ❖ Distribution of recovery and recycling payments to qualified entities covering the cost of electronic waste collection and recycling.
- ❖ Directive to establish environmentally preferred purchasing criteria for state agency purchases of certain electronic equipment.

The Swiss Ordinance on the return, taking back and the disposal of electrical and electronic equipment ORDEE is in force since 1998 which lists the appliances covered, sets the obligation to give back and take back WEEE and requires environmentally sound disposal, including recycling and final disposal. The ORDEE prescribes that the obligation to take back rests with the retailers and traders, independent from the brand and also if no new equipment is bought and the manufacturers and importers with the brand manufactured or imported by them. It also lays down that recycling and final disposal of WEEE must follow state of the art technology. In this system the municipalities are not involved in collection and transportation of WEEE. The collection and recycling of WEEE is financed by a voluntary financing system established by the industry and commerce. The funds are raised through a *Prepaid Recycling Fee* (PRF). At the point of sale the customer is charged a PRF, imposed on new equipment. The PRF is used to finance the collection, transportation and recycling of *end-of-life* equipments including electronics bought before introduction of PRF. Based on this system, WEEE collection in Switzerland during 2004 was reported to be 10.2 kg per inhabitant as compared to the EU-WEEE Directive target of 4 kg per inhabitant for 2006⁶.

The **Home Appliance Recycling Law (HARL)** of Japan distinguishes three phases in the management of WEEE, these being the disposal, the collection and transport and the recycling. Once a product is to be discarded, the end-user has to bring it to either the retailer who has sold the appliance or one who sells the same type of appliances or to a municipal collection site. For the collection, the disposer has to pay a collection and recycling fee. Manufacturers and importers are obliged to take back the appliances which they have produced and ensure their recycling. They ensure this by setting up take-in points, to which the retailers and the municipalities may bring the collected WEEE. For the collection and the recycling, the manufacturers/importers may charge a fee. Should the manufacturer be unknown, the collected WEEE has to be transferred to an officially authorized recycler by the municipality. The **Law for the promotion of Effective Utilization of Resources** is part of a plan of the Japanese government to introduce the plan for establishing a sound material cycle society. This plan includes several acts which shall promote a recycling based society. Law on Eco-friendly Procurement by State Agencies prescribes public entities on the procurement of eco-friendly appliances. Whenever replacing old appliances, any public entity shall choose a product according to a set of environmental criteria, determined by the competent authority.

The Ordinance on the Management of Waste Electric and Electronic Equipments Reclamation and Disposal⁷ of China focuses on the collection and treatment of WEEE. WEEE will be collected by registered/authorized enterprises, be it appliance distributors, after-sales service organizations or reclamation enterprises. It will be treated by accredited treatment facilities. Second hand products must pass a test and may only be sold by registered second hand dealers. The regulation does not contain provisions concerning the financing of the system set up. The National Development and Reform Commission (NDRC) is competent for the organization, coordination and monitoring of WEEE collection and disposal. The Ministry of Science and Technology, the Ministry of Finance, the Ministry of Construction, the Ministry of Information Industry, the Ministry of

⁶ WEEE Disposal System in Switzerland. Presentation by Dr Marco Buletti. Swiss Agency for the environment, Forests and Landscape. Asia-Pacific Regional Workshop on ESM of e-Waste. Tokyo. Nov 2005.

⁷ National Compendium of National WEEE Legislations. United Nations University & UNEP. 2006

Commerce, the Customs General Administration, the State Administration of Taxation, the State Administration for Industry and Commerce, the General Administration of Quality Supervision, Inspection and Quarantine and the State Environmental Protection Administration are responsible for relevant monitoring and management tasks within the scope of their respective offices. The local governments have the obligation to implement the collection and disposal of WEEE in accordance with this ordinance and to qualify and accredit disposal enterprises in their administrative areas.

Policy on Technologies for the Prevention of Pollution Caused by Waste Electrical and Electronic Products of China introduces the principle of Extended Producer Responsibility for this sector. WEEE has to be collected by a system set up by manufacturers/importers. Appliances then have to be tested on whether they are still functional or not. Should this be the case, they shall be reintroduced to the market by an authorized second hand dealer; otherwise, they shall be recycled. The scope of this ordinance covers the whole life-cycle of Waste Electrical & Electronic Products (WEEP), with an emphasis on its recycling. The aim of this ordinance is the establishing of WEEP recovery systems and regional factories engaged in the utilization of WEEP resources and in the treatment and disposal of WEEP.

Other measures: Research, Partnerships & Voluntary Initiatives

In Europe, the main research project addressing e-waste is based at EMPA in Switzerland⁸. The project *Knowledge Partnerships with Developing and Transition Countries in e-waste Recycling*, launched in 2003, involves undertaking case studies in India, China and South Africa to characterize e-waste processing practices and conditions in these areas. The conceptual framework of the project is that enhanced knowledge and management can improve environmental and economic performance simultaneously. Thus major goals are to do to identify best practices and to communicate this knowledge and train practitioners.

Table 2 enumerates the focus of the Swiss e-waste programme in the three countries are: *Technologies and Skills* in India, *Policies and Legislation* in China and *Businesses and Financing* in South Africa.

Table 2. Initiatives of the Swiss e-waste Program⁹

India	The work is concentrated on the 'Cyber City' Bangalore and supports the establishment of a "Clean e-waste Channel", starting with safe and controlled recycling of corporate e-waste. Linked to this initiative, is the forming of an e-Waste Agency and the organization and participation of the informal sector. Important is the diversion of hazardous fractions and processes to the formal industry. The activities are part of an "Indo-German-Swiss WEEE Project".
South Africa	The work will facilitate the development of "Clean e-waste Channels" for Cape Town, and possibly, Durban and Johannesburg, guaranteeing safe and controlled disposal of e-waste. Financial sustainability will be achieved through adequate financing schemes. The work focusses to obtain a maximum value added, to allow for the creation of jobs.
China	The work provides technical assistance and training in the design and implementation of a pilot e-waste Management System in Zhe Jiang Province, which could serve as a model for other provinces in China or elsewhere. This pilot e-waste management system will put into practice the Chinese e-waste legislation, currently under development.

⁸ www.e-waste.ch

⁹ Source: http://e-wasteguide.info/current_status . Last accessed on 20 July 2007.

Responding to the challenges of e-waste management several initiatives took shape across the globe. A few major initiatives tackling WEEE issues from various perspectives are enlisted in Table 3 below.

Launched in 2002, the Mobile Phone Partnership Initiative (MPPI) is currently the Basel Convention's most advanced public-partnership programme. Participants in this Initiative include representatives from mobile phone manufacturers, telecom operators, national governments, the Basel Convention Regional Centres, refurbishing and recycling companies and environmental, industrial and development NGOs. The MPPI aims to make mobile phones more environmentally friendly, influence consumer behaviour and promote the environmentally sound management of used and end-of-life mobile phones. A guidance document has been prepared which is being forwarded to COP8 in November 2006 to be considered for adoption. The guidelines will then be tested through several pilot projects.

The Secretariat of Basel Convention has also commenced development of a partnership in the computing industry under the working title of "e2e: The Global Partnership on Computing and the Environment"¹⁰. The initiative will build upon other initiatives under the Basel Convention such as the High Level Roundtable held during the sixth meeting of the Conference of the Parties on the environmentally sound management of e-waste and work on e-waste undertaken through the Basel Convention Regional Centre in Beijing, China.

The activities of the Secretariat of Basel Convention at the international level are mainly focused on awareness and promotion of response measures. The activities of the Seattle based Basel Action Network (BAN) for example, created huge awareness on the issue of e-waste.

¹⁰ Report on the implementation of the decisions adopted by the Conference of the Parties at its sixth meeting. Basel Convention Partnership Programme. October 2004.

Table 3. Initiatives tackling the WEEE issues from various perspectives¹¹

Initiatives	Description
Basel Convention and Basel Ban	A global agreement regulating movements of hazardous wastes, including WEEE, between countries, in force since 1992. However, an Amendment to the Convention, commonly known as the Basel Ban, which calls for prohibiting the export of hazardous waste from OECD to non-OECD countries, is still to come into force.
StEP initiative (Solving The e-waste Problem)	An UN-led initiative started in 2004 at the “Electronic Goes Green” Conference in Berlin to build an international platform to exchange and develop knowledge on WEEE systems among countries to enhance and coordinate various efforts around the world on the reverse supply chain.
Basel Action Network (BAN), Silicon Valley Toxics Coalition (SVTC) and computer take back campaign	A network of non-governmental organizations (NGOs) in the US working together on WEEE issues, including international advocacy for the Basel Ban, domestic collection and recycling events as well as investigative research to promote national solutions for hazardous waste management.
WEEE Forum Founded in 2002	The WEEE Forum is a group of representatives of voluntary collective WEEE take-back systems in Europe, taking care of individual producers' responsibility in Europe.
National Electronics Product Stewardship Initiative (NEPSI)	A multi-stakeholder dialogue to develop the framework of a national WEEE management system in the USA. The NEPSI dialogue includes representatives from electronics manufacturers, retailers, state and local governments, recyclers, environmental groups, and others.
Electronics Product Stewardship Canada (EPS Canada)	EPS Canada was created to work with both industry and government to develop a flexible, workable Canadian solution. An industry-led organization, the founding members are 16 leading electronics manufacturers.
ERP (European Recycling Platform)	Set up at the end of 2002 by Hewlett Packard, Sony, Braun and Electrolux to enable the producers to comply with the WEEE directive. It aims to evaluate, plan and operate a pan-European platform for recycling and waste management services.
seco/EMPA e-waste programme	A project set up in 2003 by seco (Swiss State Secretariat for Economic Affairs) and implemented by EMPA (Swiss Federal Laboratories for Materials Testing and Research) in cooperation with a number of local partners and authorities, to assess and improve WEEE recycling systems in different parts of the world by analysing the systems and by exchanging knowledge on recycling techniques and frameworks.

Apart from these international initiatives there are also initiatives at the national level by various countries and NGOs highlighting the issues involved and possible solutions.

¹¹ Global Perspectives of e-waste. R. Widmer et al. / Environmental Impact Assessment Review 25 (2005) 436–458

2.2 Efforts by South Asian Countries

South Asian countries viz. India, Pakistan, Bangladesh, Nepal, Bhutan, Sri Lanka and Maldives are all signatories to the Basel Convention prohibiting transboundary movement of hazardous waste. Amongst all India has played a lead role to address the e-waste issue. The waste electrical and electronic assemblies are covered under category B-1110 of Schedule 3 of the Hazardous Waste (Management & Handling) Rules 2003 of India. Several studies by research institutes and NGOs have been done to understand the extent and dynamics of the e-waste problem in India¹². The Indian government has authorized 6 e-waste recycling units viz. 4 located in the state of Tamil Nadu and 2 in Karnataka, operated by private entrepreneurs.

There have been several consultations carried out in South Asia to address the concerns and device response measures for management of e-waste.

The Asia-Pacific Regional Scoping Workshop on the Environmentally Sound Management of Electronic Wastes in November 2002 was the first intergovernmental meeting to be held on the “e-waste” problem in Asia. The workshop was organized by the Basel Convention Regional Centre in Beijing and the Secretariat of Basel Convention, Geneva. The major findings of the workshop were

1. That the scope of and definition of e-waste should include electrical and electronic equipments including PCs and electrical equipment.
2. That it is a problem serious enough that need to be managed, whether in developed or developing countries.
3. That e-wastes contain valuable resources which should be reused and recovered as much as possible.
4. Clear legal definitions and material specifications are required for e-waste. In addition, prior informed consent (PIC) and environmentally sound management (ESM) for export and import of hazardous e-waste are also required.
5. Technical assistance to upgrade capacity of developing countries is urgently needed. The Basel Convention Regional Centres can play an active role in this aspect e.g. increasing awareness and education, technical transfer etc.
6. Manufacturers and consumers must participate in solving this problem such as participating in product stewardship programme and life cycle management.

The workshop also recommended activities to be taken up concurrently to address the issue of e-waste. These are:

- ❖ Legal and regulatory framework
- ❖ Waste management infrastructure
- ❖ Capacity building, training and awareness raising

The other major consultation was a three day SAARC workshop organized by the Ministry of Environment and Forest, Government of Bangladesh with sponsorship from the Ministry of Foreign Affairs and the SAARC Secretariat during 10 – 12 October 2004 in Dhaka. The recommendations of the workshop, based on discussions in each technical sessions as well as group meetings among SAARC delegates and unanimous consensus among the participating countries, are considered as “Dhaka

¹² For details refer section 3.2.2.2.A

Recommendation on Waste Management 2004”. On the issue of waste management the workshop recommended that all SAARC countries should establish a SAARC network on waste management with the objectives of sharing information and technology transfer on municipal solid waste, BMW and hazardous waste management among SAARC countries.

The recently organized 3R workshop in Katmandu, Nepal dealt with the issue of e-waste management and its relevance in South Asia¹³. The workshop with experts from across Asia pointed out the needs for South Asia – technology transfer and adaptation, 3R to be used in e-waste management in applying EMS and ISO 14000 and an environmental fee-based financial model.

The Secretariat of Basel Convention adopted the Work Programme on Partnership for 2005-06 in COP7 which included e-waste as a priority. This 4-Year program will be carried out through concrete and well-targeted national and regional efforts by SBC and other partners (governments, IGOs, UNEP, NGOs and industry) based on needs. The project on Environmentally Sound Management of e-waste for Asia Pacific, launched under this program, is supporting 10 Asian countries viz. Cambodia, China, India, Philippines, Singapore, Sri Lanka, Thailand and Vietnam. The objectives of the Asia-Pacific project includes providing information on-line to countries and other stakeholders; establishment of partnerships between governments, industries, municipalities and NGOs to promote ESM of e-waste; conducting pilot schemes on identification, collection and segregation for reuse, refurbishment, recycling, material recovery and disposal; conducting pilot schemes for recycling PCs and mobile phones.

3.0 Environmentally Sound Management of e-Waste – Relevance in South Asia

3.1 Need and pre-requisites for ESM of e-Waste

The growing concerns of e-waste management are evident in the South Asian countries. With the fastest growing markets of tele-communications and mobile telephony and increasing investments in the IT and IT-enabled sectors on one hand and growth of the informal sector handling e-waste on the other, the South Asian region is poised with increased use of e-appliances and challenges of properly managing the e-waste. This calls for promotion of the *environmentally sound management* principles in managing e-waste.

Under the Basel Convention *environmentally sound management* (ESM) means taking all practicable steps to ensure that hazardous wastes or other wastes are managed in a manner, which will protect human health and the environment against the adverse effects, which may result from such wastes¹⁴.

The environmentally sound management of used or end-of-life equipment needs to be viewed in the context of integrated waste management and life cycle approach to products. It is important to develop policy and economic tools that aim at reducing the amount of hazardous wastes being dumped or finding its way into landfills. Many actions are required in this regard, including establishing collection systems, sorting the waste at source, and promoting good practices in dismantling, recycling, recovery and collection.

¹³ Report of 3R South Asia Expert Workshop, August 2006, Katmandu, Nepal

¹⁴ United Nations Environment Programme 2000. *Report of the Seventeenth Session of the Technical Working Group*. Technical Working Group of the Basel Convention on the Control of Transboundary Movements of Hazardous Waste of Their Disposal. October.
<http://www.basel.int/meetings.TWG/twg17FINAL.html>.

The OECD Council for Environmentally Sound Management of Wastes recommends six core performance elements of ESM¹⁵ applicable to evaluation, dismantling, refurbishment, pre-treatment, treatment and disposal of wastes. The following core performance elements apply to all waste management facilities:

- ❖ The Facility should have an applicable Environmental Management System (EMS) in place
- ❖ The Facility should take sufficient measures to safeguard Occupational and Environmental Health and Safety
- ❖ The Facility should have an adequate Monitoring, Recording and Reporting Programme
- ❖ The Facility should have an appropriate and adequate Training Programme for the personnel
- ❖ The Facility should have an adequate Emergency Plan
- ❖ The Facility should have an adequate Plan for Closure and After-care

The Secretariat of Basel Convention points out the following as pre-requisites¹⁶ for sound management of e-waste:

- ❖ An appropriate legislative framework;
- ❖ Sustainable development policies, including policies on the collection, recycling and recovery of electronic and electrical wastes and ones that address the transboundary movements of such wastes;
- ❖ Economic incentives for environmentally sound practices and technologies;
- ❖ Green design aimed at reducing the use of hazardous materials in electrical and electronic products and enhancing their recyclability;
- ❖ Closing the loop for recyclables;
- ❖ Extending the life of products through reuse, refurbishment or repair;
- ❖ Elimination of hazardous constituents in products;
- ❖ Worldwide environmentally sound management standards or criteria for recycling and final disposal of electronic wastes;
- ❖ Action to prevent illegal traffic;
- ❖ Broad public awareness;
- ❖ Public-private partnerships to engage all stakeholders;
- ❖ Regional level playing field on how to deal with export and import of electronic and electrical wastes;

Efforts to adopt the ESM principles for e-waste management in South Asia have been sporadic or even absent. The following section assesses the current scenario in South Asia and individual countries and identifies the bottlenecks in implementing the ESM principles for e-waste management.

¹⁵ [http://webdomino1.oecd.org/horizontal/oecdacts.nsf/linkto/C\(2004\)100](http://webdomino1.oecd.org/horizontal/oecdacts.nsf/linkto/C(2004)100)

¹⁶ The Secretariat of Basel Convention, Geneva, Switzerland www.basel.int

3.2 Detailed Situation Analysis – the Current Context

3.2.1 Of South Asia

The South Asia sub region includes Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. It occupies 4.8% of the world's total land area. Approximately 1.33 billion people live in South Asia. The South Asian economy has grown at an average of 5.3% during the period 1990–2000 and is projected to grow at a similar rate in 2000–2015¹⁷. IFC observes that in the year 2005, South Asia remained one of the world's fastest growing regions, with particularly strong growth in India¹⁸. Many companies in the region are striving for international competitiveness and pursuing new investment opportunities in South Asia. Since early 1990s, the region has also moved ahead with reforms and integration of its economies with the global economy and also has begun to liberalise intra-regional trade.

Intraregional trade in South Asia is relatively low compared with other regions in Asia. Intraregional trade as a ratio of South Asia's total foreign trade was only 5.3% in 2004, compared with 22.4% for Association of Southeast Asian Nations (ASEAN) member countries. For individual countries, the intraregional trade ratio varies from a low of 3.0% for India and 5.0% for Pakistan to a high of 47.2% for Nepal and 35.3% for Afghanistan.

The South Asian region has witnessed wide-ranging regional economic integration efforts over time. SAARC as an institutional framework was formed with the signing of its Charter by the Heads of Governments/States at Dhaka in December 1985. It was set up with an objective to accelerate the process of economic, social and cultural development, promote and strengthen collective self-reliance through joint action in certain agreed areas of cooperation. The growing popularity of RTAs has ignited South Asian countries to create SAPTA (SAARC Preferential Trade Arrangement) in 1993 as the first step towards higher levels of trade and economic cooperation in the region. SAPTA contains provisions granting "Special and Favourable or Preferential Treatment" to the least developed countries in the SAARC region. These initiatives have led to increased trade and investment in the region¹⁹.

Because regional economic development in South Asia has stimulated production and consumption of electronic and electrical products and home appliances, quantities of e-waste are expected to increase rapidly.

Despite its low telephone penetration, when compared with the rest of the world, South Asia is one of the fastest growing markets. In the year 2001 there were a total of 43.7 million fixed telephone lines (4 per cent of the world) in operation and 8.5 million mobile subscribers (less than 1 per cent of the world) in South Asia. The average fixed-line teledensity was 3.2 and the mobile teledensity was 0.63²⁰. A multi-country survey, conducted by Learning Initiatives on Reforms for Network Economies, Sri Lanka, on the use of telecommunications among low-income groups shows that the poor in South Asia are already accessing telecommunications²¹.

e-Waste generated by discarded computers, mobile phones, batteries, and other electronic goods is a growing concern in South Asia, and no specific laws and

¹⁷ Report of 3R South Asia Expert Workshop, August 2006, Katmandu, Nepal

¹⁸ <http://www.ifc.org/southasia/> Last Accessed on 20 July 2007

¹⁹ Regional Cooperation Strategy Program – South Asia (2006-08). ADB.
<http://www.adb.org/Documents/CSPs/South-Asia/2006/CSP-SA-2006.pdf>

²⁰ Report, International Telecommunication Union, 2002

²¹ The Straits Times, June 2007

guidelines presently deal with these wastes. In the near future, this issue will be aggravated due to continuing economic progress that will bring higher consumption and production of waste, making waste disposal problems steadily worse. The above growth suggests that South Asia would soon face the issue of managing the e-waste generated domestically, apart from imports. Despite being signatories to the Basel Convention, there is no legal framework to deal with the issues of e-waste management in the South Asian countries.

e-Waste contains many toxic chemicals and these harmful substances can be released easily if precautions are not taken to handle them carefully. The principles of Extended Producer Responsibility (EPR), though made mandatory in EU and countries like Japan, China etc., is not applied in South Asian countries, except for a few voluntary initiatives of product take-back by industries. The analysis of e-waste trade value chain in South Asian countries shows that e-waste material flows from the formal sector to the informal sector.

Old or used electronic and electrical goods/wastes from the domestic sector, offices, manufacturers/industrial etc goes in as exchange schemes or discarded to the primary level where the market is the formal sector. The e-waste then goes to the second level where the main stakeholders are dismantlers and scrap dealers. The market between the primary and secondary level is semi-organised i.e. both formal and informal sector. This level stakeholder has lesser financial capacity and is thus involved in segregation of the e-waste into various components like PCB's, plastic, CRT etc. Such segregated waste goes to the third level where in the market is completely informal. These stakeholders buy the items from for extraction of various valuable metals. This material flow intensifies interaction with environment leading to environmental and health impacts.

In the South Asian countries there are no standard practices for collection and recycling of e-waste at present. The e-waste finds its way to the informal sector through scrap dealers who buy the waste through auctions and from waste collectors. Waste is also imported from developed countries. Some of this e-waste is used as secondhand products, while some are dismantled for the recovery of precious/valuable metals. However, the rest of the e-waste, which are not recycled and reused, is thrown in open dumpsite. The e-waste disposal/recycling usually start from the formal dismantlers to the informal recyclers.

The informal e-waste recycling process in the South Asian region is more or less similar. The e-waste is first dismantled, sorted and sold for further processing to recyclers or exported. No occupational safety measures are followed in the informal sector and very often children are involved in the process of dismantling and sorting. Recovery of precious metal is another important activity in e-waste management. Here too the waste is segregated with emphasis on retrieval of components, which have precious metals like gold, silver, palladium and platinum embedded in its components. Hazardous chemicals like nitric acid, mercury etc. are used for leaching the precious metals.

No study has been conducted in the South Asia region to establish the extent of impact of e-waste on human and the environmental quality.

Donating second-hand equipment or selling it at low cost, in addition to donating new equipment, can be considered as a transboundary reuse activity. In this case, one should ensure that used equipment is sufficiently durable. Also, cooperation to exchange know-how on providing collection and maintenance systems is desirable.

3.2.2 Of Each Country

3.2.2.1 GROWTH OF THE COMPUTER AND MOBILE PHONE INDUSTRY

A. Information Technology

The Information Technology industry in all South Asian countries has witnessed rapid growth over the last few years not only because of the increasing demand but also conducive government policies. Moreover with major European and US-based organizations outsourcing software development in the developing countries, including South Asia, software exports and associated use of hardware is definitely expected to rise.

In recent years the electronic industry in **India** is growing at a fast pace. It is currently worth \$10 Billion but according to estimates, has the potential to reach \$ 40 billion by 2010²². The electronic industry in India constitutes just 0.7 % of the global electronic industry. Hence it is miniscule by international comparison. However the demand in the Indian market is growing rapidly and investments are flowing in to augment manufacturing capacity.

The Indian software industry has grown from a mere US \$ 150 million in 1991-92 to a staggering US \$ 5.7 billion (including over \$4 billion worth of software exports) in 1999-2000. No other Indian industry has performed so well against the global competition.

The annual growth rate of India's software exports has been consistently over 50 percent since 1991. Today, India exports software and services to nearly 95 countries around the world. India is also an exporter of a vast range of electronic components and products for various segments including display technologies, entertainment electronics, optical storage devices, passive components, electromechanical components, telecom equipment, transmission & signaling equipment, semiconductor designing and electronic manufacturing services²³. India however remains a major importer of electronic materials, components and finished equipment.

According to a NASSCOM-McKinsey report 2005, annual revenue projections for India's IT industry in 2008 are US \$ 87 billion and market openings are emerging across four broad sectors, IT services, software products, IT enabled services, and e-businesses thus creating a number of opportunities for Indian companies. In addition to the export market, all of these segments have a domestic market component as well.

Electronics is one of a cluster of high-priority industries identified by **Sri Lanka's** Board of Investment (BOI) that could help the government achieve its ambitious aim to make Sri Lanka a Newly Industrialized Country (NIC) by the next century. There are over 160 electronics, computers and communications vendors in the country. Seven of Sri Lanka's 30 software companies are exporters. Export Development Board officials report that Sri Lanka now earns about Rs.100 million (\$2 million)

²² Electronic Industries Association of India formerly Electronic Component Industries Association
www.elcina.com

²³ Electronic Industries Association of India, formerly Electronic Component Industries Association
www.elcina.com

annually from computer software exports. Government incentives for investors setting up electronics export industries include up to 10 year's tax holiday, duty free imports and venture capital financing.

The size/turnover of the software segment of the industry in **Pakistan** is about US\$ 25 million in the domestic segment and US\$ 15 million worth of export²⁴. The software segment of the IT industry has about 500 players/companies.

Bangladesh is one of the poorest, most densely populated, and least developed countries in the world. The size of the information technology industry in Bangladesh is \$170 million. Local software companies cater to the customized software development and maintenance segment of the market. Though software exports have grown rapidly in Bangladesh, contribution to overall exports remains insignificant.

The ICT industry of **Nepal** is still at a nascent stage, though it faces a bright future. The structure of the ICT industry in Nepal includes a mix of hardware, software, training and telecom firms. The industry largely comprises small and medium companies that are developing software, trading ICT solutions or focusing on systems integration. IT-Enabled Services is an emerging industry in Nepal and 29 firms are active in this domain.

The ICT sector itself is poised for a major jump. The ICT industry of Nepal recorded revenues of US\$35 million in 2002, up from US\$ 18 million in 2000. While ICT hardware was the largest seller, accounting 7% for 70 percent of the industry revenues in 2002, education and training accounted for 17 percent of sales during that period²⁵.

In **Maldives** the use of Information Technology is mainly within the Government offices, which have basic computer facilities. Some organizations are fully modern in their office automation others remain mainly manual²⁶.

B. Telecommunications

Like elsewhere in the world, South Asia is experiencing an enormous expansion of the telecom sector, particularly with the liberalization of the telecommunications sector and participation of the private operators. Added to this has been the growing demand for mobile telephony.

The number of mobile subscribers in **India** have increased more than 179 times from 1997 (678460) to June 2007 (121431166)²⁷. India has become the second largest mobile handset market in the world and the Indian market could soon become a global hub for mobile handset manufacturers. According to a study by Research and Markets, Ireland the Indian mobile handset market is worth about US\$ 2 billion. Major handset manufacturers like Nokia, Samsung, Motorola, Sony Ericsson, LG etc. are currently operating in Indian market for cellular handsets. However, their business mainly comprise of imports of readymade handsets or importing the components and resembling and selling the same in India. Initiatives to start manufacturing in the country are coming up. Nokia has already established a manufacturing plant of

²⁴ ASTINFO 2001 (Website of Science and Technology Information Institute- www.stii.dost.gov.ph)
www.stii.dost.gov.ph/astinfo/frame/jan_to_mar_

²⁵ Asian –Oceanian Computing Industry Organization, 2005 www.asocio.org/member/CAN/nepal-industry.pdf

²⁶ Ministry of Communications, Science and Technology, Maldives, 2005 www.mcst.gov.mv

²⁷ Quarterly Statistics of Subscribers, Cellular Operators Association of India www.coai.com

cellular handsets at Chennai, while rest of the companies like Motorola, Samsung, Sony Ericsson and LG will soon start making mobile handsets in India. It is expected that domestic manufacturing will ultimately replace imports and cellular handset industry will turn in to an export oriented industry²⁸.

According to a recent report in 2006 cellular services in **Sri Lanka** has grown by 61%. The number of cellular phone users grew to 5.4 million in 2006 from 3.4 million a year earlier. Teledensity touched 36.7, while mobile density was 27.1.

According to the Pakistan Telecommunication Authority total teledensity of **Pakistan** reached 11.9% in June 2005 while the total number of mobile subscribers reached 12.5 million and the total fixed line working connections reached 5.2 million during the same time. This year the annual growth rate of mobile telephony segment was astounding 278%, taking the total number of subscribers to 48,289,100. With the entry of two new telecom players in 2004, mobile telephony is seeing intense competition and as a result prices have fallen substantially. Cellular penetration in the country grew from mere 14% in December 2005 to 31.07% in December 2006.

The overall situation in **Bangladesh's** telecom sector has been improved to some extent in recent times by a rapidly expanding mobile market. After a number of years of strong growth, mobile penetration was a little over 14% at end of the year 2006. Telecom services used to be provided exclusively by Bangladesh Telephone and Telegraph Board (BTTB) - a government functionary. The recent revolution in information technology has opened up a new area for private investment in the telecom sector.

The telecom sector in **Nepal** has seen a good growth rate. The fixed line penetration is still low at 2.46%. The gap between fixed line penetration and mobile penetration is still getting wider with mobile penetration jumping to 4.03%. Mobile services saw a whopping growth of 167% in last nine months in terms of net subscriber addition.

Telecom density in **Maldives** is highest in South Asia at 98.76%, while the fixed line penetration is low at 10.88%.

The telecom sector in **Bhutan** has come a long way. Fixed-line teledensity has increased from 2.8% in 2002 to 5.3% in 2006 and mobile teledensity, as of December 2006, has reached 12.3%.

3.2.2.2 INITIATIVES & CURRENT PRACTICES FOR e-WASTE MANAGEMENT

Given the growth in both the sectors of ICT and mobile telephony and the rapid obsolescence of the products, the South Asian countries are confronted with the challenge of managing the generated e-waste. The major sources of e-waste can be divided into:

- a. Domestic (within the country): end-of-life products, post-usage, manufacturing etc.
- b. Imported (from other countries): donation, scrap for dismantling, second-hand equipments

Though there are no confirmed figures available on how the transboundary movements of these wastes occur, the fact that such movements take place is evident in several reports.

²⁸ India Brand Equity Foundation, 2006 www.ibef.org

As mentioned in the earlier section, management of the e-waste is still in the preliminary stages in South Asia. Majority of the activities are carried out by the informal sectors. Based on the findings of previously conducted studies the current scenario of e-waste management and initiatives in individual South Asian countries are enumerated below:

A. India

Published reports in 2003–2004 indicated that e-waste is becoming an important issue in India. A pilot assessment on the existence of e-waste and its recycling for the region of greater Delhi was carried out under the guidance of the Central Pollution Control Board/Ministry of Environment and Forests. This study focused on e-waste generation from personal computers, the economics of its recycling and environmental, health, and social issues associated with its rapid growth in Delhi region. The study indicated that the estimated e-waste in Delhi alone from personal computers during 2003–2004 was 6,803t, with 7 years obsolescence rate. The pilot assessment also reported that personal computers dismantled in the national capital region might reach 700,000 to 800,000 per annum by 2010.

As a follow-up to the pilot study, a national-level desk study was carried out in 2004–2005 under the guidance of CPCB/ASEM program of GTZ, to assess the quantum of e-waste being generated at the national level and to identify states and cities requiring rapid assessment²⁹. The report indicates that computers, TVs (brown goods), refrigerators, and washing machines (white goods) will drive the future growth of the electronics hardware industry in India. The data captured through Market Supply Method show that the estimated market size of personal computers (15,464,637), colored and black and white TVs (11,750,000), refrigerators (4,800,000), and washing machines (1,700,000). The growth rate of computers has been estimated to be 25%, while it varies from 15–20% annually for all other items. The obsolescence rate of computers has been established at 7 years for TVs, washing machines, and refrigerators, 15 years. The e-waste inventory based on this obsolescence rate and installed base in India for 2004–2005 has been estimated to be 14,618,000t. This is expected to exceed 16,000,000 tons by 2012.

Ten states generate 70% of the total e-waste in India. Maharashtra ranks first, followed by Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh, and Punjab. Among the top 10 cities generating e-waste, Mumbai ranks first, followed by Delhi, Bangalore, Chennai, Kolkata, Ahmedabad, Hyderabad, Pune, Surat, and Nagpur³⁰.

Box 3. Recycling by the Formal sector in India

There are a total of six Formal recyclers in India – 2 in Karnataka and 4 in Tamil Nadu:

- ❖ Ash Recyclers, Thimmaiah Road, Bangalore.
- ❖ e-Parisara Private Limited, Dobaspet Industrial Area, Bangalore.
- ❖ M/s. TES-AMM recyclers (India) Pvt Ltd – Tondiarpet village, Fort-Tondiyarpet taluk, Chennai.
- ❖ M/s. Trishiraya Recycling India Private Ltd – MEPZ-SEZ, Kancheepuram district
- ❖ M/s. AER Worldwide (India) Pvt Ltd - Thiruvellur district
- ❖ M/s. INAA Enterprises – SIDCO Industrial Area, Kancheepuram district

²⁹ Country Level WEEE Study, IRGSSA, CPCB/ASEM, 2004–2005

³⁰ Summary Report of 3R South Asia Expert Workshop –chapter 2.5 Perspective of Electronic Waste Management in South Asia: Current Status, Issues and Application of 3Rs
<http://enviroscope.iges.or.jp/modules/envirolib/upload/750/attach/content.pdf>

Recently some private entrepreneurs have been authorized by Gol to set up e-waste recycling units (see Box 3) in India. However, the bulk e-waste recycling facility in India exists in the informal sector, which operates without occupational and environmental safety measures.

The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Disposal was signed by India on 15th March 1990 ratified and acceded to in 1992. A ratification of this Convention obliges India to address the problem of transboundary movement and disposal of dangerous hazardous wastes through international cooperation. As per the Basel Convention, India cannot export hazardous wastes listed in Annex VIII of the Convention from countries that have ratified the Ban Agreement. However, the Convention agreement does not restrict the import of such wastes from countries that have not ratified the Basel Convention. It is through the orders of the Honourable Supreme Court that the import of such wastes is now banned in the country.³¹

In India however, electrical and electronic assemblies are covered under category B-1110 of Schedule 3 of the Hazardous Waste Management and Handling Rules, 2003. Import of these wastes in India for recycling or final disposal is not permitted. The MoEF/CPCB established a national-level task force to steer the e-waste initiatives in the country. e-Waste manuals describing approach and methodology for inventorization of e-waste and its updating have been prepared. CPCB is preparing guidelines for environmentally sound management of e-waste in India. This includes development of guidelines for dismantling and recycling.

Under the Foreign Trade (Development and Regulation) Act of 1992, the Central Government has provided for donations of computers and peripherals from zones, which have been set up primarily for EOUs (Export Oriented Units), EPZ (Exports Processing Zones), STP (Software Technology Parks) and EHTP (Electronics Hardware Technology Parks), at a zero custom duty.

There is a provision for two years of import and use, to recognized non-commercial educational institutions, registered charitable hospitals, public libraries, public-funded research and development establishments, organizations of the Government of India, or Government of State or Union Territory. Import of old PCs requires a special license from the concerned authority, under an “actual user condition.” The receivers of old PCs are not to act as de-canalising channels and traders.

There is no EXIM code for trade in second-hand computers for donation purposes or for resale. They have the same EXIM code as new computers under chapter 84 of the Indian Customs Tariff Act 1975. The exporters sometimes club old and junk computers along with new ones. The flexibility in the interpretation of rules makes a distinction between capital goods and non-capital goods. Capital goods are under the free list and have various tax benefits.

The e-waste management initiatives taken in India include:

- ❖ UNEP, in partnership with the Maharashtra Pollution Control Board (MPCB), conducted a rapid assessment of the e-waste that is generated in the Mumbai-Pune region in 2006.
- ❖ National WEEE Legislation Workshops were held in New Delhi in September 2005 and in Bangalore in May 2006, by the Ministry of Environment & Forests, India to a formulate national WEEE legislation

³¹ 3R Gap Analysis – India. 3R Knowledge Hub – ADB.

- ❖ The Indo-German-Swiss Initiative for e-waste management has an overall vision to reduce environmental degradation and to extend income generation opportunities through improved e-waste management (installation of suitable collection, recycling and disposal systems, substitution or minimization of toxic substances in production and product design, development and enforcement of adequate policies and regulatory systems) while strengthening links between partners globally to exchange best practices, policies and technologies.
 - The project's purpose is to provide improved technologies and skills for e-waste recycling systems in India and improve working and living environment of urban dwellers working in the (informal) e-waste recycling sector through identifying and presenting sustainable alternatives to “backyard” e-waste recycling.
 - Rapid assessments were carried out in Delhi and Bangalore to understand the quantities being generated, and identification of the e-waste recycling areas have been carried out along with a National level desk study to assess e-waste quantities.
 - An e- Waste Guide has been developed under the aegis of the partnership. The online guide was designed to serve as a current and definitive information resource on the issues, problems and opportunities created by e-waste, focusing on the present scenario in India.
 - An e-Waste Agency (EWA) was formed to bring together industry, government and NGO to work on a sustainable e-waste management strategy for Bangalore.
- ❖ A National WEEE Task Force was formed in July 2004, headed by Chairman CPCB and consists of officials/ representatives of MoEF, CPCB, Ministry of IT, regulatory agencies (representatives of SPCBs), NGOs, Industry Associations/Industry, experts in the field and producers both formal & informal. The mandate of national task force is to identify, plan and implement all issues related to e-waste in India. The National WEEE Task force focuses on five thrust areas - Policy & Legislation, Baseline Study (database and developing a National Register / Clearing House), Restructuring Recycling, EPR and Awareness Building.
- ❖ Toxics Link, UNEP and MPCB jointly conducted over a four-month period an awareness campaign in schools & colleges in Mumbai. The campaign aimed to create awareness on the hazards of e-waste, the importance of safe and environmentally friendly management. It highlighted the critical role of different stakeholders, especially household consumers as well as stimulates greater efforts of the government in environmentally friendly e-waste management.
- ❖ Several manufacturers such as Wipro, Acer, HCL, WeP Peripherals etc have initiated take back options and awareness programmes on e-waste.

B. Sri Lanka

The country report for Sri Lanka, prepared by the Basel Convention Regional Centre, China³² states that e-waste dismantling and reselling is a widespread business in Colombo. In Sri Lanka, no e-waste dismantling facility exists in the formal sector. e-Waste joins the existing general metal and plastic scrap stream, which is further, dismantled and sent to domestic dismantlers and finally exported. According to the

³² 3R Gap Analysis – Bangladesh. 3R Knowledge Hub – ADB

spokesperson for the scrap export association, their industry gives an income of about 1.5 billion Sri Lankan rupees (SLRs) per annum.

Some well-known markets are mainly Pettah, Panchikawatta, Wallewaththa, and Armer Street in Colombo. Further, there are vendors who collect discarded e-equipment from domestic users in repair shops and sell these to dismantlers and resellers. Dealers also import used computers and sell them to several resellers scattered all over the island.

In Sri Lanka, e-waste generation has been reported from domestic sources and imports. The country has prepared a preliminary inventory to highlight the extent of problem. An activity plan has been prepared for tackling e-waste issues in the country.

The salient features of this plan are:

- a. Formation of task force at ministry for planning and implementation of e-waste action plan.
- b. Control import of selected e-items such as computers and mobile phones, which have been used for three years to reduce potential waste generation.
- c. Develop e-waste policy for providing framework for its management
- d. Introduce EPR for selected items
- e. Establish efficient collection system for electronic waste
- f. Streamlining e-waste recycling infrastructure by bringing them in formal sector and building their capacity.
- g. Formulation and institutionalizing e-waste tracking mechanism in order to update the inventory

C. Pakistan

e-Waste generation has been reported from domestic sources as well as imports in Pakistan. As per the Basel Action Network (BAN) report, preliminary investigations in Pakistan reveal that it is receiving and processing western-originated e-waste. Preliminary estimates show that the penetration rate of personal computers in Pakistan is less than 10 per thousand people (World Bank 2002). However, no inventory of e-waste has been prepared or reported so far. The major e-waste market has been reported to be Sher Shah in Karachi, where electronic, electrical, spare parts and computers from countries including Australia, Japan, England, the United States, Kuwait, Saudi Arabia, Singapore, and the United Arab Emirates is routed via the sea route for subsequent recycling and disposal³³. Only 2% out of the total e-waste available in open markets is re-used with slight repair, while the rest is used for extraction of metals and plastics. Products extracted from the computers include copper, gold, platinum, plastics, lead, and glass. No special equipment or protective clothing of any kind is used during dismantling. The methods by which precious metals are extracted from the e-waste are very harmful to the workforce due to the fumes emitted during their burning and melting. There is no proper regulatory authority to oversee or control neither the pollution nor the occupational exposures to the toxins in the waste³⁴.

³³ Basel Action Network, Silicon Valley Toxics Coalition, SCOPE, Greenpeace China and Toxics Link India, 2002

³⁴ Asia Pacific Network Information Centre www.apnic.net

D. Bangladesh

Like other developing Asian countries, Bangladesh also imports tons of e-waste every year. The recent ban on importing e-waste to China has diverted much of it to Bangladesh and other neighboring countries due to cheap labor and recycling businesses. This e-waste recycling or computer recycling has been a lucrative, with much money to be made. It involves employing people to strip down the computers and extract parts that can be used again in machines to be sold on the high street. The rest is then burned or dumped, both of which are potentially highly hazardous to the environment. The process of extraction uses all kinds of chemicals, like acids - which then get dumped into the soil and go into the groundwater. Currently there is not much data available on e-waste management in Bangladesh but it does not reflect the absence of any backyard smelting of circuit boards and manual dismantling of computer parts³⁵. The analysis also identifies that material recovery, sorting and pulverization of e-waste is dealt with the informal sector and the execution is weak.

E. Bhutan

According to the National Environment Commission of the Government of Bhutan the growing population and developmental activities are increasing the pressure on Bhutan's clean and intact environment. The Sub-regional Environmental Policy Dialogue (SEPD) meeting for South-Pacific region in Thimphu, 2005 highlights that disposal of unwanted electronic products, or e-waste, is becoming a problem in this region. The Deputy Minister of Environment of Bhutan had pointed out that e-waste could become an unmanageable problem in the future, though it is not of much consequence at the moment.

The country has to be prepared to deal with this before it becomes an issue. This is especially important considering that Bhutan has always prided itself for its pristine environment. The country's environment will continue to be a selling point when it markets itself as a special tourist destination.

A consultant will need to be recruited to undertake an in-depth study and recommend a viable strategy and programme of action for the Bhutanese context. Given the importance, the government has reflected e-waste impact study as one priority program in the 10th FYP (2008-2013), under the Ministry of Information & Communications (MoIC). The Ministry being the overall coordinating body for ICT development and taking into account the associated impacts of e-waste, a strategy to "develop a national e-waste management system for sustainable environment" has been incorporated under Bhutan ICT Policy & Strategy Update 1 (BIPS-1).

F. Nepal & Maldives

No documented reports were available on e-waste management in Nepal and Maldives.

3.3 Bottlenecks in adopting ESM of e-Waste in South Asia

From the situation analysis it is evident that practices employed for managing e-waste in South Asia do not harmonize to the principles of ESM. Only India and Sri Lanka have done some preliminary inventory of e-waste. Moreover, except for India e-waste is not

³⁵ 3R Gap Analysis – Bangladesh. 3R Knowledge Hub – ADB.

covered in the regulatory/legal framework of South Asian countries³⁶. Numerous obstacles have been identified by the South Asian countries in regard to their ability to manage e-waste in an environmentally sound manner³⁷. These include:

- ❖ **Lack of easily accessible information** on flows, quantities, available technology and legislative/trade requirements of countries importing new products that will require increasingly strict standards for minimization, re-use, recycling and recovery.
- ❖ **Lack of trained personnel** both in the public and private sectors leading to weak or insufficient enforcement and unsound management of e-waste. Overall there is a lack of awareness and technical capacity for environmentally sound management of e-waste.
- ❖ **Lack of legislation including** lack of clarity regarding export/import rules for e-wastes and of regional level-playing field.
- ❖ **Inadequate infrastructure** for collection, recycling and recovery and lack of sound handling and processing during sorting, repair, and refurbishment, recycling for material recovery operations to prevent risks to workers, general public and the environment.
- ❖ **Lack of awareness** in all sectors of society on the potential harmful effects of substances in these equipment and unsound management of e-wastes leading to unsustainable patterns of consumption and production. There is also a lack of economic alternatives to activities carried out by the informal sector and small repair shops.

4.0 Proposed strategies and way forward

4.1 Emerging Priority Areas for e-waste Management in South Asia

The management of e-waste in South Asia should not be isolated but the relationship with trade, regional cooperation and economic integration should be distinctly revealed. The options for e-waste management unfolds two contradictory observations i.e. international trade of e-waste with improper recycling and state-of-the-art recycling with transboundary movement.

Moreover, the issues of policy harmonization, sharing of experiences, training and technology transfer need to be addressed to facilitate international collaboration to manage the transboundary movement of e-waste.

The 3R South Asia Expert Workshop³⁸ observed that the rapid economic growth in South Asia and the increasing trans-boundary movement of secondary resources will increasingly require both 3R endeavors (reduce, reuse, recycle) in each country and appropriate control of international material cycles. The UNEP Regional Strategy for Asia and the Pacific³⁹ has identified e-waste as an emerging environmental issue for the region. The Indo-German-Swiss joint research and action program⁴⁰ on e-waste in India confirms the burning issue of e-waste.

³⁶ Report of 3R South Asia Expert Workshop, August 2006, Katmandu, Nepal

³⁷ The Secretariat of Basel Convention, Geneva, Switzerland www.basel.int

³⁸ Report of 3R South Asia Expert Workshop, August 2006, Katmandu, Nepal

³⁹ Expert group meeting on 'e-waste management in Asia and the Pacific' June 2004, Bangkok, Thailand

⁴⁰ http://e-wasteguide.info/current_status . Last accessed on 20 July 2007.

Despite the initiatives by some of the countries, agencies with the mandate of waste management in the region lack specific knowledge of composition of e-wastes and their management. These countries have emphasized the need to obtain the latest and relevant information on environmentally sound management of e-waste, including cleaner technologies or processes used in the repair, refurbishment, recycling or recovery of used or end-of-life electrical and electronic equipment. Private enterprises have started to establish international networks of remanufacturing for their used, exported products collected from various countries through their international supply chains. Also, in Asia some recycling businesses have state-of-the-art advanced technologies for the recovery and remediation of hard-to-manage materials. Therefore, one of the major issues for the international promotion of the 3Rs must be how to extend the potential contribution of private enterprises.

BAN⁴¹ recommends that in waste management programs based on the 3R Principles adequate emphasis should be laid on the “reduce” and “reuse” components, rather than focusing only on the “recycle” component. For post-consumer wastes reduction and re-use work directly against the economic bottom-line, as profits are maximized through rapid obsolescence and new sales. It has become clear that the 3Rs are not adequate as a basis for a government or corporate policy. They are strictly technological notions devoid of meaning without the essential 4th R – Responsibility.⁴²

This calls for sub-regional cooperation amongst South Asian countries and constructive multistakeholder dialogues.

4.2 The Scoping Initiative

Development Alternatives (DA) has initiated a project ***Facilitating Partnerships for Environmentally Sound Management of e-waste in India*** with support from the Secretariat of Basel Convention. The efforts have led to a partnership of DA with **South Asia Co-operative Environment Programme (SACEP)** the intergovernmental environmental organization for the South Asian region.

DA and SACEP is jointly organizing a scoping exercise to facilitate the development of need-based responses in South Asia. DA and SACEP are working together to reduce environmental and health impacts through scientific e-waste management while demonstrating benefits and ensuring multistakeholder participation in the South Asia region. The focus is on the two fast growing industry sectors of computer and mobile phones.

SACEP focuses to achieve a regional strategy to assist, enable and facilitate the South Asian countries to address the waste related issues. SACEP seeks to work in areas where regional cooperation and collective action can add value to member countries and produce better outcomes. SACEP has an objective to establish a network of institutes, stakeholders and identify centers of excellence in the region for waste management.

For over twenty years, DA has focused on its principal objective of empowerment - challenging poverty and environmental degradation with solutions for the poor to live with dignity – making a difference by generating sustainable livelihoods while driving innovation and forging partnerships. DA has been playing a key role in South Asia through its Centre for Sustainability Management in Businesses (CSMB). The Centre facilitates internalisation of sustainability management by corporations and SMEs

⁴¹ Briefing Paper 9. BAN April 2006. The 3R Initiative: A Mask for Toxic Trade

⁴² Briefing Paper 9. BAN April 2006. The 3R Initiative: A Mask for Toxic Trade

through Participatory Planning and Management, Capacity Building, Research and Outreach.

This scoping exercise is intended to help understand issues, articulate concerns and develop action plans for promoting ESM of e-waste in South Asia, involving both the government and private sector. The initiative will integrate on-going efforts and instigate a process for information sharing amongst the South Asian countries to enable dissemination of good practices and strengthen regional policies and capacities.

A brief outline of the issues for further discussions is enumerated below:

A. Promotion of collaborative actions at the sub-regional level

Establishing a Task Force for South Asia which would report and analyze on the status of existing approaches and particular policies for electronic products and based on this explore recommendations for future developments to solve the e-waste problem.

B. Improvement of management systems at the country level

- Development of guidelines for inventorisation of e-waste
- Models for stakeholder engagement
- Awareness for all stakeholders
- Technology for recycling
- Controlled movement of used electronic goods
- Policy and regulation
- Integration of 5Rs into e-waste management system