Manual 3: WEEE / E-waste "Take Back System"

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Acronyms

ADB	Asian Development Bank
AEHA	Association for Electrical Home Appliances
APME	Association of Plastic Manufacturers in Europe
ARF	Advance Recycling Fee
ASEM	Advisory Services in Environmental Management
B2B	Business to Business
B2C	Business to Consumer
B&W	Black and White
BATRRT	Best Available Treatment, Recovery and Recycling Techniques
BPO	Business Process Organization
BCRC	Basel Convention Regional
Centre CPU	Central Processing Unit
CRT	Cathode Ray Tube
CFC / HCFC /	Chlorofluorocarbon / Hydrochlorofluorocarbons
HFC / HC	Hydrofluorocarbons / Hydrocarbons
CTV	Color Television
DCF	Designated Collection Facility
DEFRA	Department of Environment, Food and Rural Affairs
DfR	Design for Recycling
DTIE	Division of Technology, Industry, and Economics
EEA	European Environment Agency
EEE	Electrical and Electrical
Equipment EH&S	Environmental Health and Safety
EIC	Environmental Information Centre
EMPA	Swiss Federal Laboratories for Material Testing and Research
EPR	Extended Producer Responsibility
ESM	Environmentally Sound
Management EST	Environmentally Sound
Technologies EU	European Union
FR	Flame Retardant
GDP	Gross Domestic Product
IC	Integrated Circuit
ICT	Information and Communication Technology
IETC	International Environmental Technology
Centre IRGSSA	IRG Systems South Asia Pvt. Ltd.
ISWM	Integrated Solid Waste Management
IT	Information Technology
Kg	Kilogram
LCD	Liquid Crystal Display
L/D	Length/ Diameter
MCIT	Ministry of Communication and Information Technology, India
MFA	Material Flow Analysis
MIT	Massachusetts Institute of Technology
MNC	Multi National Companies
MOU	Memorandum of Understanding
MoEF	Ministry of Environment and Forest, Government of India
MPPI	Mobile Phone Partnership Initiative
MSWI	Municipal Solid Waste Incineration
MT	Metric Tonnes

NCR	National Capital Region
NGO	Non Governmental Organization
ODS	Ozone Depleting Substance
PC	Personal Computer
PCB	Printed Circuit Board
PCB-capacitors	Poly chlorinated biphenyl - capacitor
PRO	Producer Responsibility
Organizations PVC	Poly Vinyl Chloride
PWB	Printed Wire Boards
ROHS	Restriction on Hazardous Substance
RPM	Revolutions per Minute
SAEFL	Swiss Federal Agency for Environmental, Forests and Landscapes
SBC	Secretariat for Basel Convention
StEP	Solving the E-waste Problem
TV	Television
UNCTAD	UN Conference on Trade and Development
UNEP	United Nations Environment Program
USA	United States of America
Vs	Versus
WEEE	Waste Electrical and Electronic Equipment

Chapter 1: Introduction

1.0 Introduction

The United Nations Environmental Programme (UNEP) through International Environmental Technology Centre (IETC), Division of Technology, Industry, and Economics (DTIE) is implementing Integrated Solid Waste Management (ISWM) based on 3R (reduce, reuse and recycle) in urban areas of Asia –Pacific, Africa and Latin America. This project aims to promote identification and implementation of environmentally sound technologies (ESTs) for the elements of ISWM including collection, segregation, transportation, treatment, disposal, and recovery and recycle. ISWM covers all types of wastes in an integrative manner from all the waste sources including WEEE/E-waste from domestic/municipal and industrial sources. As a part of Integrated Solid Waste Management Project, UNEP DTIE - IETC is also focusing on electronic waste (WEEE/ E-waste) management. This work will compliment the work being done, globally and regionally, on WEEE/E-waste by UNEP and secretariats of multilateral environmental agreements, in particular the Secretariat of the Basel Convention (SBC). In this context, two manuals, (1) WEEE/ E-waste Assessment Manual and (2) WEEE/ E-waste Management Manual, have been prepared and pilot tested in Asia. In order to support development of policy framework and capacity building on E-waste at national & regional level, a regional workshop on E-waste Management for countries in Asia was organized by UNEP/ DTIE/IETC in Osaka, Japan on 6-9 July 2010. This workshop was attended by national governments, international organizations, private sector and civil society. The outcome of the workshop identified a need to develop WEEE/E-waste 'take back" system and financial mechanism to sustain this system. It was highlighted in the workshop that majority of the countries, which have already WEEE/E-waste regulations in place are struggling to design an optimum WEEE/E-waste take back system. In this context, a third manual on WEEE/E-waste "take back" system has been developed in continuation to the series of manual 1 and 2. The focus of the third manual is on the WEEE/E-waste collection, transportation and financial mechanism to sustain it. The various component of this manual are given below.

1.1 Objectives

This manual is intended to build the capacity of practitioners and decision makers to guide and handhold them to understand, plan, design and implement WEEE/ E-waste "take back" scheme which may be applicable in a city/ geographical area and country.

1.2 Scope

The scope of this manual includes description of various components including regulatory system, collection and transportation system, its financing and live case studies. Each component will be in the form of chapter with guidance notes and examples described at the end. The preparation of this manual has involved collection of data from secondary sources including publications from scientific journals, reports and web sites. A case study based approach has been adopted to provide the practitioner examples of live situations so that it can be adopted in a country/ geographical region or city. The manual should be usable in all the countries, where WEEE/E-waste projects have been initiated.

1.3 Format

The manual has six chapters. Chapter 1 describes rationale for developing this manual. This is followed by the description of objectives, scope and format of the manual.

Chapter 2 describes perspective of WEEE / E-waste management. This chapter summarizes the WEEE / E-waste trade, its mechanism, material flow and components of WEEE / E-waste management with focus on collection & transportation system and mechanism. This includes description of elements of WEEE / E-waste collection and transportation system and mechanism to operate this system. Chapter 3 describes regulatory system supporting 'take back' schemes in different countries and their salient features. Further, the common elements of 'take back" scheme, which forms the basis of design of the scheme have been identified. Chapter 4 describes the primary modes for collection and transportation, the mechanism for accomplishing each mode, identification of stakeholders and their responsibilities. Chapter 5 describes different financial models consisting of financing of existing E-waste "take back" activities and allocation of economic responsibilities in countries for designing potential take-back system architectures. These models identify the relationship between stakeholders (i.e., between producers, compliance scheme and final users) and the level of responsibility of the system managers. The major guidance on each model is provided on design of financial/ economic instrument and its application in the model. Chapter 6 describes two case studies on take back system, one on ICT and the other on white goods.

Chapter 2: Perspectives of WEEE/E-waste Management

2.0 Introduction

WEEE/E-waste is a complex mixture of hazardous and non-hazardous waste, which requires specialized segregation, collection, transportation, treatment and disposal. Therefore, the major objective of this chapter is to describe the collection and transportation as the key components, which drive the overall efficiency of WEEE/E-waste management system. In this context, there is a need for conceptual understanding of WEEE/ E-waste segregation, collection and transportation as a part of overall WEEE/E-waste management system described earlier in UNEP's E-waste manual 2. Since collection and transportation is involved at each step of material flow during WEEE/E-waste trade in the entire WEEE/E-waste life cycle, each of these have been described below followed by a description of components of WEEE/E-waste management and elements of WEEE/E-waste collection and transportation system. These elements form basis of WEEE/E-waste "take back" system. Further, stakeholders involved have been described below followed by guidance notes.

2.1 Mechanism of WEEE/ E-waste Trade

Three elements describe the mechanism of WEEE/ E-waste trade. These elements are given below.

1. Material Flow
2. Life Cycle
3. Geographical Boundary

"Material Flow" along the "Life Cycle" of electrical and electronic equipment including the phase of obsolescence within a "Geographical Boundary" forms the basis of WEEE/ E-waste generation in cities/ countries. The following sections provide a conceptual understanding of the role of WEEE/E-waste collection and transportation as part of management starting from WEEE/E-waste generation followed by its transformation into new material.

2.2 WEEE/E-waste Life Cycle

Conceptual life cycle of electrical and electronic equipment is shown in figure 2.1.

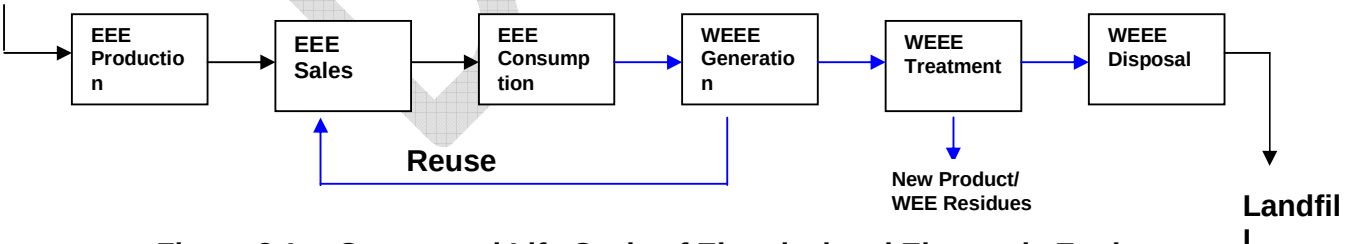


Figure 2.1: Conceptual Life Cycle of Electrical and Electronic Equipment

Source: Compiled from Figure 3.1: Conceptual Life Cycle of Electrical and Electronic Equipment, E-waste Volume 1, Inventory Assessment Manual, UNEP, 2007

The establishment of material flow within a geographical boundary assists in identifying, networks / chain connecting different phases of life cycle of electrical and electronic equipment and associated stakeholders. Once the chain gets established, "material flow balance" e.g. Input/ output balance in each phase forms the basis of quantification of WEEE/ E-waste in the life cycle, where "collection and transportation" becomes one of

the major factors of input/output balance. The arrows in blue indicate role of “collection and transportation” as a factor in input/output balance.

2.3 WEEE/ E-waste Material Flow Model

The WEEE/ E-waste material flow model developed by “European Topic Centre on Waste” shown in Figure 2.2 describes various phases of its management. The salient features of this model are:

1. The model is based on the ‘unit process approach’, where a unit process represents processes or activities.

2. The material flow model considers all unit processes and flows within a defined boundary. Arrows indicate the flow of material linking the unit processes.

3. There are two different kinds of unit processes. Type 1 receives material without any alteration, where there are no conversions. Therefore, input is equal to output for instant use and collection of electrical and electronic equipment. In Type 2, a conversion of materials takes place, thus creating new materials (products, waste, etc.) e.g. treatment of WEEE/ E-waste including dismantling/ incineration/ smelting etc.

4. The boundary is the interface between the existing system and the external environment or other systems

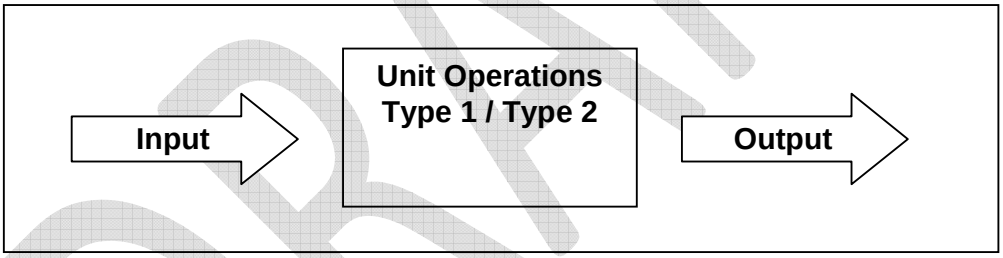


Figure 2.2: Conceptual WEEE/ E-waste Material Flow Model

Source: Waste from electrical and electronic equipment (WEEE) – quantities, dangerous substances and treatment methods, EEA Copenhagen, 2003

The material flow model, when applied to “life cycle” of electrical and electronic equipment leads to evolution of the ‘Four-Phase-Model’, where each phase describes respective unit operations and different stakeholders. The four phase model has been shown in figure 2.3.

Phase I:
Unit Operations/ Processes/ Activities: Production and sales of electrical and electronic equipment including import, export, and input of equipment for re-use from repair of WEEE/ E-waste.

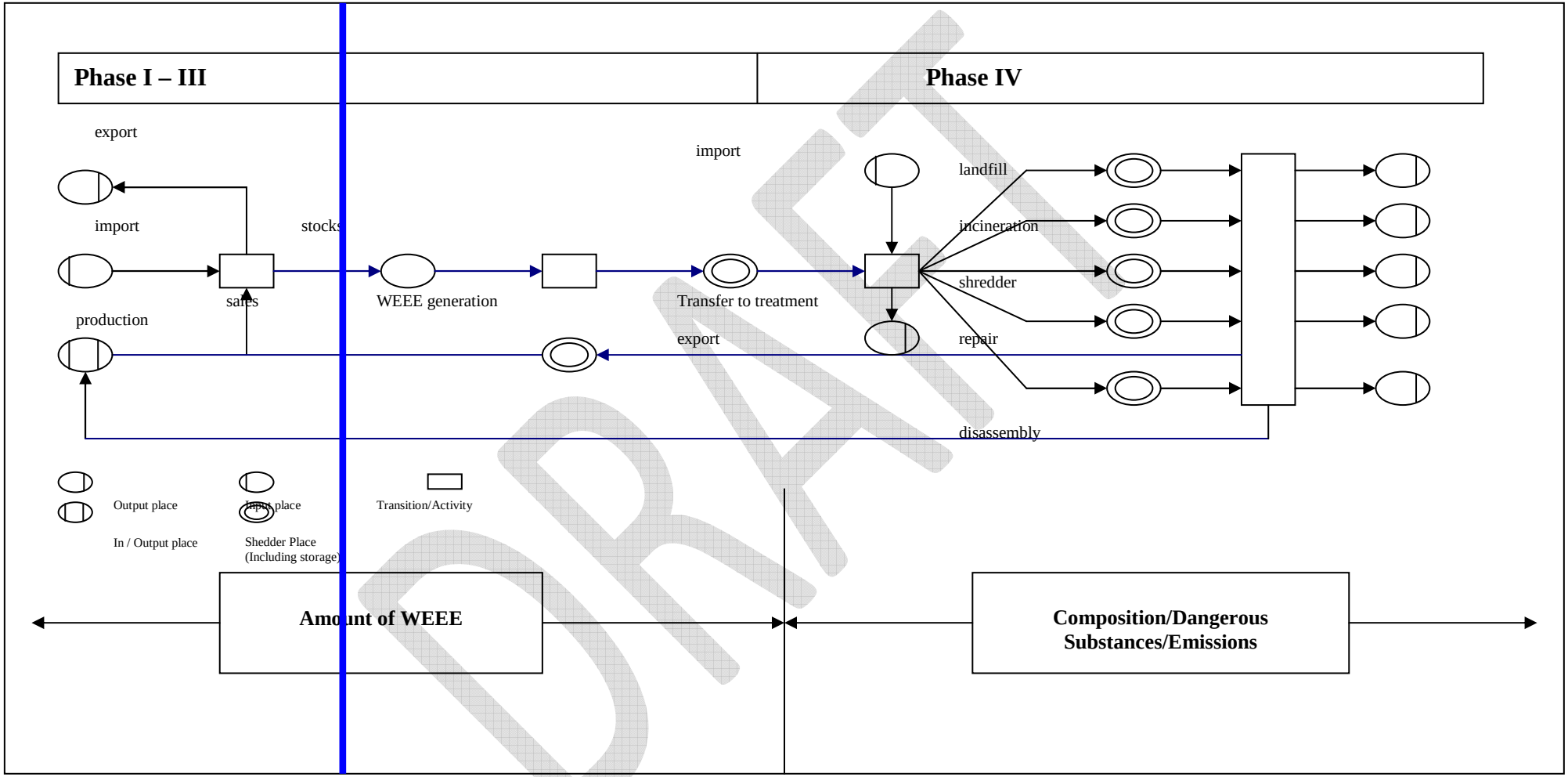
Phase II:
Unit Operations/ Processes/ Activities: Consumption of electrical and electronic equipment, use of electrical and electronic equipment in households, offices and industry.

Phase III:
Unit Operations/ Processes/ Activities: Collection of end-of-life electrical and electronic equipment, including transfer to treatment/disposal sites, import/export.

Phase IV:
Unit Operations/ Processes/ Activities: Treatment/disposal alternatives for WEEE/ E-waste e.g. repair, decontaminating, dismantling, shredding, landfill and incineration.

"Collection & Transportation" becomes a major link between each of the four phases. Therefore, "collection & transportation" along the material flow becomes a major "factor " in input and output "functions" at each phase under four phase model. Figure 2.3 indicates the major role of "collection and transportation" shown in blue arrows in Phase III and to a limited extent in Phase II and Phase IV. This role is described in table 2.1.

Figure 2.3: The 'Four-Phase-Model'



Source: Prepared from *Waste from electrical and electronic equipment (WEEE) – quantities, dangerous substances and treatment methods, EEA Copenhagen, 2003*

Table 2.1: Phase wise Life Cycle of Electrical and Electronic Equipment

Phase II – Consumption	
The design of the model in phase II requires mass/number of pieces of equipment bought and used by the consumers. ***After a certain time span (average life time t) the end-of-life goods are passed on for collection.*** It is assumed that in the consumption period no losses occur and no conversion of material takes place. The model will not consider the servicing of the equipment, the replacement of parts etc. Therefore Input = Output	Input/Output for Consumption: Input (t) = Output Sales (t) – export (t) Output (t) = WEEE generated (t)
Phase III – Collection	
The design of the model in phase III requires mass or number of goods collected after the consumption period. It is assumed that in the collection period no losses occur and no conversion of material takes place. In addition the import of WEEE/ E-waste has to be considered.	Input/Output for Collection: Input (t) =WEEE generated after consumption (t) + import of end-of-life EEE (t) Output (t) = end-of-life goods transferred to disposal/treatment/reuse [possibilities 1 ….n (t)] + export (t)
Phase IV – Treatment / Disposal	
The design of the model in phase IV requires mass or number of WEEE/E-waste collected and transferred to the different treatment/disposal activities. During this phase, a conversion or transition of WEEE/ E-waste takes place, thus creating new materials (fractions, components, dangerous substances). In phase IV the model has to be designed for each specific type of treatment/disposal, taking into account the material input and the conversion of the material. Output depends on conversion/transition of the material and will lead to specific transfer factors.	Note: Treatment/disposal comprises one, two or even successive steps with different technologies used. The formula for this phase can be developed depending on the level of treatment and disposal.

Source: Waste from electrical and electronic equipment (WEEE) – quantities, dangerous substances and treatment methods, EEA Copenhagen, 2003

The major factors having relevance to “collection and transportation”, which have been identified in each phase of table 2.1 are given below.

Phase II Consumption – End of life goods
Phase III Collection – Mass or number of goods; In the collection period no losses occur and no conversion of material takes place

Phase IV Treatment/ Disposal - The design of the model in phase IV requires mass or number of WEEE/E-waste collected and transferred to the different treatment/disposal activities.

It may be noted that all the mathematical formulations related to above factors in the three phases given in table 2.1 are functions of time. Therefore, these formulations require following data for a particular geographical region/ city/ country with respect to time. The time factor could be daily, monthly, annually and historical.

1. Local WEEE/ E-waste generation data
2. Imported WEEE/ E-waste data
3. WEEE/E-waste collected and transported
4. WEEE/ E-waste transferred for disposal/ treatment/ reuse

An example of collection performance based on above factors is shown in table 2.2.

Table 2.2: Collection performance (Kg/inhabitant) by Category

Country	WEEE/E-waste Category Number										Totals
	1	2	3	4	5	6	7	8	9	10	1-10
Japan	2.58	n.d.	n.d.	0.82	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	N/A
Norway	8.15	0.46	2.68	2.01	-	-	0.04	0.06	-	0.01	13.41
Switzerland	4.19	1.40	3.52	2.17	0.12	0.04	0.01	0.00	0.00	0.00	11.44
Austria	2.00	0.3	0.1	0.2	0.1	Inc 2	Inc 2	Inc 2	Inc 2	Inc 2	2.77
Belgium	2.99	1.12	1.16	1.64	0.20	0.14	0.00	0.02	0.00	0.00	7.26
Czech R	0.14	0.00	0.12	0.05	0.00	0.00	0.00	0.01	0.00	0.01	0.33
Estonia	0.48	0.00	0.04	0.10	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	0.63
Finland	4.75	0.28	1.44	1.30	0.27	0.03	0.00	0.02	0.01	0.00	8.10
Hungary	0.91	0.04	0.09	0.22	0.01	0.00	0.00	0.00	0.00	0.00	1.27
Ireland	6.68	0.28	0.43	0.67	0.09	0.07	n.d.	n.d.	0.00	n.d.	8.22
Netherlands	2.59	0.53	n.d.	1.18	0.03	0.06	0.03	0.00	0.00	0.02	4.44
Slovakia	0.35	0.04	0.05	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.66
Sweden	5.01	1.41	2.54	2.36	0.74	0.11	0.02	0.02	n.d.	n.d.	12.20
UK	7.17	0.54	0.59	1.10	0.04	0.35	0.16	0.00	0.00	0.00	9.95
J/NO/CH	4.97	0.93	3.10	1.67	0.06	0.02	0.02	0.03	0.00	0.01	10.80
Euro average	3.11	0.42	0.65	0.88	0.14	0.08	0.02	0.01	0.00	0.00	5.31

Source: Table 43, 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment; – Study No. 07010401/2006/442493/ETU/G4

Table 2.2 indicates that WEEE/E-waste collection efficiency varies across different countries in EU and Japan when benchmarked against target of 4 kg/inhabitant. The benchmark value was estimated to be approximately 25% of the average WEEE/E-waste generation in EU. This performance indicates performance of “take back” mechanism institutionalized under “extended producer responsibility”.

2.4 Components of WEEE/E-waste Management

Phase III, Phase II and Phase IV of the material flow model define the three major components of WEEE/ E-waste management systems. These are:

1. WEEE/E-waste collection, sorting and transportation system
2. WEEE/E-waste treatment system
3. WEEE/E-waste disposal system.

WEEE/E-waste collection, sorting and transportation system consists of producer/ retailer take back system, municipal collection system and recycler's/ dismantler's collection system. Since WEEE/E-waste is hazardous in nature, it is collected, sorted, stored and transported under controlled conditions. Each of the agencies has its own WEEE/E-waste collection and storage centers. The collection means will vary, following distances, rural or urban patterns, and the size of collected appliances. Some categories will require specific collection routes like flatbed collection (for fridges and other reusable household appliances).

2.5 Elements of WEEE/ E-waste collection and transportation System

An efficient WEEE/ E-waste collection and transportation system will ensure reuse, recycle and adequate WEEE/ E-waste management including avoiding damage or breaking components that contain hazardous substances. The major elements, which determine the efficiency of collection system, are given below.

- accessible and efficient collection facilities
- ensure minimal movements of products
- minimize manual handling
- aim to remove hazardous substances
- separate reusable appliances
- adequate and consistent information to the users.

Literature survey cites that in EU, WEEE/E-waste in general is being sorted/ separated into five groups as given below depending on different material composition and treatment categories. This facilitates efficient collection, recycling and data monitoring for compliance. These groups are given below.

Group 1: Refrigeration equipment —Due to ODS usage, this has to be separated from other WEEE/ E-waste.

Group 2: Other large household appliances — because of their shredding with end-of-life vehicles and other light iron, they need to be separated from other waste.

Group 3: Equipment containing CRTs — the CRTs need to remain intact because of health and safety reasons. Therefore, TVs and computer monitors will have to be collected separately from other waste and handled carefully.

Group 4: Lighting (linear and compact fluorescent tubes) — this needs to be deposited in a special container (due to Mercury) to ensure it does not contaminate other waste and that it can be recycled.

Group5: All other WEEE — This equipment can be collected in the same container because there are no recycling or health and safety reasons.

Figure 2.4 indicates the mapping of different components of "collection and transportation" system to the conceptual life cycle of electrical and electronic equipment. The major options of "collection and transportation" system are given below.

Option 1: Producer's "take back" system can cover entire life cycle of electrical and electronic equipment. It can start from EEE production and extend till WEEE/E-waste disposal.

Option 2: Retailer's 'take back" system is a sub set of producer's "take back" system.

Option 3: Municipal "collection and transportation" system range starts from WEEE/ E-waste generation and ends at WEEE/E-waste disposal.

Option 4: Recycler's/ Dismantler's collection and transportation system range starts from WEEE/ E-waste generation and ends at WEEE/E-waste disposal.

The level of WEEE/ E-waste treatment and disposal within a geographical boundary can be achieved either by integration of all or a combination of any of the four WEEE/E-waste collection and transportation options. An example of the usage of different types of combination in EU under extended producers responsibility is given in table 2.3.

Table 2.3: Allocation of Responsibility for Collection of WEEE from private households in EU

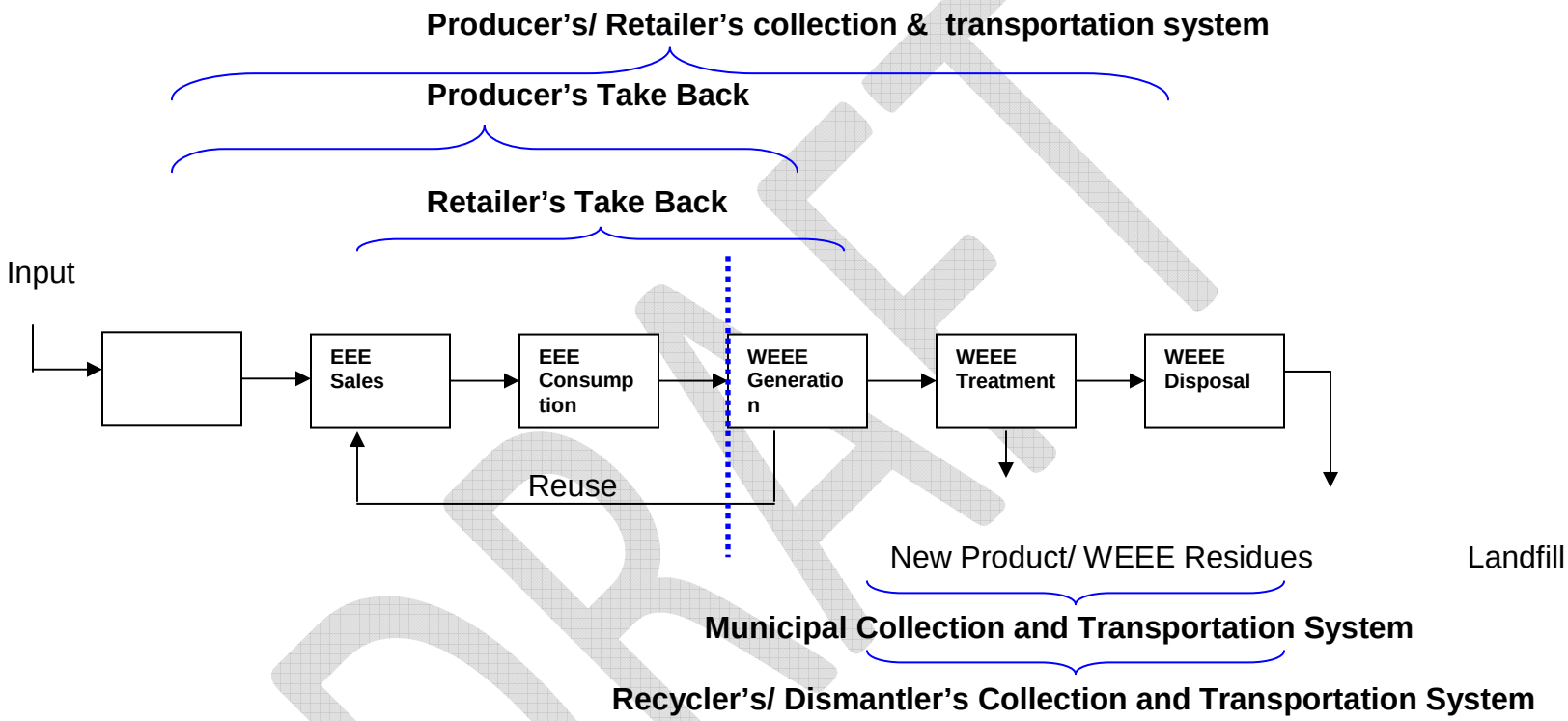
Member State	Physical Responsibility	Financial Responsibility
Austria	D/M/P	D/P
Belgium (Brussels)	D/M	D
Bulgaria	P	P
Cyprus	P	P
Czech R.	D/P	D/P
Denmark	M	M
Estonia	D/P	D/P
Finland	D61/P	P
France	D/M/P	D/P
Germany	M	M
Greece	P	P
Hungary	P	P
Ireland	D/M	D//P
Italy	D/M	D/M
Latvia	P	P
Lithuania62	D/M/P	P
Luxembourg	D/M	D/M
Malta	D/P	D/P
Netherlands	D/M	D/M
Poland	D	D
Portugal	D/M/P	D/P
Romania	M	M
Slovakia	D/P	D/P

Member State	Physical Responsibility	Financial Responsibility
Slovenia	D/M	D/M
Spain	D/M	P
Sweden	P	P
UK	D/P	D/P

D = Distributor/Retailer M = Municipality P = Producer (definition varies between national and European approach)

Source: Table No.9, The Producer Responsibility Principle of the WEEE Directive, Final Report, August 19th 2007

Figure 2.4: WEEE/ E-waste Collection & Transportation Systems



Source: Compiled from E-waste Volume 2, UNEP, 2007

2.6 Major Stakeholders

Some of the major stakeholders, identified along the flow include importers, producers/ manufacturers, retailers (businesses/ government/ others), consumers (individual households, businesses, government and others), traders, retailers, scrap dealers, dissemblers/ dismantlers and recyclers. At each step in the flow, business transaction defines the movement of the electronic item in the flow. The description of each of these stakeholders is given below.

Manufacturers and Retailers

WEEE/E-waste from this sector comprises defective IC chips, motherboards, CRTs other peripheral items produced during the production process. It also includes defective PCs under guarantee procured from consumers as replacement items or items, which fail quality tests. Manufacturers are responsible to 'take back" these items under "extended producer responsibility".

Imports

Huge quantities of WEEE/ E-waste like monitors, printers, keyboards, CPUs, typewriters, projectors, mobile phones, PVC wires, etc are imported. These items belong to all ranges, models and sizes, and are functional as well as junk materials.

Individual Households

Most of the households do not directly sell obsolete WEEE/ E-waste into the scrap market. The preferred practice is to get it exchanged from retailers while purchasing a new computer, or pass it to relatives or friends. In former case, it is the retailer's responsibility to dispose off the computer.

Business/ Government Sector

The business sector (government departments, public or private sector, MNC offices, etc) were the earliest users of IT and IT products; today they account for a sizable amount of total installed ICT equipment. The incompatibility of old systems to cater to present needs and requirements prompts them to pass the obsolete electrical and electronic equipment to dismantlers/ recyclers, who pick up these items based on auction or other standard business practices.

Dissemblers/ Dismantlers

Immediately after securing WEEE/E-waste from various sources, dismantlers decide which item ought to be dismantled and which to be retained for resale. This decision is based on the resale of second hand products. The not-to-be-resold WEEE/ E-waste item/ components find their way to the storehouses for dismantling. During dismantling, each item is dismantled as per building blocks described in section 3.1 of WEEE/E-waste manual 1 and segregated leading to different WEEE/E-waste fractions.

Recyclers

In developed countries the recycling operations may be combined with dismantling operation in integrated facilities or alternatively the dismantlers may carry out the dismantling operation, segregate the fractions and send them to large scale smelters for material recovery technologies. Generally these stakeholders are not concentrated in a single place, but spread over different areas, each handling a different aspect of recycling.

2.7 Guidance Notes

Objective: The major objective of guidance notes on perspective of WEEE/E-waste management is to assist in assessment of "collection and transportation" requirements under WEEE/E-waste management in city/ geographical region. This assessment will serve as foundation for planning and implementation of a formalized WEEE/E-waste "take back" system in a city/ geographical region.

Guidance Procedure: Guidance procedure includes completion of following seven steps as given below.

Step 1: Determine WEEE/E-waste trade value chain in a city/ geographic region using guidance notes described in WEEE/E-waste manual 1. The output of this step will give complete background information on WEEE/E-waste management.

Step 2: Determine existing and future item-wise WEEE/E-waste inventory in a city/ geographic region using guidance notes described in WEEE/E-waste manual 1. The output of this step will give baseline and fix the collection target from the predicted WEEE/E-waste to be collected, segregated, transported, treated and finally disposed.

Step 3: Determine item-wise content of WEEE/E-waste inventory using guidance notes described in WEEE/E-waste manual 1. The output of this task will give information on quantity and type of hazardous WEEE/E-waste that needs to be collected, segregated, transported, treated and finally disposed.

Step 4: Determine the existing and proposed item-wise WEEE/E-waste quantities treatment and disposal capacity requirement. This information will give an idea of matching of existing and proposed treatment capacity with "collection and transportation" requirement.

Step 5: Determine the existing "collection and transportation" options given in section 2.5 to cater to WEEE/E-waste quantities by using the template given in table 2.4.

Table 2.4: Collection and Transportation Option Analysis

WEEE/E-waste Quantity/ Options	Option 1 (Y/N)	Option 2 (Y/N)	Option 3 (Y/N)	Option 4 (Y/N)
Year/ Quantity				
Year/ Quantity				
Year/ Quantity				
Year/ Quantity				
Year/ Quantity				
Year/ Quantity				
Year/ Quantity				
Year/ Quantity				
Year/ Quantity				

Note: Y- yes and N - No

The outcome of this analysis will give insight into the type of collection system in place and the major stakeholders involved in it within a geographical boundary.

Step 6: Determine the existing "collection & transportation" infrastructure under each option and identify the cost of transportation by using the template given in table 2.5.

Table 2.5: Collection & Transportation Infrastructure & Costs

WEE/E-Waste Quantity/ Options	Option 1			Option 2			Option 3			Option 4		
	No. of Collection Points	Total Area (Sq m)	Cost of transport – ation ($/Tons)	No. of Collection Points	Total Area (Sq m)	Cost of transport – ation ($/Tons)	No. of Collection Points	Total Area (Sq m)	Cost of transport – ation ($/Tons)	No. of Collection Points	Total Area (Sq m)	Cost of transport – ation ($/Tons)

Chapter: 3 Policy Framework for E-waste Management

3.0 National and Social Policies/ Laws/ Regulations/ Institutional Roles in Developed Countries

Policies/ laws/ regulations related to WEEE/E-waste management provide an institutional framework for their implementation. Countries in Europe and Japan have been the frontrunner in formulating policies/ laws/ regulations for WEEE/E-waste followed by their institutionalization and implementation. The following sections describe policies/ laws/ regulations followed by institutional mechanism in developed countries for WEEE/E-waste management.

3.1 Policies/ Laws/ Regulation

The fundamental principle for development of E-waste policies/ laws/ regulations is based on conceptual the life cycle of electrical and electronic equipment (EEE) as given in Figure 2.1.

The major feature in any policy/ law / regulation is the definition of WEEE / E-waste and the sections/ blocks in the life cycle which need to be regulated. If a section/ block of the life cycle falls outside the geographical boundary of a country, then the WEEE/E- waste is governed by international conventions .e.g. Basel convention on trans boundary movement of hazardous waste. If all sections/blocks of the life cycle falls within the geographical boundary of a country then national policy/law/regulation drive the E-waste management.

Globally, WEEE/ E-waste are most commonly used terms for electronic waste. There is no standard definition of WEEE/ E-waste. A number of countries have come out with their own definitions, interpretations and usage of the term “E-waste/WEEE”. The most widely accepted definition of WEEE/ E-waste is as per EU directive, and this is followed in member countries of European Union and other countries of Europe.

Definition as per EU directive with status of its transposition and variation in major EU countries is described in Annexure 1 followed by E-waste’s reference in Basel Convention. WEEE Directive (EU, 2002a) describes E-waste as “Electrical or electronic equipment, which is waste including all components, subassemblies 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.” ‘Electrical and electronic equipment’ or ‘EEE’ means equipment which is dependent on electrical currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such current and fields falling under the categories set out in Annex IA to Directive 2002/96/EC (WEEE) and designed for use with a voltage rating not exceeding 1000 volts for alternating current and 1500 volts for direct current.

Annex IA
Categories of electrical and electronic equipment covered by this Directive.

1. Large household appliances
2. Small household appliances
3. IT and telecommunications equipment
4. Consumer equipment
5. Lighting equipment
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

Annex IB

List of products, which fall under the categories of Annex IA are given below.

1. Large household appliances: Large cooling appliances; Refrigerators; Freezers; Other large appliances used for refrigeration, conservation and storage of food; Washing machines; Clothes dryers; Dish washing machines; Cooking; Electric hot plates; Microwaves; Other large appliances used for cooking and other processing of food; Electric heating appliances; Electric radiators; and other fanning, exhaust ventilation and conditioning equipment.
2. Small household appliances: Vacuum cleaners; Carpet sweepers; Other appliances for cleaning; Appliances used for sewing, knitting, weaving and other processing for textiles; Iron and other appliances for ironing, mangling and other care of clothing; Toasters; Fryers; Grinders, coffee machines and equipment for opening or sealing containers or packages; Electric knives; Appliances for hair-cutting, hair drying, tooth brushing, shaving, massage and other body care appliances; and clocks, watches and equipment for the purpose of measuring indicating or registering time scales.
3. IT and telecommunications equipment: Centralized data processing; Mainframes; Minicomputers; Printer units; Personal computing; Personal computers (CPU, mouse, screen and keyboard included); Laptop computer (CPU, mouse, screen and keyboard included); Notebook computers; Notepad computers; Printers; Copying equipment; Electrical and electronic typewriters; Pocket and desk calculators; And other products and equipment for the collection, storage, processing, presentation or communication of information by electronic means; User terminals and systems; Facsimile; Telex; Telephones; Pay telephones; Cordless telephones; Cellular telephones; Answering systems; and other products or equipment of transmitting sound, images or other information by telecommunications.
4. Consumer equipment; Radio sets; Television sets; Video cameras; Video recorders; Hi-fi recorders; Audio amplifiers; Musical instruments; and other products or equipment for the purpose of recording or reproducing sound or image, including signals or other technologies for the distribution of sound and image than by telecommunications.
5. Lighting equipment: Luminaries for fluorescent lamps with the exception of luminaries in households; Straight fluorescent lamps; Compact fluorescent lamps; High intensity discharge lamps, including pressure sodium lamps and metal lamps; Low pressure sodium lamps; and other lighting or equipment for the purpose of spreading or controlling; light with the exception of filament bulbs.
6. Electrical and electronic tools (with the exception large-scale stationary industrial tools): Drills; Saws; Sewing machines; Equipment for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, making, holes, punching, folding, bending or similar processing of wood, metal and other materials; Tools for riveting, nailing or screwing or removing rivets, nails, screws; or similar uses; Tools for welding, soldering or similar use; Equipment for spraying, spreading, dispersing or other treatment of liquid or gaseous substances by other means; and tools for mowing or other gardening activities.
7. Toys, leisure and sports equipment: Electric trains or car racing sets; Hand-held video game consoles; Video games; Computers for biking, diving, running, rowing, etc.; Sports equipment with electric or electronic components; and coin slot machines.
8. Medical devices (with the exception of all implanted and infected products): Radiotherapy equipment; Cardiology; Dialysis; Pulmonary ventilators; Nuclear medicine; Laboratory equipment for *in-vitro* diagnosis; Analysers; Freezers; Fertilization tests; and other appliances for detecting, preventing, monitoring, treating, alleviating illness, injury or disability.
9. Monitoring and control instruments: Smoke detector; Heating regulators; Thermostats; Measuring, weighing or adjusting appliances for household or as laboratory equipment; and other monitoring and control instruments used in industrial installations (e.g. in control panels).

10. Automatic dispensers: Automatic dispensers for hot drinks; Automatic dispensers for hot or cold bottles or cans; Automatic dispensers for solid products; Automatic dispensers for money; and all appliances which deliver automatically all kind of products.

Basel Convention covers all discarded / disposed materials that possess hazardous characteristics as well as all wastes considered hazardous on a national basis. Annex VIII, refers to E-waste, which is considered hazardous under Art. 1, para. 1(a) of the Convention:

A 1010: Metal wastes and waste consisting of alloys of any of the following:

- Antimony
- Arsenic
- Beryllium
- Cadmium
- Lead
- Mercury
- Selenium
- Tellurium
- Thallium

A 1020: Waste having as constituents or contaminants, excluding metal waste in massive form, any of the following:

- Antimony; antimony compounds
- Beryllium; beryllium compounds
- Cadmium; cadmium compounds
- Lead; lead compounds
- Selenium; selenium compounds
- Tellurium; tellurium compounds

A 1030: Wastes having as constituents or contaminants any of the following:

- Arsenic; arsenic compounds
- Mercury; mercury compounds
- Thallium; thallium compounds

A 1090: Ashes from the incineration of insulated copper wire

A 1150: Precious metal ash from incineration of printed circuit boards not included on list

A 1170: Unsorted waste batteries excluding mixtures of only list B batteries. Waste batteries not specified on list B containing Annex I constituents to an extent to render them hazardous

A 1180: Waste electrical and electronic assemblies or scrap containing components such as accumulators and other batteries included on list A, mercury-switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or contaminated with Annex I constituents (e.g., cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they possess any of the characteristics contained in Annex III. Annex IX, contains the mirror entry, B1110 Electrical and Electronic assemblies given below.

- Electronic assemblies consisting only of metals or alloys.
- Waste electrical and electronic assemblies or scrap (including printed circuit boards) not containing components such as accumulators and other batteries included on List A, mercury-switches, glass from cathode-ray tubes and other activated glass an1d PCB-capacitors, or not contaminated with Annex 1.

A 1190: Waste metal cables coated or insulated with plastics containing or contaminated with coal tar, PCB1, lead, cadmium, other organohalogen compounds or other Annex I constituents to an extent that they exhibit Annex III characteristics.

A 2010: Glass waste from cathode-ray tubes and other activated glasses.

3.2 Other Countries

Australia

There is no specific definition of E-waste/ WEEE in law. It is generally referred to as “end of Life” or “discarded” electrical or electronic equipment. “ National Waste Policy: Less Waste, More resources” proposes formulation of legislation based on “Product Stewardship”.

Canada

Canada’s WEEE/ E-waste regulations are in the process of being enforced at the provincial level. Alberta, British Columbia, Nova Scotia, Ontario and Saskatchewan have WEEE/ E-waste regulations in place. The WEEE/ E-waste definitions or statements as per these regulations are given below.

Alberta

Electronics Designation Regulation A.R.94/2004 published on 12 May 2004 and has come into force from 1 October 2004 as Appendix to Environmental Protection and Enhancement Act defines “Electronics” as all electrical and electronic equipment or devices, whether intended for consumers, industrial or commercial use, and includes, without limitation,

- Television
- Computers, laptops and notebooks, including CPUs, keyboards, mouse, cables and other components in the computer
- Computer monitors
- Computer printers, including printers that have scanning or fax capabilities, or both
- Scanners
- Audio and video playback and recording systems
- Telephones and fax machines
- Cell phones or other wireless devices and
- Electronic game equipment, but does not include electronics contained within and affixed to a motor vehicle

PCBs are at a concentration level of 50 mg/kg or more.

Electronics has been defined as designated material for the purpose of Part 9, Division 1 of the Act and the “Designated Material Recycling and Management Regulation”. The term used instead of WEEE/E-waste is “Disposal of Electronics” under this regulation.

British Columbia

Schedule 3,”Electronic Product Category” was included in “British Columbia Recycling Regulation” dated 7 October 2004 as amended on 16 February 2006. The electronic product category consists of “Computers” that are designed for desktop use by an individual, for desktop use as a server or to be portable, except hand held devices, “Desktop Printers” and “Televisions”. The electronic product category does not include computers and televisions that are part of or attached to vehicles, marine vessels or commercial or industrial equipment. Computers include a computer monitor and computer peripheral. Computer peripheral means a keyboard, mouse or cable that attaches or is attached to a computer. Desktop printer means a printer that will print on

paper not exceeding 8.5 inches in width but does not include a label printer. “British Columbia Stewardship Plan for End-of-Life Electronics”, a plan formulated in response to the above regulation defines WEEE/ E-waste as “End of Life” electronics where electronics means the electronic product category mentioned above.

Nova Scotia

“Solid Waste-Resource Management Regulations” made under Section 102 of the Environment Act as amended on February 22,2007 mentions “Electronic Products Stewardship Program” in Part II. “Electronic Product” means an electrical device or electronic equipment that is a designated material. “Designated Material” has been defined as materials listed in Column 1 of Schedule “B” and includes the following electronic items.

- Televisions
- Desktop, laptop and notebook computers, including CPU’s, keyboards, mice, cables and other components in the computer
- Computer monitors
- Computer printers, including printers that have scanning or fax capabilities or both
- Computer scanners
- Audio and video playback and recording systems
- Telephones and fax machines
- Cell phones and other wireless devices

“Electronic Product Stewardship Program” means a program that establishes a process for collection, transportation, reuse and recycling of electronic products and, if no further options exist, the disposal of any residual electronic product components and incorporates the principles of a pollution prevention hierarchy by replacing disposal with reuse and recycling of electronic products.

Ontario

The Waste Electronic and Electrical Equipment (WEEE) regulation under the *Waste Diversion Act, 2002* (WDA) was filed on 14 December, 2004 and amended in 2009. The regulation designates seven categories of electronic and electrical equipment as waste, and targets more than 200 items that could be designated, including computers, telephones, broadcast equipment, televisions and CD players, children's toys, power tools, lawn mowers and navigational and medical instruments. Products targeted under Ontario WEEE legislation are given in table 1.

Table 3.1: Products Designated under Ontario Legislation

Schedule	Priority Categories	Items
Schedule 1	Household Appliances	49 Items
Schedule 2	IT Equipment	28 Items
Schedule 3	Telecommunications equipment	24 Items
Schedule 4	Audio-Visual Equipment	24 Items
Schedule 5	Toys, Leisure Equipment & Sports Equipment	11 Items
Schedule 6	Electrical & Electronic tools	32 Items
Schedule 7	Navigational Measuring, Medical Monitoring or Control Equipments	36 Items

Saskatchewan

"The Waste Electronic Equipment Regulations" effective on February 1, 2006 and amended in 2009, under The Environmental Management and Protection Act, 2002, defines WEEE/ E-waste as "waste electronic equipment", which means electronic equipment that the consumer no longer wants. "Electronic Equipment" means any electronic equipment listed in Column 1 of Table 1 of these regulations. This table includes the following electronic equipment:

- Personal desktop computer, including the central processing unit and all other parts contained in the computer
- Personal notebook computer, including the central processing unit and all other parts contained in the computer
- Computer monitor, including cathode ray tube, liquid crystal display and plasma,
- Computer mouse, including cables
- Computer printer including dot matrix; ink jet; laser; thermal and computer printer with scanning or facsimile capabilities or both
- Television (cathode ray tube, liquid crystal display, plasma and rear projection)

China

WEEE is referred as electrical and electronic appliances discarded by the consumer, elements, parts, and components and consumable materials discarded in the process of manufacturing (Order No. 551, "Order of the State Council of The People's Republic of China on Regulation for the Administration of the Recovery and Disposal of Waste Electrical & Electronic Products). E-waste is also covered under 'Management Methods for Controlling Pollution Caused by Electronic Information Products Regulation" referred commonly as "China RoHS" promulgated on 28 February 2006, and effective from 1 March 2007. E-waste is covered under the term "control and reduce" pollution to the environment caused after disposal of Electronic Information Products.

India

As per draft E-waste (Management and Handling) Rules, 2010 dated September, 2010, E-waste is defined as "waste electrical and electronic equipment whole or in part included in, but not confined to equipment listed in schedule 1 and scraps or reject from their manufacturing process, which intended to be discarded". "Electrical and electronic equipment (EEE)" means equipments is dependent on electronic currents or electro magnetic fields to be fully functional including those used for generation, transfer and measurement of such currents and fields falling under the categories set out schedule 1. There are two categories of EEE in schedule 1 consisting of 15 items as described in schedule 2.

Japan

There is no specific definition of WEEE/ E-waste as defined in the regulatory system. E-waste is covered under laws to promote recycling within Japan. The two major laws covering broad range of E-waste items are "The Law for Recycling of Specified Kinds of Home Appliances (Home Appliances Recycling Law)" enacted in 1998 and "The Law for Promotion of the Effective Utilization of Resources" enacted in 2000.

In "The Law for Recycling of Specified Kinds of Home Appliances (Home Appliances Recycling Law)", E-waste is referred as "Used Consumer Electric Goods Discarded by Consumers". This law covers TVs, Refrigerators, Washing Machines and Air Conditioners. In "The Law for Promotion of the Effective Utilization of Resources", E-waste is covered under "Used goods and by-products" which have been generated and their large part is discarded. This law covers personal computers (home and office) and other electronic items. According to this law "Used goods" means any articles that are collected, used or unused, or is disposed of (except radioactive materials or those contaminated thereby). "By-product" means any articles obtained

secondarily in the process of manufacturing, processing, repair or sale of the product; in the process of supply of energy; or in the process of construction pertaining to architecture and civil engineering (hereinafter referred to as "construction work") except radioactive materials or those contaminated thereby.

Malaysia

WEEE/E-waste has been included as scheduled wastes in the "Environmental Quality (Scheduled Wastes) Regulations 2005. These wastes have been categorized as "wastes from electrical and electronic assemblies containing components such as accumulators, mercury switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or contaminated with cadmium, mercury, lead, nickel, chromium, copper, lithium, silver, manganese or polychlorinated biphenyl". As per guidelines for the classification of "Used Electrical and Electronic Equipment in Malaysia", there are 27 items considered as E-waste under used category.

Used electrical and electronic equipment or components is defined as E-waste if it has any of the following criteria: (a) A defect that materially affects its functionality. For example it does not: power up; or have a functioning motherboard; or perform Basic Input / Output System (BIOS) or internal set-up routines or self-checks fail; or communicate with the host; or print / scan / copy a test page or the page is not identifiable or readable or is blurred or lined; or read, write or record / burn. (b) Physical damage that impairs its functionality or safety, as defined in the specification. (c) a faulty hard disc drive and a faulty Random Access Memory (RAM) and a faulty Video Card; or (d) batteries made with lead, mercury or cadmium or lithium or nickel that are unable to be charged or to hold power; or (e) insufficient packaging to protect it from damage during transportation, loading and unloading operations; or (f) the appearance of the equipment or components are generally worn or damaged, thus reducing the marketability of the equipment; or (g) the electrical and electronic equipment or components are destined for recycling or recovery or disposal; or (h) the electrical and electronic equipment or components are discarded, or are intended or are required to be discarded; or (i) there is no regular market for the used electrical and electronic equipment or components; or (j) the used equipment or components are old and out dated, and destined for salvaging purpose; or (k) end-of-life electrical and electronic equipment; or (l) for the importing purposes, the age of the electrical and electronic equipment or components is not more than three years from the date of manufactured; or (m) products / goods produced by partially E-waste recovery facilities.

New Zealand

There is no legislation, which defines WEEE/ E-waste in New Zealand. However, Imports and Exports (Restrictions) Order (No 2) 2004 defines WEEE/E-waste. It states that "Electronic Waste" covers electronic items, which are to be disposed of by recycling or final disposal. Such equipment includes:

- Computer equipment including monitors and printers;
- Mobile and land line telephones;
- Fax machines;
- Photocopying equipment;
- Television sets;
- Video recorders;
- Printed circuit boards; and
- Equipment containing cadmium, mercury or lead batteries.

Electronic equipment is also considered to be "Waste" if it has any of the following:

a. A defect that materially affects its functionality. e.g. it does not power up; or
b. Physical damage that impairs its functionality or safety e.g. the screen is broken or cracked; or
c. A faulty hard disk drive, or RAM or video card; or

d. Batteries containing lead, mercury or cadmium or liquid cathodes that are unable to be charged or to hold power; or
e. Insufficient packaging to protect it from damage during transport.

Republic of Korea

Article 2 of Act for Resource Recycling of Electrical and Electronic Equipment and Vehicles adopted on 2 April 2007, defines "Waste Electrical and Electronic Equipment" as electrical and electronic equipment, which is classified as "waste" in accordance with Article 2, Section 1 of the Waste Management Act. "Electric and Electronic Equipment" means equipment or device (including components and parts thereto) operated by electric currents and electromagnetic fields.

USA

According to USEPA, electronic products that are "near" or at the "end of their useful life" are referred to as "E-waste" or "e-scrap." Recyclers prefer the term "e-scrap" since "waste" refers only to what is left after the product has been reused, recovered or recycled. However, "E-waste" is the most commonly used term.

3.3 Institutional Mechanism

"Extended Producer Responsibility" or "Product Take Back" forms the basis of policy framework in developed countries. WEEE directives provide a regulatory basis for collection, recovery and reuse/ recycling targets in EU. The development of legislation and compliance structure as per EU directives is an on-going process in all EU countries. The member states have to guarantee minimum collection, recovery and reuse/ recycling targets as specified in the directive. The fundamental principle of WEEE directive is "Extended Producer Responsibility", where producers are responsible for WEEE/ E-waste take back. Those European countries, which are not part of EU either follow EU directive or more stringent standards based on WEEE/ E-waste management. Majority of countries have regulations similar to WEEE directives. Countries like Japan have regulations focused on "Reuse, Recycling and Recovery". Other countries like Canada, USA and Australia are developing their systems based on the similar principles of "Extended Producer Responsibility". The transposition of EU directive into national laws of EU countries and regulatory structure in other developed countries is summarized in annexure 1.

Institutional mechanism under "Extended producer responsibility" or "Product Take Back" for WEEE/E-waste management system has been described in terms of three elements like collection systems, national registry and logistics. Each of these three elements has been further described in terms of different stakeholders and their respective roles/ responsibilities. Annexure 1 and Annexure 2 describe the existing institutional mechanism in terms of these elements in developed countries till 2009. Major factors that impact the institutional mechanism are given below.

1. Total inventory of WEEE/ E-waste to determine the economies of scale for institutional operations.
2. Distance and geography of the country/ area/ region/ city, with smaller distances reducing costs for transport and logistics.
3. Population size and density, where a higher population enables the generation of economic efficiencies and economies of scale.
4. Cost of labour, as collection, sorting and treatment are highly labour intensive.
5. Length of time in operation
6. Consumer behaviour with respect to recycling
7. The level of WEEE/ E-waste recycling awareness in relation to specific product groups

3.4 Collection Systems

Regulation in each country provides the basis of WEEE/ E-waste collection system. There are two generic categories of collection systems at national level i.e. “collective system (monopoly)” and competition based “clearing house system” for managing WEEE/E-waste. The objective of both the systems is to provide WEEE/E-waste management services at reduced costs to the consumers i.e. household or business and ensure compliance at the national level.

Collective System

The collective system is a system which is responsible for collection, recycling and financing of all or major part of WEEE/ E-waste within national boundaries. This is the general approach in the countries with established WEEE/ E-waste system. Their legal status differs from country to country, but they are generally nongovernmental, not-for-profit companies which are set up and owned by one or more trade associations. They are organized into product categories in order to focus on achieving maximum efficiency in their recycling operations and to identify markets for recycled material and product reuse.

Clearing House System

The clearing house system is a system in which multiple partners (producers, recyclers, and waste organizations) can provide services on a competitive basis. The government ensures that there is a register of producers and it defines the allocation mechanisms, and reporting and monitoring systems. The responsibilities of a central national coordination body are to determine the collection obligation of each producer (via the national register) and to assign this obligation to the compliance scheme action on behalf of the producer. This body will also establish an allocation mechanism that enables compliance systems to indeed collect WEEE/ E-waste in an equitable manner from collection points throughout the territory.

3.5 National Registry

Any registered body/ agency, which maintains the register of producers/ recyclers/ waste organizations, inventory of WEEE/E-waste has been defined as national registry. This body/ agency can also determine collection obligation of each producer and ensure equitable compliance. This body/ agency could be any government entity or a non-profit organization recognized/ supported by the government for discharging the above mentioned functions.

3.6 Logistics

There are three primary channels of WEEE/E-waste collection. All the three channels address “Business to Consumer” (B2C) and “Business to Business” (B2B) WEEE/Ewaste collection. These channels are municipal sites, in store retailer take-back and producer take-back. Generally, municipal collection sites are usually free for households to use to an unlimited extent while take-back through retailers is usually free but can be dependent upon the purchase of a new product (both B2C and B2B). The direct producer take-back system may apply to larger commercial equipment and operates on a new for old basis (B2B).

3.7 National and Social Policies/ Laws/ Regulations/ Economic/ Institutional Roles in Developing Countries

Policies/ laws/ regulations and institutional mechanism in developing countries, where some level of WEEE/E-waste awareness exists have been described in table 3.2. These have been described based on status of two elements, which are inventory and national legislation.

Table 3.2: Policies/ Laws/ Regulations/ Institutional Roles for WEEE/E-waste in Developing Countries specific to WEEE/E-waste

Country	Inventory	National Legislation
Asia		
Bahrain	Solid waste inventory available but no specific E-waste inventory	Lack of WEEE/E-waste legislation
Cambodia	Inventory conducted	Under planning
China	Inventory needs updation	EPR based have been prepared.
India	Inventory needs updation	EPR based draft regulation in place but needs enforcement
Indonesia	Preliminary inventory needs updation	Under planning
Jordan	Preliminary inventory conducted	No legal framework
Kuwait	No inventory assessment	No legal framework
Lebanon	No inventory assessment	No legal framework
Malaysia	Initial inventory conducted	Legal framework without EPR
Oman	Initial inventory conducted	No Legal framework
Pakistan	No inventory	No legal framework
Philippines	Initial inventory conducted	Under planning
Qatar	Inventory not available	Under preparation
Saudi Arabia	Inventory assessment initiated	No legal framework
Thailand	Initial inventory conducted	Draft prepared under EPR
UAE	Solid waste inventory available but no specific E-waste inventory	Planned and being prepared
Vietnam	Initial inventory prepared. Need updation	Under planning
Yemen	Preliminary assessment conducted	No legal framework
Latin America		
Argentina	Initial inventory conducted	EPR based regulation in place but needs enforcement
Brazil	Planning to conduct inventory	EPR based regulation at federal level is under preparation
Chile	Initial inventory conducted	Under planning

Country	Inventory	National Legislation
Colombia	Initial inventory conducted	Under planning
Costa Rica	Initial inventory conducted	EPR based regulation in place but needs enforcement
Mexico	Initial inventory conducted	Under planning
Paraguay	Planning to conduct inventory	Under planning
Peru	Initial inventory conducted	Under planning
Uruguay	Planning to conduct inventory	Under planning
Africa		
Algeria	Inventory assessment initiated	No legal framework
Benin	Initial inventory conducted	Under planning
Coted` Yvoire	Initial inventory conducted	Under planning
Egypt	Inventory assessment initiated	No legal framework
Ghana	Initial inventory conducted	Under planning
Liberia	Initial inventory conducted	Under planning
Morocco	Inventory assessment initiated	No legal framework
Nigeria	Initial inventory conducted	Under planning
Rawanda	Inventory assessment initiated	Under planning
South Africa	Initial inventory conducted	Under planning
Tunisia	Inventory assessment conducted but lack of data	Planned & prepared

Majority of developing countries have either planned or developed their regulations under extended producer responsibility. These countries can learn from the constraints/ steps encountered/ followed in implementing EU directive, while designing their regulations under EPR regime.

3.8. Major constraints/steps in Implementation of the EU Directive

An analysis of the EU directive transposition outcome in the Member States (MS) for the implementation of the EPR provisions has been carried out and summarized below based on literature survey[1]. This analysis gives insight into identification of constraints encountered/steps taken by MS while institutionalizing "take back" mechanism under extended producers responsibility. The following sections describe each of these items with constraints and steps taken during implementation.

3.8.1. Producer Definition

[1] *Knut Sander et. al. Final Report, The Producer Responsibility Principle of the WEEE Directive, August 19th 2007, DG ENV. Study Contract N°07010401/2006/ 449269/MAR/G4*

Producer's definition is one of the most important issues. It covers manufactures, importers, exporters and their relationship with distributors or retailers. Table 3.3 describes the status of exporters and importers in legal text of MS.

A significant issue which has emerged is interpretation of importers and exporters i.e., whether import/and export is defined on the national level ('**National Approach')**, or whether it refers only to the trade with countries outside of EU and not intra-community trade (**'European Approach')**. 22 MS obligate the first importer of EEE products into the national state as producer in the absence of a manufacturer. "European" approaches are defined in the legal text of Finland, Spain and the UK.

Table 3.3 : Interpretation of importers and exporters in the legal text of Member States in EU

Country	Legal clauses defining producers	Approaches
Austria	13(1) of Waste Management Act	National
Belgium (Brussels)	1(3)	National
Belgium (Flanders)	Part 1 Def.	National
Bulgaria	No definition found in the legal text reviewed	
Cyprus	2(1)	National
Czech R.	37g. (e)	National
Denmark	9i(2), Act no. 385 of 25 May 2005	National
Estonia	1(5), Government Regulation 376-2004	National
Finland	3(9), Government Decree 852/2004	European
France	3(1)	National
Germany	3(11)	National
Greece	3(15)	Ambiguous
Hungary	2(d-f)	Ambiguous
Ireland	3(3)	National
Italy	3. (1)m	National
Latvia	202 (1), Waste Management Act	National
Lithuania	2(18), (19), (32) Law on Waste Management	National
Luxembourg	3(i)	National
Malta	3(1)	National
Netherlands	1, Section 1(j)	National
Poland	3(13)	National
Portugal	3(d)	National
Romania	3(i)	National
Slovakia	54a(10)	National
Slovenia	3(20)	National
Spain	2 (c)	European
Sweden	3	National
UK	2 (1)	European

Source: Table No.8, Knut Sander et. al. Final Report, The Producer Responsibility Principle of the WEEE Directive, August 19th 2007, DG ENV. Study Contract N°07010401/2006/449269/MAR/G4

- Since countries have legal jurisdiction within their own borders. They can identify a legal agency within their national territory that can be held liable for WEEE financing obligations under national approach. With the national approach an unfavourable consequences could be the potential that multiple producers exist for the same product in the absence of manufacturers.

- Identifying wholesalers as producers may not be useful in providing incentives for product and product system improvements due to their lack of involvement in and control over product design.

3.8.2. Allocation of Responsibility for Collection of WEEE from Private Households

Allocation of responsibilities related to collection and financing of collection are the two major responsibilities in WEEE/E-waste management. Table 3.4 describes allocation of both types of responsibilities in EU.

Table 3.4: Allocation of Responsibility for Collection of WEEE from private households in EU 27

Member State	Physical Responsibility	Financial Responsibility
Austria	D/M/P	D/P
Belgium (Brussels)	D/M	D
Bulgaria	P	P
Cyprus	P	P
Czech R.	D/P	D/P
Denmark	M	M
Estonia	D/P	D/P
Finland	D1/P	P
France	D/M/P	D/P
Germany	M	M
Greece	P	P
Hungary	P	P
Ireland	D/M	D//P
Italy	D/M	D//M
Latvia	P	P
Lithuania	D/M/P	P
Luxembourg	D/M	D/M
Malta	D/P	D/P
Netherlands	D/M	D/M
Poland	D	D
Portugal	D/M/P	D/P
Romania	M	M
Slovakia	D/P	D/P
Slovenia	D/M	D/M
Spain	D/M	P
Sweden	P	P
UK	D/P	D/P

D = Distributor, M = Municipality, P = Producer (definition varies between national and European approach)

Source: Table No.9, Knut Sander et. al. Final Report, The Producer Responsibility Principle of the WEEE Directive, August 19th 2007, DG ENV. Study Contract N°07010401/2006/449269/MAR/G4.

WEEE directive mandates separate collection of WEEE/E-waste from the rest of the waste stream for the improvement of WEEE/E-waste management in MS. The WEEE Directive distinguishes separate collection of WEEE/E-waste from private households and those from non households.

- Regarding physical responsibility, the directive does not explicitly identify who should be responsible for setting up the infrastructure. It requires distributors to accept WEEE/E-waste from consumers on a one-to-one basis when selling new products. Member State can deviate

from this requirement if they can show that an alternative convenient procedure exists for consumers.

- Concerning financial responsibility, producers are financially responsible for "at least" the collection from collection points onwards. Therefore, gap exists for extending the producer responsibility to finance collection from households.

Table 3.4 shows that municipalities are allocated both physical and financial responsibility in some of the countries. Participation of municipalities in the collection of WEEE/E-waste from households may create a disturbance to a level playing field for producers that choose to set up their own compliance schemes. This is because they may not have access to collection sites that is potentially subsidized by municipalities.

3.8.3 Allocation of Responsibility for Collection, Treatment, Recovery, Recycling and Disposal of WEEE from Private Households deposited at collection points

Member States are unanimous in their assignment of responsibility to producers for this obligation and there are no deviations on this issue.

3.8.4 Financial Mechanism: WEEE from Private Households

Allocation of financial responsibility for WEEE/E-waste from households, for historical and new WEEE/E-waste is an important issue. The distinction between the financial mechanism to be applied for new WEEE/E-waste and historic WEEE/E-waste is that producers bear individual financial responsibility for new WEEE/E-waste and collective responsibility for the historic WEEE/E-waste on all producers on the market.

Three patterns have emerged related to individual financial responsibility for new WEEE/E-waste in EU which are described below in table 3.5.

Table 3.5: Pattern of Financing

Pattern 1: Financing the management of waste from their own products for new WEEE/E-waste In the countries listed below, the legal text clearly distinguishes that producers are required to finance the waste from their own products placed on the market after 13 August 2005.	Belgium (Brussels, Flanders) Cyprus Czech Republic Estonia3 Luxembourg Malta Netherlands Romania Slovakia
Pattern 2: Ambiguous Interpretation of individual financial responsibility Countries do not appear to have formulated their legal text in such a way that an explicit individual financial responsibility is assigned. That is, in many cases producers responsibilities for products placed on the market after 13 August 2005 are mentioned in the plural form. For e.g. In Germany and Austria, producers are given the choice to decide whether they are individually or collectively responsible financially for products placed on the market after 13 August 2006.	Austria Belgium (Walloon) Germany Hungary Ireland Italy Lithuania Poland Portugal Spain Sweden
Pattern 3: Absence of Individual Financial Responsibility for New WEEE/E-waste In many countries listed, allocation of financial responsibility for new WEEE/E-waste is to be determined by a current market share as in the historical WEEE/E-waste financing	Bulgaria Denmark Finland France Greece

mechanism.	Latvia Slovenia UK

Source: Knut Sander et. al. Final Report, The Producer Responsibility Principle of the WEEE Directive, August 19th 2007, DG ENV. Study Contract N°0701040 1/2006/449269/MAR/G4

3.8.5 Form of Financial Guarantee for managing: WEEE from Private Households

Since WEEE Directive stipulates individual financial responsibility for new WEEE/E-waste, producers are required to finance the costs of waste management of their own products. Although producers can choose to fulfil their obligations collectively, they are not forced to finance the cost of other producer's WEEE/E-waste.

- Since it cannot be assumed that all producers that are on the market today will remain active on the market when their products are collected as WEEE/E-waste, a financial guarantee is required to meet these costs in order to prevent its burden on society.

- This guarantee can be the form of participation in collective compliance scheme, a blocked bank account or recycling insurance to satisfy the guarantee requirement.

- Recycling insurance or a blocked bank account as a financial guarantee are more costly than joining a collectively-organised compliance scheme especially for individual system or limited brand compliance. In Germany the guarantee can be based on a collective guarantee, which means that producers will be responsible for other producers' products in the event that one member exits the market.

3.8.6 Distance Sellers

There is a lack of harmony in applying registration of distance sellers either in "sellers" or "end users" member state.

3.8.7 Allocation of Responsibility of WEEE other than WEEE from Private Households

Producers are responsible for historical non–household WEEE/E-waste, when they supply new products on an old-for-new basis. Producers are responsible for the financing of the costs of collection, treatment, recovery and environmentally sound disposal of WEEE/E-waste from users other than private households for products placed on the market after 13 August 2005.

- Majority of MS determined that for historical WEEE, producers are responsible to accept WEEE from end users when purchasing new products.

- If end users of historical WEEE/E-waste are not purchasing new equipment the responsibility rests with the end user. However in Germany, France and the Netherlands the end user is responsible for financing all B2B historical WEEE/E-waste.

There is no explicit mention of the requirement for a guarantee for WEEE/E-waste from users other than private household. However certain some MS have extended the requirement for a financial guarantee for B2B products in addition to WEEE from private households.

3.8.8 Labeling of EEE – Producer Identification

Producer identification is important in order to facilitate the requirement that producers are responsible to finance the management of WEEE/E-waste from their own products. Member States shall ensure that any producer of an electrical or electronic appliance put on the market after 13 August 2005 is clearly identifiable by a mark on the appliance.

Problems arise depending on how MS have interpreted the definition of producer. When the national definition of producer is applied, the identified producer in many circumstances will be the local stakeholders that brings EEE on to the national market. In countries where a manufacturer has no legal operations it is either the wholesaler, distributor or in some circumstances retailers.

3.8.9 Producer Registration & Reporting

WEEE Directive requires MS to draw up national registers and to collect information on the amount of EEE put on the market as well as collected, reused, recycled and recovered within the MS including exports. The largest concern raised by industry stakeholders is the lack of harmonization between the administrative functions of the national producer registers. Actors claim that they must adhere to up to 27 varying requirements for reporting.

- Reporting Periods (frequency of reporting): Reporting of products put on the market varies from monthly, quarterly biannually to annual reporting periods.
- Criteria to distinguish B2C vs. B2B EEE which will end up as WEEE/ E-waste
- Definition of "put on the market": In most Member States, it is when a financial transaction raising VAT occurs that theoretically products are "put on the national market" and sales are required to be reported by the producer who placed those products on the market.
- Reporting Formats: Diversity of reporting formats can lead to increased administrative burden placed on them to report data to national registers.
- Lack of common definition of weight: Divergence exists between Member States application of the definition of weight causing unnecessary administrative burden. In this circumstance, when a new product is launched in the market, the producer must physically weigh the product and relevant components in order to fulfill the weight definition. Again, a common definition would reduce this burden considerably and allow rationalisation of the enterprise resource planning software and develop a standard applicable for all products and Member States.
- Who can register/report as producer: In most countries it is only legal entities that are based in the Member State where products are placed on the market that are entitled to register as the legally obligated producer. Distance sellers that are based in Member States where they must register in countries where they sell products to end users and sell to end users in countries that only allow nationally based actors to be producers, cannot meet their producer responsibility obligations, and are therefore unwilling free-riders.
- Harmonisation efforts: National registers established the European WEEE Registers Network (EWRN). So far the group has been concentrating on establishing contact with all functioning registers and are beginning to address options for registers to harmonise/ apply consistent practices on the approach to address a number of key issues.

3.9 Lessons from overseas product stewardship schemes

Literature cites that no single product stewardship approach could simply be copied or introduced in any country for a given product.

Some of the lessons from the North American and European schemes are given below:

- Program objectives must be clearly defined;
- Collaborative approaches may be helpful in progressing programs;
- Any market intervention should be transparent, justified, fair, and support competition;
- Effective stakeholder engagement in the program design will ensure smooth implementation. Existing or planned waste and recycling systems should be taken into account;
- A robust process for establishing fee structures is essential to ensuring perception of fees as fair, reasonable and based on actual program costs. The fee establishment in an developing process and must be revisited.

- Most manufacturers are active in global markets and tend to achieve consistent standards that have generally been established in Europe.

The lessons from the Asian schemes are given below:

- Effective design of financial incentives is vital to the success of a scheme. Emphasis on sales-based targets does not encourage re-use or design for the environment;
- A coordinated mechanism which creates incentives and obligations for various players along the supply chain can promote resource efficiency;
- Convenience strongly influences consumer behaviour especially “Collection & Transportation”.
- Impacts on competition should be considered—there is a need to balance growth of the recycling industry against opportunity for the formation of monopolies;
- Participation of manufacturers in the physical management of their end-of-life products is a significant factor in success of EPR schemes. Schemes that assign only a financial responsibility for end-of-life goods to the manufacturer are less effective in improving efficiency and reducing the cost of resource recovery;
- Accounting for non-participants is important e.g. Consumers in Japan pay more for disposing of goods manufactured by non-participants,
- End-of-life consumer goods should not be viewed as worthless ‘waste’ but as cost-effective sources of materials.

3.10 Elements of “take back” mechanism

Some of the major elements of “take back” mechanism which emerge from the regulatory framework under extended producer’s responsibility are given below.

1. Definition of WEEE/E-waste
2. Items covered under WEEE/E-waste
3. Cut off date for implementation.
4. WEEE/E-waste inventory
5. Definition of Producer/ Importers/ Exporters, distributors, collection points, dismantlers, recyclers, disports etc.
6. Physical responsibility of collection of WEEE/E-waste from private household and the point/stakeholder from where this responsibility starts. e.g. collection points.
7. Allocation of responsibility for collection, treatment, recovery, recycling & disposal of WEE/E-waste from private household deposited at collection points.
8. Allocation of financial mechanism for collection of WEEE/E-waste from private households.
9. Type of financial mechanism e.g. individual financial responsibility or collective financial responsibility for “historical” or “new” WEEE/E-Waste from private households.
10. Form of financial guarantee for managing WEEE/E-waste from private households.
11. Status of distance sellers and their registration.
12. Allocation of responsibility others
13. Labeling of EEE for producer identification.
14. Producer registration & reporting e.g. reporting periods, criteria for B2B & B2C, definition of “put on the market”, reporting formats.

Clarity on the above elements will assist in development of WEEE/E-waste management system architecture. An example of mapping of above elements has been described in table 3.6, while analyzing draft WEEE/E-waste regulations in India. A copy of these draft regulations is given in Annexure 3.

Table 3.6: Responsibilities of Stakeholders for Collection, Transportation, storage and disposal of E-waste

Responsibilities	Collection		Takeback / setting up of		Registration Authorization	Filing of annual return	Annual Inventory handled	Transportation to					Financing
	Manufacturing / Refurbishing	End of life	Collection centre					Distributor	Producer	Collection Centre	Refurbisher / Dismantlers / Recyclers	TSDF Facility	
			Individual	Collectively									
Producer	√	√	√	√	√ (Rule 11)	√ (Form 3)	√ (Form 2)			√	√	√	√
Distributor			√		√ (Rule 5 Form 4)	√ (Form 3)	√ (Form 2)		√	√			
Refurbisher	√				√ (Rule 6 Form 4)	√ (Form 3)	√ (Form 2)		√	√	√		
Collection Centre			√	√	√ (Form 1)	√ (Form 3)	√ (Form 2)						
Consumer								√		√			
Bulk consumer						√ (Form 3)	√ (Form 3)	√	√	√	√		
Dismantler					√ (Rule 13)	√ (Form 3)	√ (Form 3)				√	√	
Recycler / Reprocessor					√ (Rule 13)	√ (Form 3)	√ (Form 3)				√	√	

Note: √ means "Yes"

Summary analysis of Draft E-waste (Management and Handling) Rules 2010

These rules are based on the principles of "Extended Producer's Responsibility" (EPR). EPR means responsibility of any producer of electrical or electronic equipment, for their products beyond manufacturing until environmentally sound management of their end-of-life products. These rules are applicable to every producer(s), distributer(s), collection centre(s), refurbisher(s), dismantler(s), recycler(s), consumer(s) or bulk consumer(s) involved in the manufacture, sale, purchase and processing of electrical and electronic equipment or components as specified in Schedule-I. They shall come into force with effect from 1st January 2012.

These rules clearly define electrical and electronic equipment (EEE) and E-waste. Definition of E-waste categorizes them into two broad categories "IT and Telecommunication Equipment and Consumer Electrical and Electronics". IT and telecommunication equipment clearly identifies fifteen items, while consumer electrical and electronics category consist of four items. Historical and orphaned E-waste is also defined. Further, regulations clearly define producers, distributer, bulk consumer, consumer, re-furbisher, dismantler and recycler. These form an integral part of material flow chain. Environmentally sound management of e-waste means taking all steps required to ensure that e-waste are managed in a manner which shall protect health and environment against any adverse effects, which may result from hazardous substance contained in such wastes. Facility means any location meant for collection, reception, storage, segregation, refurbishing, dismantling, recycling, treatment and disposal of e-waste. Disposal has been defined any operation which does not lead to recycling, recovery or reuse and includes physic-chemical or biological treatment, incineration and deposition in secured landfill. Transporter has been defined as a person engaged in the off-site transportation of E-waste by air, rail, road or water.

Gap Analysis with respect to Emerging Regulatory Scenario

The emerging regulatory scenario indicates that gaps, which were identified earlier have been covered. The WEEE/ E-waste coverage under existing regulations include the following:

1. WEEE/ E-waste definition in existing regulations
2. WEEE/ E-waste classification as per schedule 1.
3. EEE in the local market to be ROHS compliant by 2015
4. Intact E-waste to be transported as normal EEE
5. Responsibilities of producers, distributors, consumers/ bulk consumers, collection centre, refurbishers, dismantlers and recyclers.
6. The components of WEEE/ E-waste obtained after dismantling and recycling, which are hazardous in nature will be collected and transported in line with Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules 2008 and disposed to TSDF facility if not recoverable, recyclable and reusable.
7. Ban on import of WEEE/ E-waste
8. Import of only ROHS compliant EEE to fulfill obligations under EPR.

Major gaps, which have been identified with respect to implementation of new regulations as per analysis of table 3.6 are given below.

1. Quantity of E-waste at the end of year 2012 is not known as well as it has not been declared.
2. No target has been fixed to collect E-waste from the time of enforcement. Producer is not bound by any collection target. Therefore, there is uncertainty in quantities of channelization of E-waste to registered refurbisher and recycler.
3. How much quantity of EEE has been placed in the market five to ten years prior to 2012 is not known. This figure needs to be established in order to fix the target for producers while enforcing the new E-waste rules from 2012 onwards.
4. There are no mandatory provisions for producers in the rules to declare quantity of EEE placed in the market since 2012.
5. Form 2 and Form 3 in the rules will have no basis to compare the collection efficiency during first three to six years of implementation.
6. Producer is expected to channelize the E-waste through the entire material flow chain and incur all the cost to implement it. However, there is no economic instrument to recover the cost of channelization.
7. The mechanism of implementation of economic instrument in line with E-waste collection target is non-existent and needs to be developed.
8. No mechanism for tracking purchase of EEE by bulk consumers exists. Therefore, filing of "Form 3" by them appears more to be a voluntary exercise by them rather than mandatory.
9. The responsibility of "assigning" orphan product among producers is not clearly defined.
10. Dismantlers and recyclers are not responsible for collection of E-waste. Mechanism for their integration to collection and transportation mechanism is not missing.
11. There is no centralized mechanism to monitor the entire collection, transportation, dismantling, recycling and disposal of E-waste.

3.11 Guidance Notes

Objective: The major objective of guidance notes is to assist policy makers/ other stakeholders draft a new regulations where WEEE/E-waste "takeback" mechanism can be addressed. Six steps identified in guidance notes for WEEE/ E-waste definition given in WEEE/E-waste manual 1 are being integrated to new steps to provide a broad road map to assist in development of an enabling policy/ laws/ regulations and institutional framework for WEEE/ E-waste management.

Guidance Procedure: Guidance procedure includes completion of following Fourteen steps as given below

- *Step 1:* Identify the environmental legislation, where Municipal Solid Waste/ Hazardous Waste or items related to trans-boundary movement of hazardous waste/ Basel Convention are addressed.

- *Step 2:* Identify the sections and subsections where any item related to electrical and electronic equipment are mentioned.

- *Step 3:* Look for following words in the legislation/ regulation and their definition and interpretation:

- Electrical and Electronic Equipment
- Electrical Assemblies/ Components/ Products

- Discarded / Disposal
- Used Goods/ Scrap/ Waste
- Recycle/ Reuse
- Treatment

- *Step 4:* Prepare WEEE/E-waste definition reference matrix with respect to three drivers like definition of "electrical and electronic equipment", description of its "loss of utility" and "way of disposal".

E-waste reference in regulations with respect to identified drivers

Regulation/ Drivers	Drivers		
	Definition of Electrical and Electronic Equipment (Yes/ No)	**Definition of loss of utility (Yes/ No)**	**Definition of way of disposal (Yes/ No)**
"Hazardous" waste			
"Non-Hazardous" waste			
Regulation related to Basel Convention			
Any other regulation			

In case of "Yes" specify the reference, its coverage and application in domestic and trans-boundary trade.

- *Step 5:* Incase WEEE/E-waste is mentioned either directly or indirectly in any regulation, specify roles and responsibility of following stakeholders

- Generator/ Producer
- Exporter/ Importer
- Collector/ Transporter
- Waste Treatment Operator
- Regulatory Agencies (Local/ National)

- *Step 6:* Identify the gaps from the matrix and recommend tentative content, extent and coverage of WEEE/E-waste.

- *Step 7:* Identification of EEE items in WEEE/E-waste inventory which are manufactured, imported or exported. This step will assist in defining producer.

	Item					
	PC	**TV**	**Cellphone**	**Refrigerator**		
Manufactured (Y/N)						
Imported (Y/N)						
Exported (Y/N)						

Note: Y/N: Yes or No

- *Step 8:* Define producers, importers, exporters, distributors/retailers, collection points, dismantlers, recycler and disposal based on step 1 to 7.

- *Step 9:* Carry out due diligence on WEEE/ E-waste policy/ laws/ regulations eg. EPR/ WEEE directive/ other country policy and regulatory framework. Identify the gaps with respect to existing environmental regulations (outputs of step 1 to 3) and recommend tentative content, extent and coverage of WEEE/E-waste policy/ laws/ regulatory framework.

- *Step 10:* Allocate responsibility for collection, treatment, recovery, recycling and disposal of WEEE/E-waste from private household from other sources e.g. commercial.

- *Step 11:* Financial mechanism and allocate financial responsibility e.g. individual/collective financial responsibility for “new / historical” WEEE-E-waste using the following template.

Year	Itemwise WEEE/E-waste Inventory from						
	Household	Individual Financial responsibility	Collective Financial responsibility	Financial Guarantee	Other Sources	Individual Financial responsibility	Collective Financial responsibility
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

- *Step 12:* Map the proposed WEEE/E-waste regulations including responsibilities as per the format given below. An example of this mapping has been carried out for draft WEEE/E-waste regulations from India given below.

Responsibilities	Collection		Takeback / setting up of		Registration Authorization	Filing of annual return	Annual Inventory handled	Transportation to					Financing
			Collection centre										
	Manufacturing / Refurbishing	End of life	Individual	Collectively				Distributor	Producer	Collection Centre	Refurbisher / Dismantlers / Recyclers	TSDF Facility	
Producer													
Distributor													
Refurbisher													
Collection Centre													
Consumer													
Bulk consumer													
Dismantler													
Recycler / Reprocessor													
Note: √ means “Yes”													

- *Step 13:* Carryout gap analysis with respect to outputs of step 12.

- *Step 14:* Organize a workshop of major stakeholders like line ministries/ government agencies (IT/ Electronics/ Consumer Durables/ Electrical/ Industries/ Environment/ Forests/ Finance/ Economy and Commerce), industry associations, retailer's associations, municipalities, formal and informal recyclers, transporters, operators for incinerators/ hazardous waste management facilities and NGOs to arrive at an acceptable WEEE/ E-waste policy/ laws/ regulations & institutional mechanism.

Chapter 4: WEEE/E-waste collection and transportation under 'take back'

4.0 Introduction

An efficient WEEE/ E-waste collection and transportation system will ensure reuse, recycle and adequate WEEE/ E-waste management including avoiding damage or breaking components that contain hazardous substances. Therefore, WEEE/E-waste collection and transportation under 'take back' system requires technical intervention at each step along the material flow chain. This intervention has been described in terms of collection systems consisting of collection channels, system architecture and management and infrastructure required to support it. Finally, guidance notes provide a broad framework to assist in design and development of technical specifications for WEEE/ E-waste collection and transportation system.

4.1 Collection systems

WEEE/ E-waste collection systems have been described in terms of WEEE/E-waste collection channels and method of collection. Each of these items followed by examples is described below.

4.1.1 Collection Channels

The three major WEEE / E-waste collection channels, which are being successfully used, are municipal collection sites, retailer take-back, and producer take-back. The collection system used by each collection channel is given below.

4.1.1.1 Retailer Take Back and Storage

In this collection channel, consumers can take back WEEE/ E-waste to retail stores that distribute similar products. They may give back the product at the retail store in exchange for purchase of a new product or without any purchase. It is sometimes done at the point of home delivery and installation of a new item by the retailer/distributor. Where available, this service is usually free to private households.

4.1.1.2 Producer Take Back and Storage

In this collection channel, WEEE/ E-waste is taken back by producers either directly at their facilities or pre-determined collection centres and then fed into the WEEE/ E-waste system. This usually applies to larger commercial equipment and operates on the principle of "new equipment replacing the old ones".

4.1.1.3 Municipal Collection and Storage

In this collection channel, consumers and/ or businesses can leave WEEE/ E-waste at municipal sites. A number of sorting containers and/or pallets are provided at their collection site according to the product scope and logistical arrangements with recyclers and transporters. This collection mechanism is usually free for household WEEE/ E-waste, although charges sometimes apply for commercial companies.

4.1.1.4 Other Collection Channels

Other collection channels include collection points, where consumers and or businesses can leave/ drop off WEEE/ E-waste at specially created sites/centers. These can be specialized sorting centers controlled by the collective system/ PRO or more commonly third party sites, whose operators may be remunerated for the provision of space. A

number of sorting containers and/or pallets are provided according to the product scope and logistical arrangements with recyclers and transporters. This is usually free for household WEEE/ E-waste, but sometimes charges apply for commercial products.

Existing common collection methods includes permanent Drop-off sites with regular hours; special collection events; retail stores; regular curbside pick-up and as needed scheduled pick-up. A combination of these methods is used by system architect to develop collection channel.

The majority of schemes in Europe operate around the municipal collection system eg. ICT Milieu, in Denmark and El Kretsen in Sweden use this channel exclusively. Others, such as Recupel, Belgium, NVMP, the Netherlands and El-Retur, Norway encourage retailer participation. Some non EU schemes, such as SWICO, Switzerland achieved much higher levels of collection via the retail chain.

Municipal solid waste collection sites, which are used for WEEE / E-waste collection, have been found to be very cost effective as minimal up-gradation of these facilities are required. Similarly, drop-off and permanent collection point at retail outlets have been found to be very successful. The operation of collection system described above require storage and transportation infrastructure as described below.

The primary methods for accomplishing collection include permanent drop-off facility, special drop-off/ collection events, regular curbside pickup, door-to-door pick-up and as needed scheduled pick up. The mechanism for accomplishing a method depends on the stakeholder responsible for collection, which could be a government, retail, original equipment manufacturer (OEM) or commercial entity. A summary of collection mechanisms involving four stakeholders are listed in Table 4.1.

Table 4.1: Collection mechanisms for various stakeholders

Modes / Stakeholders	**Government**	**Retail**	**Commercial**	**OEM**
Permanent Drop-Off Location	Co-located with offices or other hazardous waste drop-off locations	Located at retail Stores	Located at entity	Location created In partnership with one of other three stakeholders
Special Drop-Off / Collection Event	A one- or two-day event dedicated to generators dropping off E-waste at a location affiliated with the stakeholder			
Door-to-Door Pick-Up	Curbside pick-up	N/A	Direct pick-up, particularly from other commercial entities	Pick-up by mail or logistics company

Source: Prepared from Solving the E-waste Problem (Step) White Paper; E-waste Take-Back System Design and Policy Approaches, January 2009.

4.2 WEEE / E-waste "take back" Architecture and System Management

Every recycling system has some form of management structure responsible for coordinating both the monetary and material flows through the system. The system manager must be responsible for coordinating the actions of various stakeholders and enforcing the system rules and regulations. The jurisdiction of system manager is shown in figure 4.1. System management responsibilities can include establishment and collection of recycling fees, contracting transportation logistics firms and processors, setting and

enforcing processing standards, enforcing sales bans (for noncompliant producers), and advertising to increase public awareness of and participation in the system. Systems often differ with respect to the number of transportation, processing, and other options they provide to those held financially responsible.

System Manager

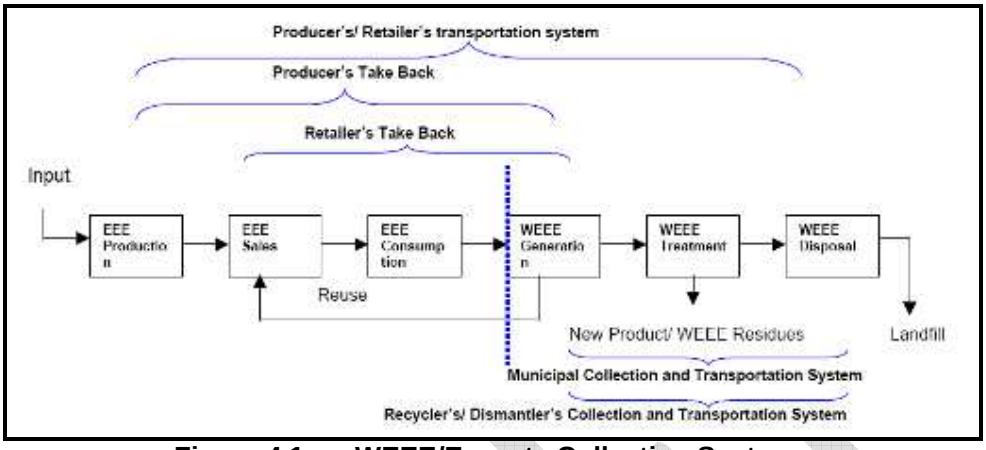


Figure 4.1: WEEE/E-waste Collection Systems

Source: WEEE/E-waste Inventory Assessment – Manual 2; United Nation Environmental Programme (UNEP), Division of Technology, Industries and Economics, International Environmental Technology Centre, Osaka/Shiga.

The system management can be done by producers, recyclers, governmental entities, or third party organizations. Each of these system manager is described below.

Government entities may be tasked with managing take-back systems. In particular, government agencies that handle environmental affairs are typically given the additional responsibilities associated with supervising system operations. These responsibilities might include collection fees, reimbursing collectors and processors, setting and enforcing treatment standards, enforcing sales bans on OEMs, who do not comply with take-back system laws and approving processors and collectors to take part in the system. Government entities may be tasked with supervising a single take-back system for an entire region or multiple systems within a region.

A third party organization (TPO) also provides the management and administration of a recycling programme for its members. The TPOs membership may be made up entirely of manufacturers of the products being recycled, but it can include government entities and other members such as recyclers or collectors. Alternatively, it may be a single entity created by the government to manage a system. Activities carried out by TPOs, or compliance schemes, vary from country to country, depending on specific legislation requirements, but also depend on services offered to members.

For example, Sweden requires all logistics and processors be hired through El-Kretsen, the Swedish E-waste system manager, whereas Germany has over 20 system managers each choosing their own logistics and processing providers. Thus, in Sweden, the electronics manufacturers held responsible for the majority of the E-waste system finances must pay the bills distributed by El-Kretsen if they wish to sell their products in Sweden. In Germany, the producers may choose to participate in any one of several E-waste recycling systems.

Some producers have established individual product stewardship programmes. Under such scenarios two different options exist: (i) A product recovery network, which includes its own recycling infrastructure and refurbishment or recycling programmes to process own appliances. The OEM has full control over operations and a direct involvement in the entire process. (ii) Service providers are contracted in order to collect and treat the OEM's proprietary discarded appliances. The level of engagement of the OEM is determined by the contractual agreement and can vary from full oversight of the process to insignificant engagement in how the contracted operations are per- formed.

The overall WEEE/E-waste management system comprises of three smaller systems:

1. A collection system, which projects the mass of e-waste collected, cost of operating collection sites and the costs and environmental impacts of transporting e-waste as a function of the geo-economic context and the chosen number of available collection and processing points;
2. A processing system , which calculates the amount of various materials recovered from the recycling process and the associated revenues and costs to the system;
3. A management and financing system, which accounts for the overhead costs of operating an e-waste system.

Within system architecture, the optimization of collection and transportation system can be carried out as shown in figure 4.2. Processing model has already been described in E-waste manual 2.

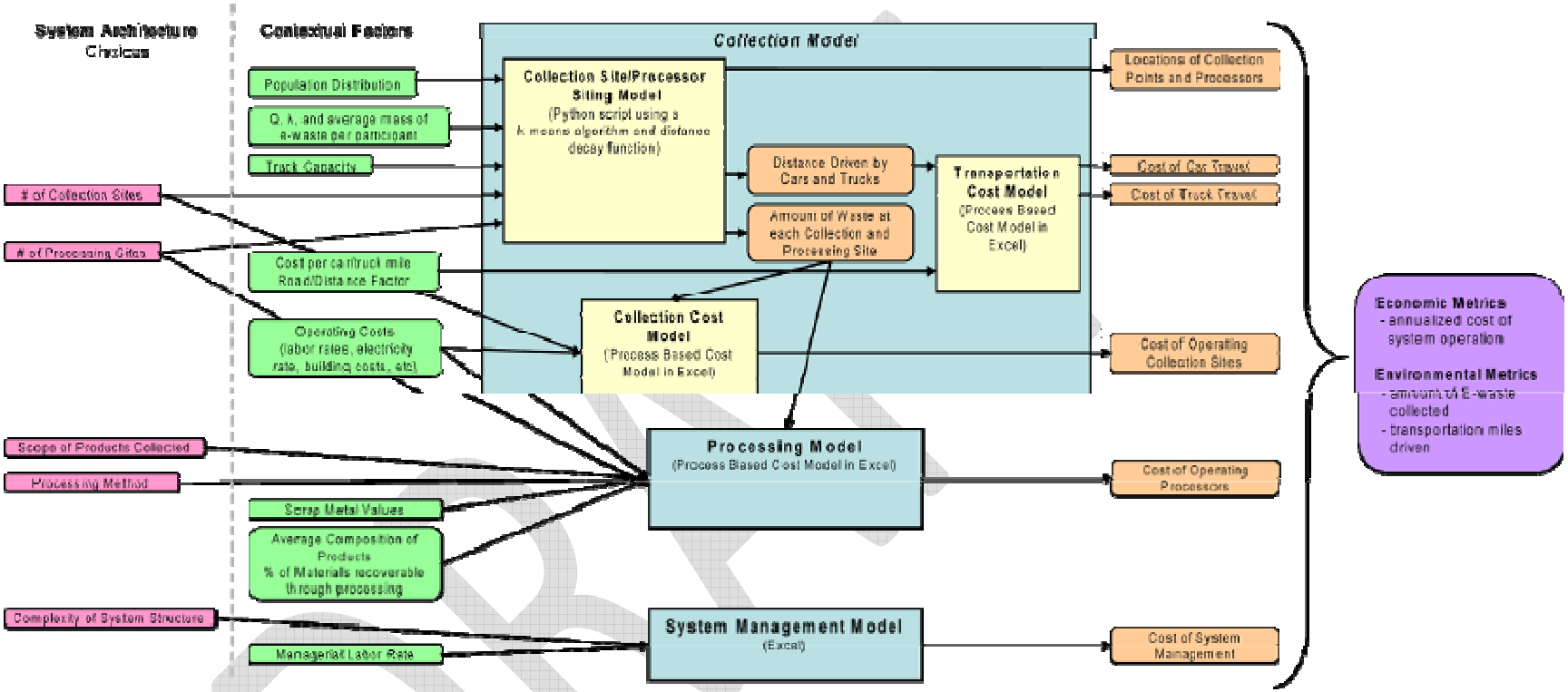


Figure 4.2: Collection and Transportation System within Overall WEEE/E-waste recycling system

Source: Susan Fredholm, Evaluating Electronic Waste Recycling Systems:The Influence of Physical Architecture on System Performance, Submitted to the Engineering Systems Division in Partial Fulfillment of the Requirements for the Degree of Master of Science in Technology and Policy at the Massachusetts Institute of Technology, September 2008.

4.3 Collection & Transportation Infrastructure

Collection target and the transportation required to achieve the target defines the collection and transportation infrastructure in a geographical region. Collection infrastructure requires establishment of WEEE/ E-waste collection points and storage area in a city/ geographical region. Different criteria have been used in different countries to identify these locations. The various steps to fix location of collection point/ storage facility are given below:

1. Study the consumer behaviour for the best used option for collection point i.e. retailer take back collection centre, municipal collection centre or other through a pilot survey.
   The literature source[2] cites that in Switzerland, transport distances of 35 to 50 km between WEEEE-waste collection points (according to type of collection point), which is weighted according to actual collection amount of various types of collection point, have been taken for life cycle assessment calculation of WEEE/E-waste collection systems.
2. Calculate the WEEE/E-waste haulage capacity
3. Calculate the number of trucks/ trailers of different capacities required to transport the WEEE/ E-waste
4. Optimize the route and frequency of collection based on accessibility of the collection site.

The collection system is designed based on collection target i.e. WEEE/E-waste collected and the distance driven to bring it to the recycling centre. This requires fixing of the geographical boundary or the catchment area for system's operation. An assessment of the catchment area under "business as usual" i.e. without any economic instrument can be carried out by comparing the cost of collection and transportation versus "value" of recoverable item from "targeted" WEEE/E-waste. Value of recoverable item from the targeted WEEE/E-waste can be assessed as shown in example given in Annexure 4.

Cost of collection = Cost of collection centre + Cost of transportation

Cost of collection includes sum of the cost of establishing and operating collection centre and WEEE/E-waste transportation. Cost of transportation can be calculated based on ton per kilometer or per mile rate taken from transporters. Cost of collection centre is calculated based on costs of exogenous variables (capital cost and other cost factors), facility operations and packaging using inputs from Annexure 5.

An example of assessment of "cost of collection" of WEEE/E-waste in USA for CRT TV, CRT monitors and laptops is given below.

[2] R.Hishier et al. 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 25 92005) 525-539

Cost of collection centre

1. Exogenous Variables

Average Employee Wage	$16	/hr	(LABORSTA
Benefits	82%		(Cascadia 2003)
Working days	260	days/yr	
Number of shifts	1	shifts/day	
Paid time	7	Hrs/shift	
Financial Rate of Return	15	%	
Equipment Life	10	Yrs	
Building Life	20	Yrs	
Price of Electricity	$0.12	/kWh	(EIA 2006)
Price of Building Space	$1,00	/sq m	
Investment Maintenance	5%	%	
Overhead Cost	25%	%	

2. Facility Operations

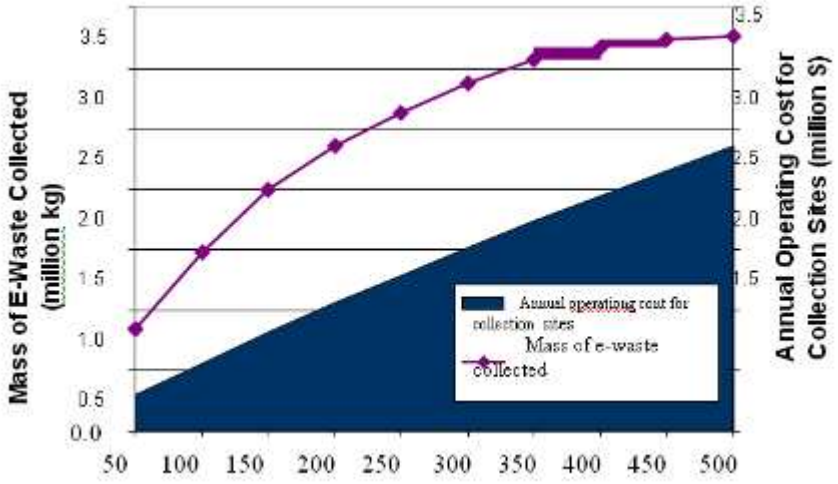
Capacity/Actual Processed	10000	
Equipment Cost	$2,00	/station
Space Requirement	100	m^2/station
Processing Rate	300	kg/hr/station
Workers	1	workers/station
Power consumption	1	kW/station
Is equipment dedicated?	0	[1=Y 0=N]
Forklift Cost	$20,00	
Forklifts required per station	0.25	forklifts/station
Forklift power (electric)	2	kW/forklift
Forklift dedicated?	0	[1=Y 0=N]

3. Packaging

Gaylord cost	$10	/Gaylord	Take it Back
Gaylord capacity	200	Kg	Network (2003)
Pallet cost	$8	/pallet	
Cardboard layer cost	$3	/ea	
Pallet CRT capacity	27	/pallet	(FEC 2006)
Cardboard layers per CRT pallet	2	/pallet	
Pallet CPU capacity	45	/pallet	(FEC 2006)
Cardboard layers per CPU pallet	2	/pallet	
Shrink wrap cost	$0.03	/m	
Shrink wrap amount per pallet	17.48	m/pallet	

Source: Susan Fredholm, Evaluating Electronic Waste Recycling Systems:The Influence of Physical Architecture on System Performance, Submitted to the Engineering Systems Division in Partial Fulfillment of the Requirements for the Degree of Master of Science in Technology and Policy at the Massachusetts Institute of Technology, September 2008

It has been observed that the greater number of collection centre in a particular catchment, the greater will be WEEE/E-waste collection efficiency. A 'cost benefit' analysis can be carried out by comparing cost of collection and transportation versus "value" of recoverable item from "targeted" WEEE/E-waste. An example for Maine in USA is shown in figure 4.3.



Source: Susan Fredholm, Evaluating Electronic Waste Recycling Systems:The Influence of Physical Architecture on System Performance, Submitted to the Engineering Systems Division in Partial Fulfillment of the Requirements for the Degree of Master of Science in Technology and Policy at the Massachusetts Institute of Technology, September 2008

Figure 4.3: Modeled Mass of E-Waste Collected and Annual Operational Costs of Collection in Maine, USA as a function of the number of collection sites.

An example of the cost of collection and transportation versus "value" of recoverable item from "targeted" WEEE/E-waste in India is table 4.2.

Table 4.2: Tentative Recovery Vs Total Cost of Procurement

No. of Computers	Wt in Kgs	Cost of Transport			Cost of Computer / Kg @ Rs.20 – 25	Total Cost			Total Recovery Cost (Rs.)
		50 km	100 km	200 km		50	100	200	
2	54	400	800	1600	1080 – 1350	1480 - 1750	1880 - 2150	2680 - 2950	2797.20
10	270	400	800	1600	5400 – 6750	5800 - 7150	6200 - 7550	7000 - 8350	13986.00
50	1350	600	1200	2400	27000 - 33750	27600 - 34350	28200 - 34950	29400 - 36150	69930.00
100	2700	750	1500	3000	54000 - 67500	54750 - 68250	55500 - 69000	57000 - 70500	139860.00
	Cost of Transportation assuming Full Load								
	Small Pick up			@ Rs. 8					
	Mini Trucks			@ Rs. 12					
	Canter			@ Rs. 15					

Table 4.2 indicates that under "business as usual", where there is no economic instrument, it is viable to have a catchment area between 700 km to 1000 km. This assessment further indicates the price sensitivity for procuring WEEE/E-waste with respect to distance to be transported as well as quantity to be collected. Further, it assists in fixing the "feeder collection stations" and "daughter collection stations". Feeder collection stations cater to a number of daughter stations, while daughter collection stations will capture the WEEE/E-waste inventory based local factors. Therefore, a pan country WEEE/E-waste collection and transportation system can be conceptualized based on number of feeder and daughter stations. In case of B2B, it has been observed that the collection and transportation system via feeder and daughter mode is very smooth. However for B2C or household collection, a number of local factors are responsible for locating the collection centre. The major factors determining the location of collection centre under B2C include the WEEE/E-waste generated, population density and distance of the collection centre.

Literature cites that some of the models, which have been used to identify the number of WEEE/E-waste collection sites, follow the hypothesis that an individual's likelihood of participation decays with increasing distance to nearest collection site. The mathematical formulation of this phenomenon is given below.

$$eWaste\ \underline{Collected} = eWaste\ Participant \bullet \sum_{population} [\underline{Max}\quad Participation \square e - e^{\lambda * dis\tan ce}]$$

Or

$$eWaste\ \underline{Collected} = eWaste\ Per\ Participant \bullet \sum_{town} [\underline{town\ population} \square \underline{Max}\quad Participation \square e - e^{\lambda * dis\tan ce}]$$

Source: Susan Fredholm, Evaluating Electronic Waste Recycling Systems:The Influence of Physical Architecture on System Performance, Submitted to the Engineering Systems Division in Partial Fulfillment of the Requirements for the Degree of Master of Science in Technology and Policy at the Massachusetts Institute of Technology, September 2008

Where eWaste_Per_Participant represents the average mass of E-waste each participant will bring to the collection site.

Max_Participation, or Q, represents the maximum likelihood, as a percentage, that a member of the population will participate in the E-waste program. Among the long list of factors which can influence Q are the individual's age, education, likelihood of having e-waste, convenience of drop-off points, public awareness of the system and other similar factors.

Max _ Participation = (% with E-Waste) • (% participating if distance = 0)

λ (Lambda) determines the strength of the decay in participation as a function of distance

Distance is the length between an individual's home and his or her nearest collection site.

The participation rate of E-waste owners in an E-waste recycling system is determined by many factors, which are governed by consumer behavior. The consumer behavior can be determined through a pilot survey. The tentative locations during pilot survey can be fixed

based on land use categories and mapping of WEEE/E-waste trade value chain described in Annexure 5 prepared from WEEE/E-waste manual 2. The results of pilot survey can be simulated to arrive at optimum location.

Carry out the cost benefit analysis by comparing the total cost versus benefits based system catchment / geographical area and system architecture versus benefits to be accrued. Calculate the viability gap analysis for each item.

4.4 Guidance Notes

Objective: The major objective of guidance notes is to assist policy makers/ other stakeholders to design a "collection and transportation" system under "take back" mechanism. This includes design of collection channel, system architecture, system manager and system infrastructure within a geographical area.

Guidance Procedure: Guidance procedure includes completion of following …….. steps as given below

Step 1: Fix the target of WEEE/E-waste inventory to be collected and transported in each geographic area. This can be accomplished by using the outputs from step 1 and step 2 of guidance procedures in chapter 2.

Step 2: Assess the WEEE/E-waste collection and transportation infrastructure requirement to meet the target to be achieved.

Step 3: Assess the price sensitivity of procuring and collecting WEEE/E-waste with respect to distance to be travelled to the collection centre and quantity to be collected under "business a usual" scenario as given in table 4.2. This can also be correlated to the capacity of recycling facility in terms of numbers of trucks required per day from the catchment area to feed the recycling facility.

Step 4: Carry out the pilot study in order to assess consumer behavior and address collection and transportation requirement for B2C.

Step 5: Assess the WEEE/E-waste collection and transportation infrastructure requirement based on the output of Step 3 and step 4.

Step 6: Carry out the "cost benefit" analysis of infrastructure under "business as usual" and assess the viability gap for each WEEE/E-waste item. This will form the basis of development of any econometric tool e.g. EOL tax or advanced recycling fee.

Chapter 5: Financing Schemes

5.0 Introduction

This chapter describes financing of existing WEEE/E-waste take back activities and allocation of economic responsibilities in countries for WEEE/E-waste potential take-back systems. The way stakeholders financially contribute to different activities varies and many models exist applicable to the conditions in a given country. Further, this chapter will provide guidance on assessing the financial flows. This will further provide guidance to assess the impact on stakeholders, compliance with legislative requirements and its economic and financial effectiveness. The major guidance on each model will be provided on design of financial/ economic instrument and its application in the model. The economic/ financial instrument may consists of different options. These options include actual costs of recycling, projected costs of recycling per category and cross subsidization considering WEEE/E-waste from ICT and white goods. Each of these items are described in the following sections.

5.1 Financing Mechanism of WEEE / E-Waste 'take – back' system

The financing mechanism of WEEE/ E-waste take back activities and allocation of economic responsibilities along the material chain is complex and challenging both in countries with existing "take back" system and developing countries. This mechanism includes design and operation of financing the system architecture of downstream WEEE/E-waste activities and allocation of economic responsibilities to different stakeholders. The activities along the downstream chain include waste generation, collection, transportation, treatment and disposal. There are three main stakeholders, society, consumers and producers, who share the economic responsibility to finance WEEE/E-Waste management.

- Society: WEEE/E-waste management systems could be financed by the entire society (i.e. by taxpayers), especially when government organizations keep control over operations.

- Consumers: This is based on "polluter pays principle", where the polluter is recognized as the person responsible for discarding an end-of-life appliance. It could also be argued that even though a producer may bear financial responsibility, consumers will eventually pay the end-of-life costs as an increase of the product price, even when no up-front external charges are paid at point of sale.

- Producers: This is implementation of various degrees of the extended producer responsibility principle. It should be noted that although the financing of systems is ensured by producers, internalization of costs in the product price can arise by means of the reduction of the producer's sales margins, resulting in the financial impact fully borne by the producer, or an increase of sales price, resulting in the financial impact indirectly borne by the consumer.

Out of the three different approaches mentioned above, a combination of "consumers" and "producer" approach is being currently used in the majority of countries for WEEE/E-waste management. This combination includes integration of "polluter pays principle" with "extended producer responsibility", which form the basis for design of "compliance scheme". Different financing models currently using this approach are described below.

5.2 Financing Models & Funding for Supply Chains

Financing models of WEEE/E-waste take back systems are based on basic principles of the financial management of compliance schemes. These compliance schemes are designed to minimize the cost of operation, while meeting the compliance requirements mentioned in the regulations. The basic principle is to minimize cost of compliance while fulfilling regulatory requirements, meeting environmental goal as well as recovering the items of economic value. These principles define, Financial flows; Linkages between stakeholders involved in the flow; Assess the impact on stakeholders; Compliance with legislative requirements and assess the economic and financial effectiveness of any compliance scheme.

Literature[3] cites that there are five generic financing models which are operating in the world. These models are Compliance cost model; Compliance cost visible fee model; Reimbursed compliance cost model; Recycling fee model and End of life model. Each model funds its own supply chain using different instruments. The flow of funds using these instruments cover different parts of material flow chain involved in WEEE/E-waste management. Each of these models are described below.

5.2.1 Compliance Cost Model

In a compliance cost model, producers finance activities in the system. It includes their direct involvement as stakeholders in the financing of the system. They bear the costs by joining a compliance scheme, financing their own take-back system or product stewardship program as well as historical and orphan waste. Salient features for compliance cost model are given below.

1. Producers join a compliance scheme by paying money to cover the costs of take-back and recycling programs and all other services included in the scheme.
2. The cost could be unit-based or weight-based. It is assessed by the scheme on the basis of actual recycling costs or estimation of future costs.
3. Compliance costs are assessed based on fees charged by treatment plants and fee charged by logistics partners.
4. The contractual agreements between producers and the compliance scheme generally contain:
    - Provisions of cost revisions (quarterly, annually/ others)
    - Specific provisions to treat historical and orphan waste

Generally, the burden of financing historical and orphan waste in a given year is usually shared collectively by those producers, who are active in the market in any given year. The mapping of these features depicting the financial flows in the WEEE/E-waste management system is shown in figure 5.1. The orange line in figure 5.1 indicates the financial flow.

[3] Solving the E-waste Problem (StEP) White Paper, E-waste Take-Back System Design and Policy Approaches, January 2009, ISSN:2017-3576 (Online); ISSN:1999-7965 (In-Print)

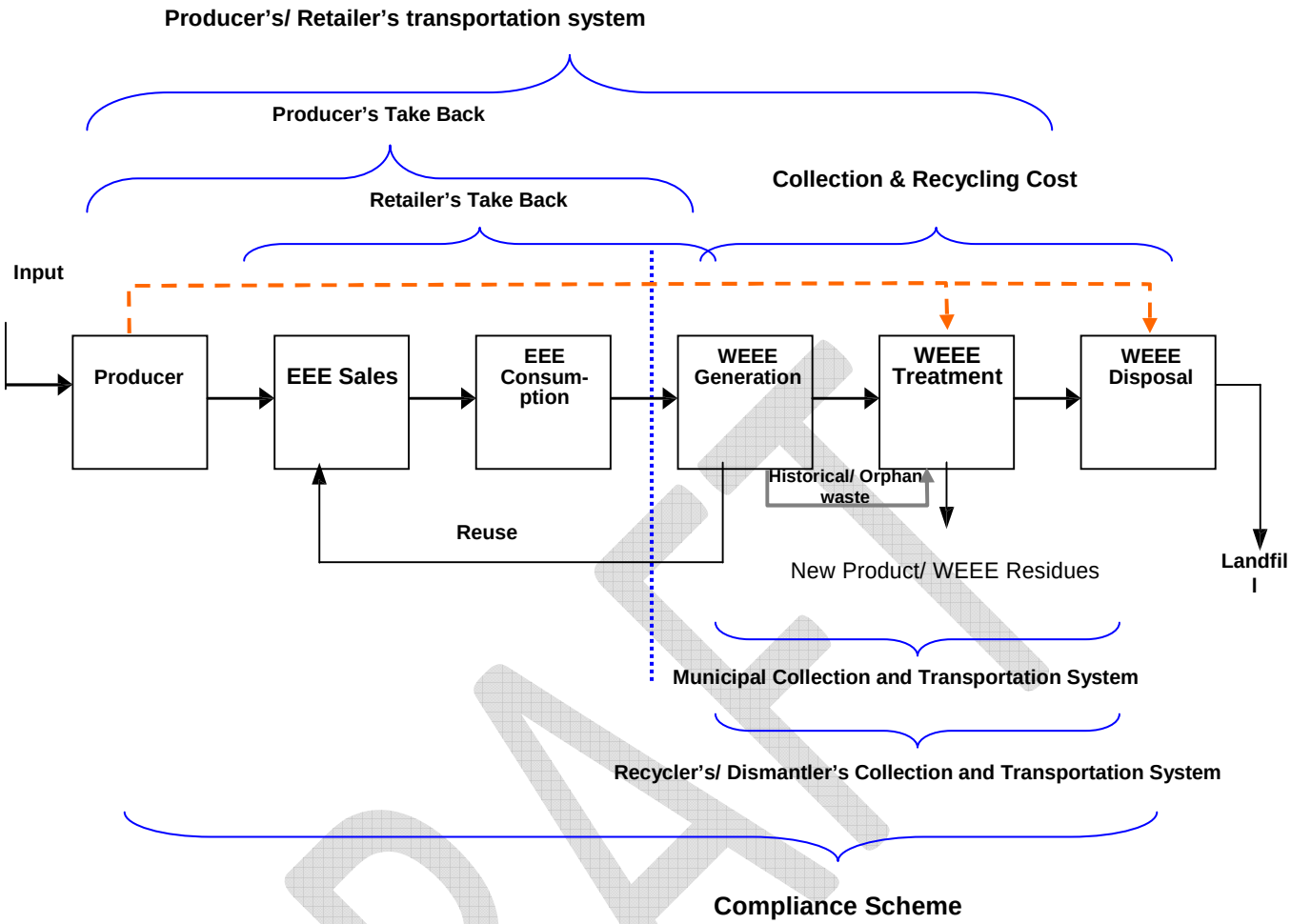


Figure 5.1: WEEE / E-Waste Compliance Cost Model

5.2.2 Compliance Cost & Visible Fee Model

Compliance cost & visible fee model uses salient features of compliance cost model described in section 5.2.1 as well as usage of an economic instrument. It includes their sharing of involvement along with consumers as stakeholders in the financing of the system. They bear the costs by joining a compliance scheme, financing their own take-back system or product stewardship program as well as historical and orphan waste. They use an economic instrument "Visible Fee" to generate revenues from final users to cover historical waste management costs. Salient features of compliance cost & visible fee model are given below.

1. The model combines two different financial mechanisms for the two separate flows of appliances (i.e., new and historical).
2. The compliance cost and visible fee model includes direct involvement of producers as stakeholders in the financing of the system.
3. Producers are allowed to share financial responsibility with consumers to cover the costs of historical waste.

The mapping of these features depicting the financial flows in the WEEE/E-waste management system is shown in figure 5.2. The orange line in figure 5.2 indicates the financial flow from the producers, while green lines show financial flows due to usage of economic instrument.

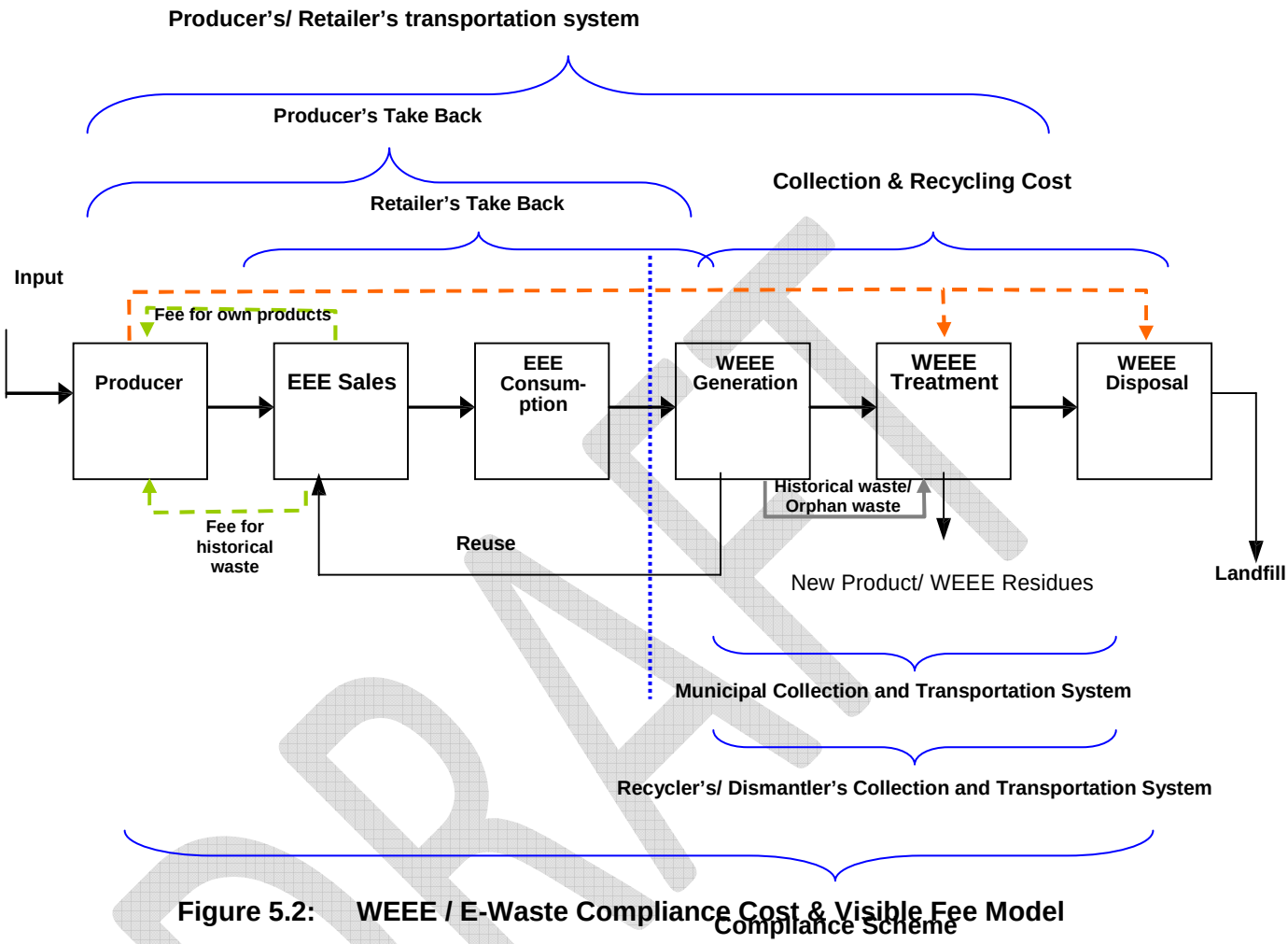


Figure 5.2: WEEE / E-Waste Compliance Cost & Visible Fee Model

5.2.3 Reimbursed Compliance Cost Model

Reimbursed compliance cost model uses salient features of compliance cost model described in section 5.2.1 as well as usage of an economic instrument. It also includes their sharing of involvement along with consumers as stakeholders in the financing of the system. They bear the costs by joining a compliance scheme, financing their own take-back system or product stewardship program as well as historical and orphan waste. They use an economic instrument "Visible Fee" to generate revenues from final users to cover historical waste management costs. Salient features of compliance cost & visible fee model are given below.

1. Producers pay compliance schemes upfront when placing appliances on the market
2. Producers are reimbursed for the costs when selling appliances to final users through visible fee.

3. Consumers are financing the entire system by paying the Visible Fee.

The mapping of these features depicting the financial flows in the WEEE/E-waste management system is shown in figure 5.3. The green line in figure 5.3 indicates the financial flow from the producers, while light green lines show financial flows due to usage of visible fee.

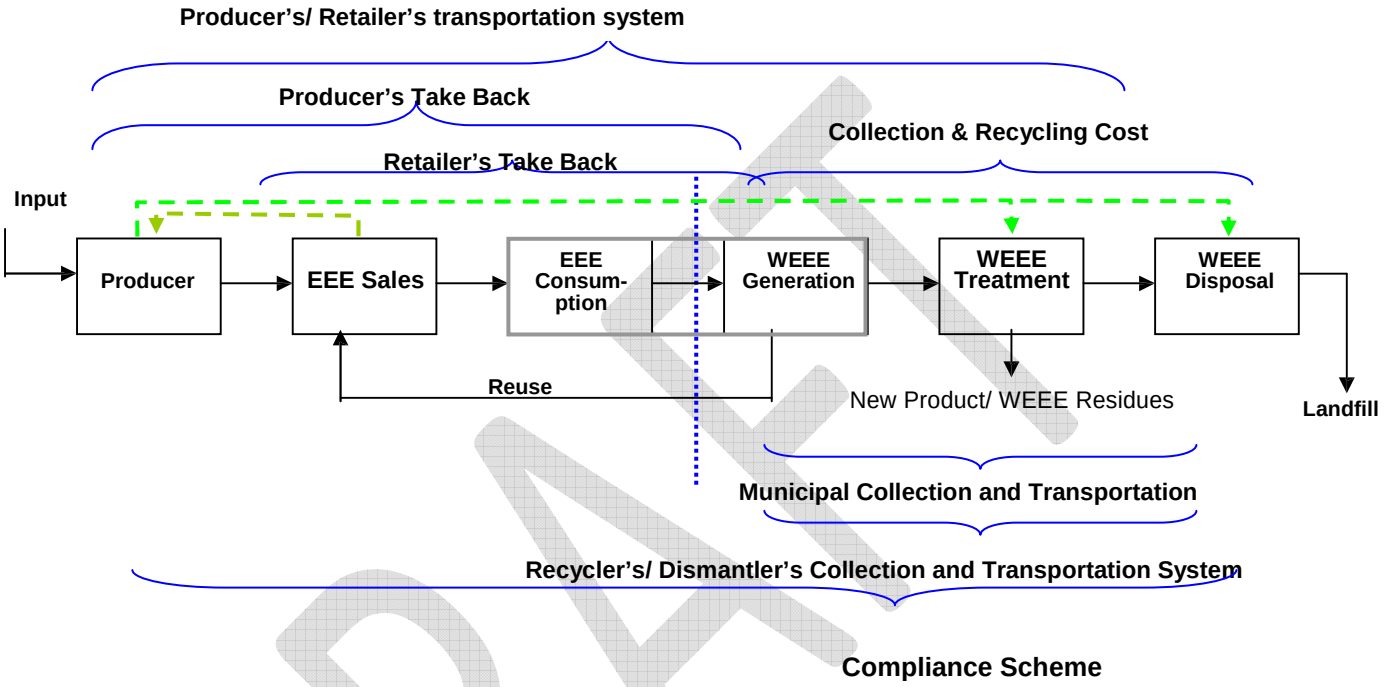


Figure 5.3: WEEE / E-Waste Reimbursed Compliance Cost Model

5.2.4 Recycling Fee Model

Recycling fee model does not involve producers to finance the WEEE/E-waste management. "Recycling fee or Recovery fee", which is paid by consumers when they buy new equipment, is used to finance the cost of WEEE/E-waste management. Therefore, the consumers bear the entire costs for management of WEEE/ E-waste. Salient features of recycling fee model are given below.

1. Recycling fee could be used to raise funds for future treatment of appliances currently being sold.
2. The future recycling costs for each appliance is estimated in advance and paid up-front by the consumer when buying the appliance.
3. Recycling costs currently arising are shared among appliances being sold.
4. The main difference between the two options is that in the first case the amount paid by the consumer represents an upfront estimation of costs arising in the future, whereas in the second case appliances sold contribute, by means of a fee, to the financing of current recycling costs.

The mapping of these features depicting the financial flows in the WEEE/E-waste management system is shown in figure 5.4. The green line in figure 5.4 indicates the financial flow from the consumers due to usage of economic instrument.

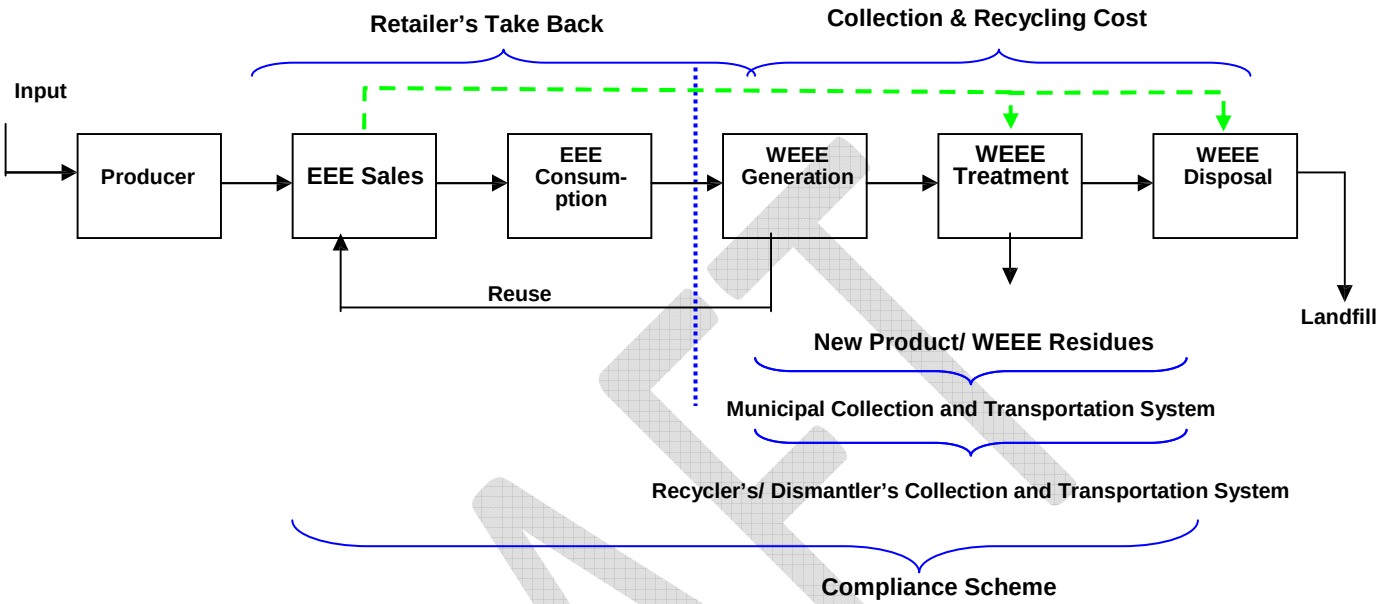


Figure 5.4: WEEE / E-Waste Recycling Fee Model

5.2.5 End-of-Life Fee Model

End-of-life fee model includes payment of end of life fee by generators of WEEE/ E-waste (i.e., the last owner of a product who decides to recycle it) to an entity who assumes responsibility for recycling the EoL product. The fee covers collection and recycling costs. The mapping of these features depicting the financial flows in the WEEE/E-waste management system is shown in figure 5.5. The green line in figure 5.5 indicates the financial flow from the WEEE/E-waste generators to any entity responsible for recycling.

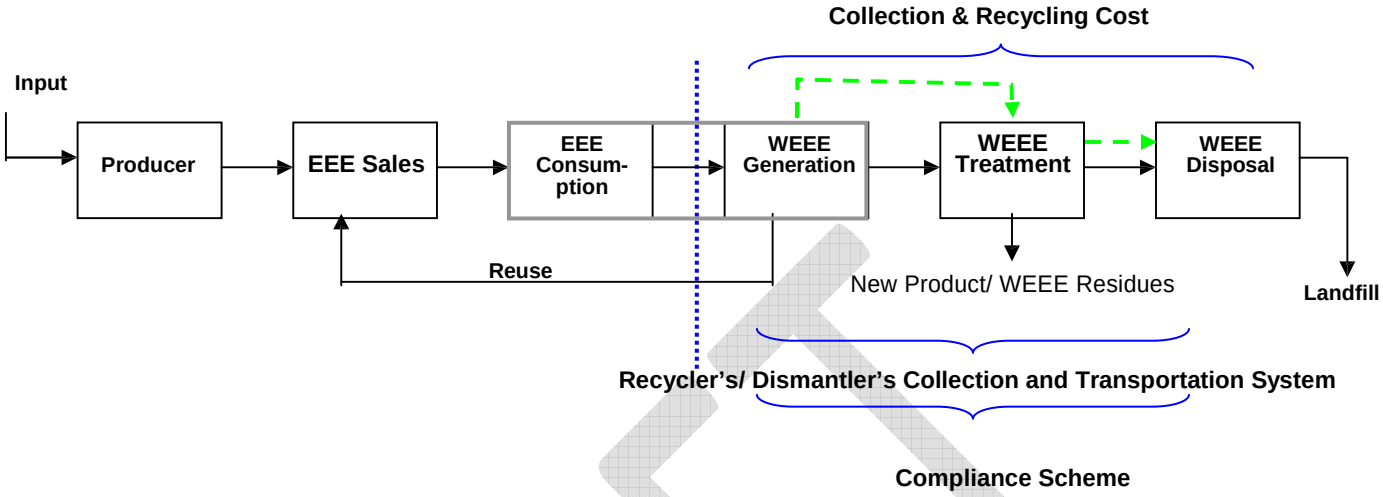


Figure 5.5: WEEE / E-Waste End – of – Life Fee Financing Model

5.3 Fee/Economic Instrument

A number of policy instruments broadly classified under administrative, economic and informative instruments are being used under extended producer responsibility regime in different countries. The economic instruments are derived from partners sharing the "economic responsibility" i.e. society, producers and consumers. The major criteria is "who" can pay "what", "at what point" in the material flow chain and "when". These instruments could be material/ product taxes, subsidies, advance disposal fee systems, deposit-refund systems, upstream combined tax/subsidies etc.

An analysis of the above models indicates that the development of economic instrument and its internalization is a major issue in any WEEE/E-waste management system. This issue is on account of "types of products" (A, B, C & D) i.e. identifiable and non-identifiable put on the market "after" or "before" the effectiveness of the EPR regulation. Products A & B are new products, while C & D are historical products. Product D as shown in Table 5.1 is the extreme case of non-identifiable, historical & orphan product.

Table 5.1: Types of Products

		The Producer of a product	
		Identifiable	Non-Identifiable
Put on the market	After	A	B
	Before	C	D

Source: Table 1, Types of products, Extended Producer Responsibility in a non-OECD context, The Management of Waste Electrical and Electronic Equipment in Thailand Manomaivibool, et. Al., 2009

The economic responsibility implemented through the economic instruments and their structure in a given model is summarized in table 5.2.

Table 5.2: Financing Models & Economic Instruments

S.No.	Model	Economic Instrument (New + Historical + Orphan)	Fee Structure
1.	Compliance Cost Model	Fee (Recyclers & Logistics Partner)	Compliance cost = Fee (Recycler) + Fee (Logistic Partner)
2.	Compliance Cost & Visible Fee Model	Visible Fee	Compliance Cost = Visible fee for new WEEE/E-waste + Visible Fee for historical & orphan product
3.	Reimbursed Compliance Cost Model	Visible Fee	Compliance Cost (upfront) = Reimbursed Costs through visible fee from end users
4.	Recycling Fee Model	Recycling Fee	Recycling Cost (future/current) = Collection Fee + Recycling Fee (upfront)
5.	End of life fee model	End of life (EOL) Fee	EOL Fee = Collection Fee + Recycling Fee

The development of fee structure and the point of its application in the material flow chain is a key to its internalization. If producer is the key stakeholder then the compliance cost could be paid "Upfront" with cost recovery either "Upfront" or "Reimbursed" depending upon the regulation and acceptance by stakeholders. Literature cites that some of the efficient WEEE/E-waste management systems in Europe have moved from "End of Life fee" to "Visible Fee" model over the years. The management of funds generated from product fee is an important driver of WEEE/E-waste management system. Some of the principles defining the fee structure and the fund management framework are given below.

1. Effectiveness: The fee collected and the fund generated should drive the WEEE/E-waste management while meeting the environmental goal at the same time.
2. Self Sufficiency: Revenues received from the product fees should cover the implementation costs.
3. Fairness: The fee structure should avoid free-riders. It should not render the EEE sector uncompetitive vis a vis inter international market.
4. Simple: The fee structure should be simple to implement.
5. Viable: It should be viable for products covered under regulation.

The structure of economic instrument e.g. product fee is based on the above principles. It is a function of three types of costs:

- Buy back cost
- Technical cost
- Administrative cost

Mathematically,

F (Product fee) = f (buy back cost) + f (technical cost) + f (administrative cost)

All the three types of costs are independently computed and are added to arrive at product fee.

Product Fee = Buy-back cost + Technical Cost (collection, transportation, dismantling & recycling, disposal) + Administrative cost

Assessment of 'buy back' cost

Some of the salient features, which assist in assessing buy back costs, are given below. These are based on existing WEEE/E-waste management in both developed and developing countries.

1. In majority of developed countries, buy back costs are nil and the old products are exchanged for new products free of cost. Buy back costs are a function of consumer behavior.
2. In developing countries/ countries in transition, buy back rate is a major issue under both B2B, B2C scenarios because the consumer receives money from WEEE/ E-waste procurer. The procurer could be both either' formal' or 'informal' sector. Therefore, in order to make the 'take back' system work, there is a need for paradigm shift in consumer behavior from "money receiver" to 'money provider".
3. Under B2B, fulfilling regulatory compliance is a major driver for supplying WEEE/ E-waste to the WEEE/E-waste compliance scheme.
4. For B2C involving household, choice of collection system is one of the major drivers to discard WEEE/E-waste.
5. The "trade off" between "buy back" rates and the "location" of collection centre or "door to door" pick up can be established by consumer/ household survey.

Therefore, there is a need to carry out consumer/ household survey. The type of survey is very important because assessment of paradigm shift in consumer behavior needs to be assessed. This means that the survey could be based on fundamental principles of "willingness to accept" under existing situation and "willingness to pay" under future condition. Since informal sector is competing with formal sector in buy back scenario under existing conditions, there appears a need to understand consumer's "willingness to accept" buy back rate. This will give an idea up to what extent, the consumer is ready both in terms of "convenience to return" WEEE/E-waste and the 'buy back" rate in the context of meeting the WEEE/E-waste collection target fixed under EPR regime. This will help to design the "take back" scheme during the "transition period' for implementing EPR based regulations. Once, the "take back" system stabilizes, consumer survey based on 'willingness to pay" can be carried out to institutionalize the "take back" mechanism in the long term. The salient features to design the consumer survey based on "willingness to accept" are given below.

1. The major factors, which should be considered to design the consumer/ household survey include "income group" analysis and revised "buy-back" rate as compared to the current "buy-back" rates offered by informal sector with the choice of "drop off, door to door pick up service, return to retailer/ distributor".
2. Survey methodology could be based on how extensive the survey needs to be carried out with a sample size based on percentage of WEEE/E-waste in a geographical region by using a structured survey instrument e.g. in Thailand, Contingent Valuation

methodology got changed to Choice Experiment method, where respondents were given five following options.

Option 1: Drop-off without receiving any payment
Option 2: Pick-up without receiving any payment
Option 3: Drop-off and receive payment (x amount)
Option 4: Pick-up and receive payment (y amount, lower than x)
Option 5: Not willing to return in any option

3. Expected factors to influence households' willingness to accept the proposed buy-back payment include Socio-Demographic Variables (Age, Gender, Education, Household Income, Residence, Family size); Specific Knowledge, Skills and Habits and others like level knowledge and exposure to hazardous substance from WEEE/E-waste; level of participation in waste sorting and collection activities; vehicle ownership and distance to work place/ shopping centre/ market etc.
4. The survey instrument can be designed to elicit following information:

- Background information
- Current EEE possessed and WEEE/ E-waste stored and past behavior of WEEE/ E-waste disposal (e.g. stored at home without use/ throw away with other waste, return old with new one with discounted price, donated to relatives/others, sell to junk shops, others)
- Questions on socio-economic profile
- Questions on Participating in Buy- Back Program to address options 1 to 5 given above e.g. at what price (range of price) "drop off" and "pick up" is acceptable. An example of response received from this item in Thailand is given in table 5.3.

Table 5.3: WEEE/E-waste items & proposed "buy back" rates (bath/ unit)

WEEE/ E-waste item	Low bids		Medium bids		High bids	
	drop-off	pick-up	drop-off	pick-up	drop-off	pick-up
1. Television sets						
• CRT –Small (≤ 21")	80	50	120	70	180	110
• CRT - Large (>25")	100	60	150	90	230	140
• LCD/Plasma -Small (≤ 32")	120	70	180	110	270	160
• LCD/Plasma – Large (> 33")	150	90	230	140	350	210
2. Digital Cameras/ Camcorders	40	20	60	40	90	50
3. Portable media players	10	6	20	12	30	20
4. Printers & Facsimiles	60	40	90	50	140	80

Source: Household Surveys on WEEE Management and Buy-Back Program, Seminar on the progress of Study Project on Criteria and Fees of Thailand's WEEE Management, 18 November 2009, Bangkok.

Assessment of Technical Cost (collection, transportation, dismantling & recycling, disposal)

Technical costs include cost of collection, transportation, dismantling, recycling and disposal. Calculations of collection & transportation costs have been described in chapter 4. Calculations of dismantling and recycling have been described in UNEP's E-waste Manual 2. Ideally, the revenues recovered from material recovered from recycling should be deducted from cost of recycling if "rights to own material" remains with recycler.

Assessment of Administrative Cost

Administrative costs are the costs incurred by the system manager to manage WEEE/E-waste, which include costs related to fee collection, fund administration and auditing This figure varies from country to country and can be arrived at by consensus in a given country context e.g. in Thailand survey studies indicate its rage to be between 1 to 3 % of the tax/ fee collected; In India it could vary between 3% to 5% without considering salary and wages of administering agency.

The recovered product fee will go into a WEEE/E-waste management fund, which could be managed by a PRO, an association of producers/ retailers etc. or a government agency or a combination of both. The determination of financial responsibilities will be determined as per the EPR regulation in the country as described in chapter 3. Some of the major features/ factors/ inferences related to administration of fee and fund management are given below.

1. The flow of buy-back rates to the consumer is the key to successfully collect WEEE/E-waste. Therefore, the role of interface agency between consumer and the receiver, which is responsible to transfer buy back rate is important. If this agency is not transferring the agreed buy back rate to the consumer then it will lead to 'leakage" of WEEE/E-waste to informal sector. In order to prevent "leakage" there is need to harmonize uniformly "buy-back rates and accounting rules" across the entire material flow chain and with partners for regulated products so that buy-back partners and other partners can be strictly monitored and audited.
2. It is important that the auditors verify the amount of incoming WEEE/ E-waste corresponds with the amount of WEEE/E-waste going to authorized partners i.e. from retail/ buy back centre to registered transfer station/ collection centre and from there to dismantler/ recycler. Transporting companies can be checked for licensing, inspection and the manifest system under existing laws.
3. Visibility of the product fees is an important aspect of the "take back" system. Though it can raise consumer awareness, it can also lead to public resistance against environmental policies. Consumers might mistake the product fees with the buy-back rates. Since the buy-back rates will be lower than the fees, this might unnecessarily stir discontent and mistrust from the public. Therefore, visible fees may also be perceived as price fixing that allows the industries to shift the whole burden to the consumers especially during the start up of the 'take back" system. Disclosure of fee and its component need to be strategically agreed between "system manager", "producer" and the regulatory agencies.
4. The major challenges, which have been perceived for the management of fund, include the negative balance in the short run and the surplus in the long run. The negative balance may be on account of weak WEEE/E-waste collection/ hibernating WEEE/E-waste and on account of inventory collected by collectors to get maximum amount of subsidies from the fund. Surplus funds may be on account of slipped targets of WEEE/E-waste collection and the growing market for EEE products. The fund

balance in a particular year may be calculated based on input EEE products placed in the market and the WEEE/E-waste collected in that year as given below.

$$FB_t = \sum [(F_i \times QP_{it}) - (S_i \times QC_{it})]$$

Where,
FB_t is the fund balance in the year t
F_i is the fee of product i
QP_{it} is the quantity of new shipments of product i in year t
S_i is the subsidy for WEEE/E-waste item i
QC_{it} is the quantity of WEEE/ E-waste item i collected in year t

5. Negative balance can be addressed by phasing the "take back" implementation as present phase, preparatory phase and implementation phase. During the preparatory period, "EOL fee" as per "EOL Model" or "discounted product fee" can be levied to replenish the fund to address the implementation phase. This has been used in Switzerland during initial years of 'take back" implementation. Alternately, government can levy tax or use combination of both tax and fee during this period to replenish the fund.
6. Surplus money can be reinvested in awareness campaigns to increase collection rates; capacity building or for some other environment related activities.

An example of proposed WEEE/E-waste management system has been developed in Thailand as shown in figure 5.6.

The development of economic instrument and its usage requires phasing, which should match the implementation of EPR based regulations. The phasing of implementation period depends on individual country's circumstances and strategy to address WEEE/E-waste before it becomes "uncontrollable" waste.

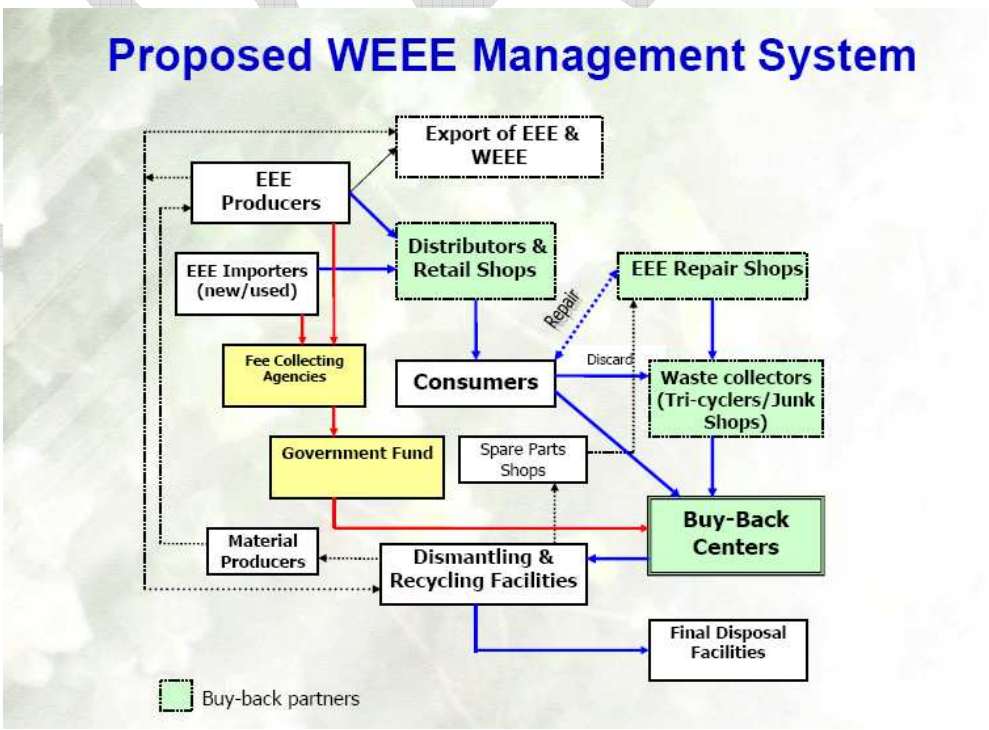


Figure 5.6: Proposed WEEE/E-waste management system in Thailand

Source: Presentation, Surin Aree, WEEE Management in Thailand, Regional Workshop on WEEE/E-waste Management (6th – 9th July 2010), UNEP-DTIE-IETC in collaboration with the Global Environment Centre Foundation (GEC).

The red line shows financial flows while blue line shows product waste flow with participation of distributors & retail shops, EEE repair shops, waste collectors and Buy-Back centers as buy-back partners. Figure 5.6 also shows involvement of fee collecting agencies and creation of government fund to manage WEEE/E-waste management system.

5.4 Guidance Notes

Objective: The major objective of guidance notes is to assist policy makers/ other stakeholders to design the financing mechanism of take back system, identify the model to be followed, design of fee/ Economic instrument and its phasing for implementation. The major guidance on each model will be provided on design of financial/ economic instrument and its application in the model. The economic/ financial instrument may consists of different options. These options include actual costs of recycling, projected costs of recycling per category and cross subsidization.

Guidance Procedure: Guidance procedure includes completion of following eight steps as given below

Step 1: Identify the responsibilities and their allocation as per regulatory requirements as an outcome of following steps 1 to 14 of chapter 3

Step 2: Map the output of step 1 to five models described in section 5.2 and identify the model, which may be applicable in a given country. Identify the economic instrument, which could be used e.g. tax, fee or a combination of both.

Step 3: Calculate the "buy back" costs by carrying out the following activities.

- Review literature on household surveys i.e. "willingness to pay" or "willingness to accept" and survey methodology. Fix the sample size based on WEEE/E-waste generation and population profile in the identified area.
- Set assumptions on factors influencing households to participate in WEEE/E-waste buy-back mechanism i.e. different types of buy back rates vs. participation and different options 1 to 5 mentioned in section 5.3
- Design survey instrument/ questionnaire for identifying the consumer behavior based on socio-economic profile, current EEE possessed and WEEE/E-waste stores, past behavior of WEEE/E-waste stored, policy scenarios, bidding prices and elicitation formats
- Pilot test the questionnaire and fine tune it to elicit maximum response.

- Plan the survey and collect data
- Analyze data to estimate "buy back" rates by using the template given in table 5.4.

Step 4: Develop "Economic instrument "e.g. product fee based on buy back cost, technical cost and administrative cost.

Table 5.4: WEEE/E-waste items & proposed "buy back" rates (currency/ unit)

WEEE/ E-waste item	Low bids		Medium bids		High bids	
	drop-off	pick-up	drop-off	pick-up	drop-off	pick-up

- Arrive at the range of buy back rate for each WEEE/E-waste item

Step 5: Calculate the technical costs. Use the outputs of steps 1 to 6 from chapter 4 to calculate collection and transportation costs as part of technical costs. Calculate dismantling/ recycling and disposal costs as per WEEE/E-waste manual 2.

Step 6: Calculate the administrative costs based on similar type of activities in a given country

Step 7: Organize a workshop with different stakeholders e.g. producers/ recycler/ collector/logistics/ government agencies/ municipalities etc. to discuss the outputs of steps 3, 4 and 5 and arrive at consensus for economic instrument i.e. fee versus tax or their combination. Identify the fund flow and arrive at consensus for fund manager.

Step 8: Develop action plan for implementation of WEEE/E-waste take back system consisting of starting from the base year, preparation period and implementation period. Decide the use of the choice of the economic instrument during preparation and implementation phase.

Step 9: Develop monitoring and auditing requirements for each category of stakeholder along the material flow chain. The auditing could be product audit, financial and accounting audit and collection and transportation audit.

Chapter 6: Case Study

6.0 Introduction

Knowledge of WEEE/E-waste management especially "take back" mechanism both in a developed and developing country context is important for practitioners, while designing any WEEE/E-waste management project. This chapter presents two case studies, one from Europe and the other from a developing country describing each aspect of WEEE/E-waste

"take back" mechanism. These case studies can be read in parallel to chapters 1 to 5 in order to understand and conceptualize specific elements described in each chapter.

6.1 Case Study 1: Existing financing mechanism of WEEE/E-waste management in Europe

Financing mechanism of WEEE/E-waste management system in Europe has evolved after gaining experience over the years of operation. It covers each aspect of WEEE/ E-waste management like collection, transportation and treatment costs of WEEE/ E-waste. Typically, this system follows "Compliance Cost & Visible Fee" model and "Reimbursed Compliance Cost" model for financial management. Variation of these models used in different EU countries showing elements defined in sections 5.2, 5.3 and 5.4, chapter 5 are described in the following sections.

6.1.1 Financing Models

The entire financial model in Europe is based on "Extended Producer Responsibility" integrated with "polluter pays principle", where the producing organizations are responsible for WEEE/E-waste take back and treatment. The financial model is an integrated model consisting of WEEE/ E-waste collection, transportation and treatment and end user pays "product fee". The conceptual guidance for financing each of schemes in EU has been provided by EU directive. These guidance features as per EU directive are given below. Non EU countries in EU have basic features similar to EU directive with variations.

1. Producers are responsible for the costs of picking up WEEE/E-waste from collection facilities and for refurbishing waste products for reuse or for recycling and recovery.
2. For "historical" products" both C&D types as per table 5.1, Chapter 5 (i.e., those put on the market before August 13, 2005), the costs of waste management are to be shared by all producers in existence at the time those costs are incurred. These producers may impose a separate "visible fee" (one that is explicitly designated, perhaps on the price tag) to cover these costs for eight years (ten years for large household appliances).
3. End users other than households may be made partly or totally responsible for financing the management of historical products.
4. For new products, A type as per table 5.1, chapter 5 (i.e., those put on the market after August 13, 2005), producers have "individual responsibility", i.e. they must pay the cost of managing their own products. They can do this through programs set up by individual companies or through participation in collective schemes.
5. No visible fees are permitted to fund the management of waste from new electrical and electronic products.
6. When producers put a new product on the market, they must provide a financial "guarantee" that waste management of the product will be paid for. Producers can get waiver on this guarantee by participating in a producer responsibility organization (PRO), paying recycling insurance, or setting up a special bank account for this purpose.

ICT sector and brown and white goods sector have different financial models with regard to WEEE/ E-waste management. These models are "Compliance Cost & Visible Fee" model and "Reimbursed Compliance Cost" model. Each product category prefers the model suitable to their "Consumption and Discard" pattern. Salient features are given below.

1. Brown and white goods producers are comfortable with the schemes set up to address brown and white goods product categories, while the IT producers are comfortable with those schemes set up to address IT goods.

2. White Goods firms, and to a lesser extent consumer electronics generally support visible fee schemes e.g. Recupel and NVMP, and are less supportive of arrears-based market share schemes e.g. ICT Milieu.

3. ICT firms prefer the arrears –based schemes in comparison to visible fee scheme.

4. ICT firms also tend to favor competitive compliance systems, rather than national schemes, as they perceive that costs provided by different compliance systems will be competitive and will be better managed.

This indicates that difference in charging fee by two models reflects the differing preferences for dealing with "historic" (Product category C & D) and "orphan" (Product category B& D) WEEE/E-waste. ICT firms have fewer historic liabilities due to high obsolescence rate of products in comparison to brown and white goods.

6.1.2 Fee Structure

The fee structure consists of different options. These options could be as per individual product category or same for all categories. Table 6.1 gives an example of fee structure in some European countries, where collection efficiency is high.

Table 6.1: Established European WEEE Schemes (EU/EEA): Flexibility of Cost Models

Scheme	Number of Cost Models	Type of Cost Allocation
Recupel (Belgium)	1	Fixed Fee Model – All categories.
NVMP (The Netherlands)	1	Fixed Fee Model – Certain categories excluded
ICT Milieu (The Netherlands)	1	Debitting Model – ICT products. Real costs are calculated on a month-by-month basis and divided amongst members on a market share basis, calculated monthly.
EI Retur (Norway)	3	Fixed Fee Model (EE Bransjen) – According to type and volume of product placed on market (Brown Goods). ICT Model (IKT Retur/IT Retur) – Actual Costs are calculated month by month and divided amongst members on a current market share basis. Fixed Fee Customer Model – White Goods (Hvitevareretur). A fee is levied by customs on import and passed to PRO.
EI Kretsen (Sweden)	3	Debitting Model – Preliminary Cost. A preliminary cost (per unit, per kg or % of sales values) is fixed for the year. These fees are compared against actual costs at year-end and difference settled. Debitting Model – ICT products. Real costs are calculated on a month-by-month basis and divided amongst members on a market share basis, calculated on the preceding year. Costs per

Scheme	Number of Cost Models	Type of Cost Allocation
		unit will therefore vary on a month-by-month basis. Other Debitting Model. Special fixed fee debiting models have been developed for specific product groups – e.g. light bulbs (2500 SEK per year).
SWICO (Switzerland)	2	Fixed Fee Models: ICT Products. Fixed fee tariff banded according to sales price. 12 fee bands with no fee for products under 50CHF. Fixed Fee Model: Consumer Electronics/Photographic. Fixed tariff according to product category. 5 fee levels with no fee for price below 50 CHF.

Source: WEEE/E-waste Management Manual, Volume 2; United Nation Environmental Programme (UNEP), Division of Technology, Industries and Economics, International Environmental Technology Centre, Osaka/Shiga.

An analysis of table 6.1 indicates:

1. Fee is levied based on “product category” and “volume”

2. If the fee is same for all categories then level of cross subsidization across product categories is anticipated since different product categories will have different “buy back, technical and administrative cost” components. It also indicates usage of some other economic instrument for managing WEEE/E-waste system in case cross subsidization does not occur.

3. Fixed fee models consisting of different fixed fee bands, which are banded to “sales price” of EEE products placed in the market with “cap and ceiling” rates e.g. SWICO

4. Fixed fee levied by customs on imports and passed on to PRO.

5. Debitting model is based on ‘upfront’ payments followed by debiting on monthly/ yearly basis based on actual costs and market share.

The above analysis also indicates the existence of variants of model for different product category in a country, which means that the fee and fund management system has stabilized to an extent in that country.

6.2.3 Financial Guarantee

A financial guarantee is provided by the producer to fulfill their “take back” obligation for electrical and electronic products placed on the national market after the effective date of the local legislation. The form of financial guarantee in EU countries is summarized in table 6.2.

Table 6.2: Summary of Financial Guarantees in EU Countries

	Austria	**Belgium**	**Cyprus**
New B2C WEEE & Financial Guarantee	Membership in collective scheme eliminates need for Guarantee Collective scheme not required to provide guarantee	Only required from individual compliers Visible fee allowed for estimated costs of collection, treatment and recycling until 2011 (2013 for large appliances)	As Directive
	Czech Republic	**Denmark**	**Estonia**
New B2C WEEE & Financial Guarantee	Coll. System members may comply for new WEEE in the same way as for historical WEEE Guarantee only required from producers that comply individually	Individual compliers must provide guarantee Collective schemes may be exempted if members have >30% market share	By market share Guarantee only required from producers that comply individually
	Finland	**France**	**Germany**
New B2C WEEE & Financial Guarantee	Guarantee required only from individual compliers	Pro rata principle to be applied at 'whichever date the EEE is placed on the market' Guarantee required only from individual compliers	By market share OR sorting own WEEE at each collection point All B2C producers to provide guarantee. 3 insurance based systems: GSA, ZVEI, Philips
	Greece	**Hungary**	**Ireland**
New B2C WEEE & Financial Guarantee	Financial guarantee only required from individual compliers	No distinction between the financing of historical and new WEEE Guarantee only required from individual compliers	Producer pays for own products Guarantee only required from individual compliers
	Italy	**Latvia**	**Lithuania**
Financing of New B2C WEEE & Financial Guarantee	Until EU wide system for producer identification in place but no later than 13 August 2007 new WEEE to be financed as	Producers have 3 options to comply: -pay Natural Resource Tax -join collective system -comply individually	Options for producers: - manage WEEE individually or through WEEE management

	historic WEEE Guarantee: No explicit exemption for collective system members Obligation from 13/8/06, unclear if required before producer identification in place		company; - join collective system - found/participate in a system which extends municipal WEEE management programme Guarantee required for individual or joint compliance
	Luxembourg	**Malta**	**Netherlands**
Financing of New B2C WEEE & Financial Guarantee	Producer responsible for own products, may transfer obligation Guarantee only required from individual compliers	Collective or individual compliance will be possible Guarantee only required from individual compliers	Producer to finance WEEE from own products from retail and local govt. collection points Guarantee only required from individual compliers – membership of collective system = guarantee
	Poland	**Portugal**	**Slovakia**
Financing of New B2C WEEE & Financial Guarantee	Producer to finance own brand and any brand in same category proportional to market share Guarantee only required from individual compliers	Producer responsible for WEEE from own EEE placed on market Guarantee only required from individual compliers	Producer to finance WEEE from own Products Guarantee only required from individual compliers
	Slovenia	**Spain**	**Sweden**
Financing of New B2C WEEE & Financial Guarantee	Guarantee required from all producers (bank guarantee or insurance), further details to be defined	Producer responsible for own WEEE Only required from individual compliers	Producer responsible for own WEEE Only required from individual compliers

Source: WEEE/E-waste Management Manual, Volume 2; United Nation Environmental Programme (UNEP), Division of Technology, Industries and Economics, International Environmental Technology Centre, Osaka/Shiga.

Following inferences can be drawn from table 6.2.

1. Guarantee is required for joint and individual compliance.

2. Membership in collective scheme eliminates the need for providing financial guarantee. This could be product category-wise or otherwise depending on type of compliance scheme in operation.
3. In collective scheme, the value of guarantee could be as per actual market share
4. Guarantee could be blocked bank account/insurance or any other form

In most European countries, an additional financial guarantee is not needed if the producer is member of a collective scheme. In majority of countries, the producers join collective scheme to minimize the need to submit bank guarantee, thereby minimizing the cost of WEEE/E-waste management.

6.2.4 Funding for Supply Chain

The fee charged catalyses financial flow along the WEEE/E-waste supply chain. Examples of funding of WEEE/E-waste stakeholders along the supply chain in Netherlands, and Switzerland are described below and shown in figure 6.1 and figure 6.2. These examples demonstrate usage of single and two types of economic instruments.

Dutch/ NVMP Model

The salient features of Netherlands NVMP model are given below:

1. Usage of two economic instruments: Visible Fee & Municipal Waste Tax. Municipal waste tax funds the municipal infrastructure used in WEEE/E-waste management.
2. Producers/ Importers pay NVMP to manage their WEEE/ E-waste responsibilities under Dutch legislation. A fixed fee is paid to NVMP for each product placed on the market. This fee is passed on to the consumer with no mark up. The scheme covers household WEEE/ E-waste.
3. Households pay a visible fee on the purchase of new EE products. Households pay a local municipal waste tax to fund general waste collection and operation of municipal sites. Households may return WEEE/ E-waste free of charge to municipal collection sites. Municipalities provide some kerbside collection. Households may also return WEEE/ E-waste to a retailer/distributor free of charge on the basis of 1:1 new for old purchase. Retailers may charge for collection of the old product from household:
4. Retailers are obliged to take back WEEE/ E-waste on a new for old basis from consumers. They may then transfer the WEEE/ E-waste to a municipal waste site, direct to the regional sorting stations (RTS) or pay for collection by NVMP.
5. Municipal collection sites receive WEEE/ E-waste and take responsibility for delivery to regional sorting stations operated by the municipalities and NVMP. Municipalities are not reimbursed.
6. Regional sorting stations receive WEEE/ E-waste free of charge and sort for collection and treatment. NVMP makes a financial contribution to the operation of RTS.
7. Transport contractors are responsible for the collection of WEEE E-waste from the RTS and delivery to treatment plants and recycling firms. Contractor invoices on the basis of weight. Logistics are organized in house by NVMP.
8. Treatment and recycling contractors take receipt of WEEE and process. Contractors invoice NVMP on the basis of actual treatment costs.

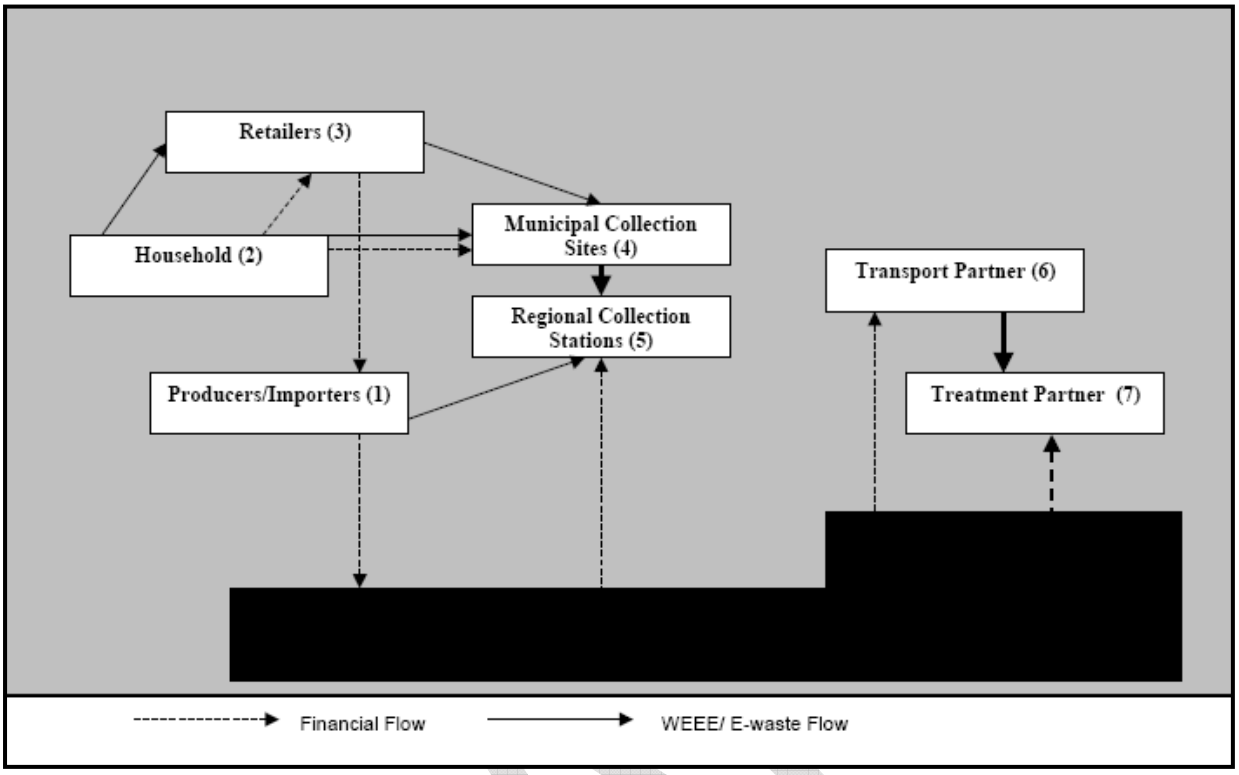


Figure 6.1: Financial Model of Netherlands NVMP – A Collective EU Collective Compliance System

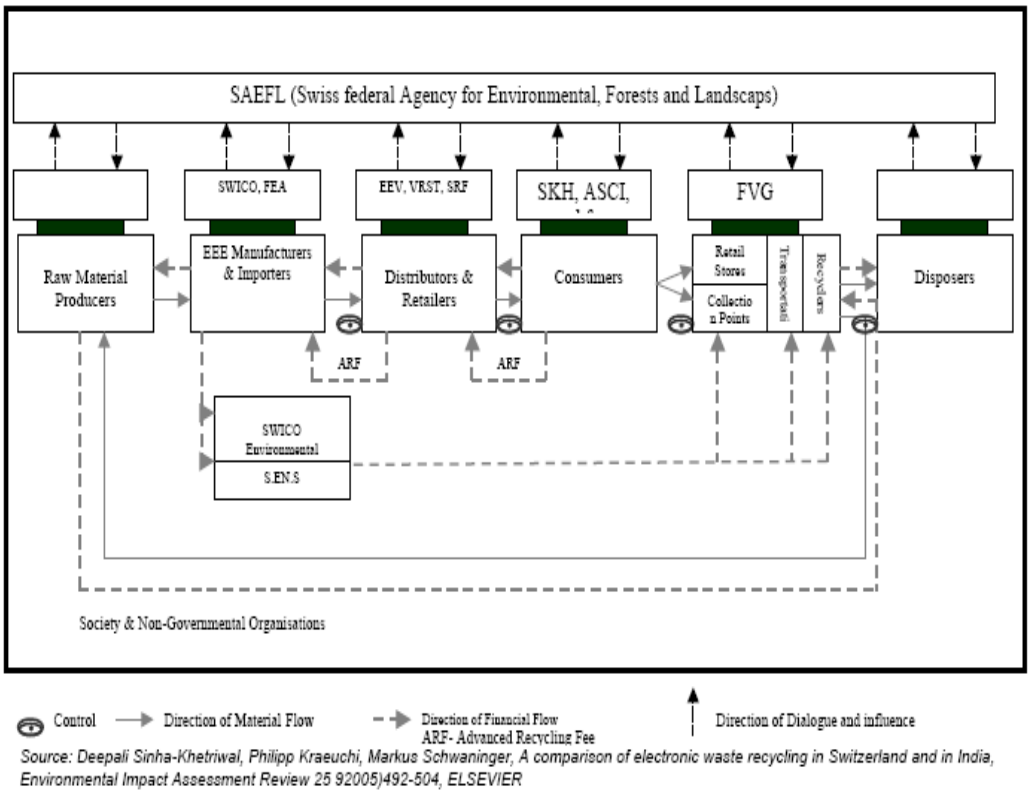
Source: WEEE/E-waste Management Manual, Volume 2; United Nation Environmental Programme (UNEP), Division of Technology, Industries and Economics, International Environmental Technology Centre, Osaka/Shiga.

Swiss SWICO/SENS Model

The Swiss system is based on EPR, both legally and operationally i.e. producers and importers are both physically as well as the financially responsible for an environmentally sound disposal of WEEE/E-waste. It also shows application of one economic instrument i.e. advanced recycling fee, which differs with respect to product categories, banded with selling price with "cap" and 'ceiling" boundaries. The salient features of Swiss WEEE/E-waste supply chain model are given below:

1. The entire operative responsibility is shared with the two PROs–SWICO and S.EN.S, who manage and operate the system on behalf of their member producers.
2. Secured financing of the collection and recycling is ensured by way of the Advance Recycling Fee (ARF) charged on all new appliances. The ARF is used to pay for the collection, the transport and the recycling of the disposed appliances. The ARF can range from a minimum CHF (Swiss franc) 1 on small items, such as hair dryers and electric shavers, to up to CHF 20 for TVs or CHF 40 for refrigerators. Both SWICO and S.EN.S have distinct categories of products according to the approximate cost of recycling them. It is seen that the largest portion of the ARF goes to the recyclers.

3. The Swiss ARF is an intergenerational contract between appliances purchased in the past and those that will be purchased in the future, similar to a pension system. Therefore, it requires accurate estimations of how much waste will be generated and how many new products will be sold.
4. SWICO and S.EN.S have official collection points around Switzerland in addition to the thousands of retail locations which have to take back old equipment free of charge, irrespective of the brand or year of manufacture. It becomes easier for consumers to dispose their WEEE/E-waste at appropriate locations.
5. By having common collection points, the PROs are better able to manage logistics, benefit from economies of scale and provide a consumer friendly, all inclusive solution instead of a prohibitively expensive brand specific one.
6. Both material and financial flows are controlled at every stage, as shown in figure 6.2.



Source: Deepali Sinha-Khetriwal, Philipp Kraeuchi, Markus Schwaninger, A comparison of electronic waste recycling in Switzerland and in India, Environmental Impact Assessment Review 25 92005)492-504, ELSEVIER

Figure 6.2: Financial Flow Model of Swiss WEEE/E-waste

The independent controls not only deter free riders, but also give credibility to the entire system. It also ensures participation of retailers and consumers.

6.2 Case Study 2: Developing a WEEE/E-WASTE/E-waste management in a developing country

Financing mechanism of WEEE/E-waste management system in developing countries is evolving after customizing experience gained over the years of operation in developed countries in the specific country context. It covers each aspect of WEEE/ E-waste management like collection, transportation and treatment costs of WEEE/ E-waste. An attempt has been made to describe this customization in the following sections. This case study has been adapted from a study carried out in Thailand. It is based on presentations/ documents

presented in the national workshop organized for consultative purposes-and the publication, "Extended Producer Responsibility in Thailand", Prospects for Policies on Waste Electrical and Electronic Equipment, Journal of Industrial Ecology, Volume 15, No. 2, 2011.

6.2.1 WEEE/E-waste Scenario

Electrical & electronic devices penetration is showing high growth in Thai households. This rate has increased from 17% to 92%, between 1979 to 2003. Similarly mobile phone penetration increased from 5.6% to 47.2% while computer penetration in households has increased from 0.8 to 4.5 million units. It is expected that ICT & household appliance market in Thailand will get saturated after 2035. Besides, there is a EEE repairing and reuse market in Thailand. In this context, WEEE/E-waste generation is expected to reach 25 million units equivalent to 180,000 tonnes by 2020. Industrial WEEE/E-waste, has been estimated to be around 11,000 tonnes/year. The main driver for this generation is the increased consumption of EEE, though life cycle of EEE is also coming down.

Currently, WEEE/E-waste is regulated by two legislations in Thailand. First, the Public Health Act, B.E. 2535 ("Buddhist Era"; A.D. 1992), regulates collection and disposal of municipal solid waste (MSW) and the second "Factory Act", of the Year B.E. 2535 (A.D. 1992) which, classifies and regulates industrial activities, including recovery, treatment, and disposal of wastes. Under the regulations, sorting plants, landfill operators and reprocessing plants have to obtain a license from the industrial authorities. Most of the postconsumer WEEE/E-waste collected through donation and waste dealers hardly reaches recycling, although Thailand had 41 recycling facilities till 2006. These facilities survive on high- grade WEEE/E-waste from industries, which is available to them because of strict regulatory compliance. However postconsumer WEEE/E-waste is rarely channelized into existing value chain. Though Commercial "take back" schemes exist, no environmentally driven "take back" scheme exists in Thailand. A simplified version of WEEE/E-waste chain in Thailand has been shown in figure 6.3.

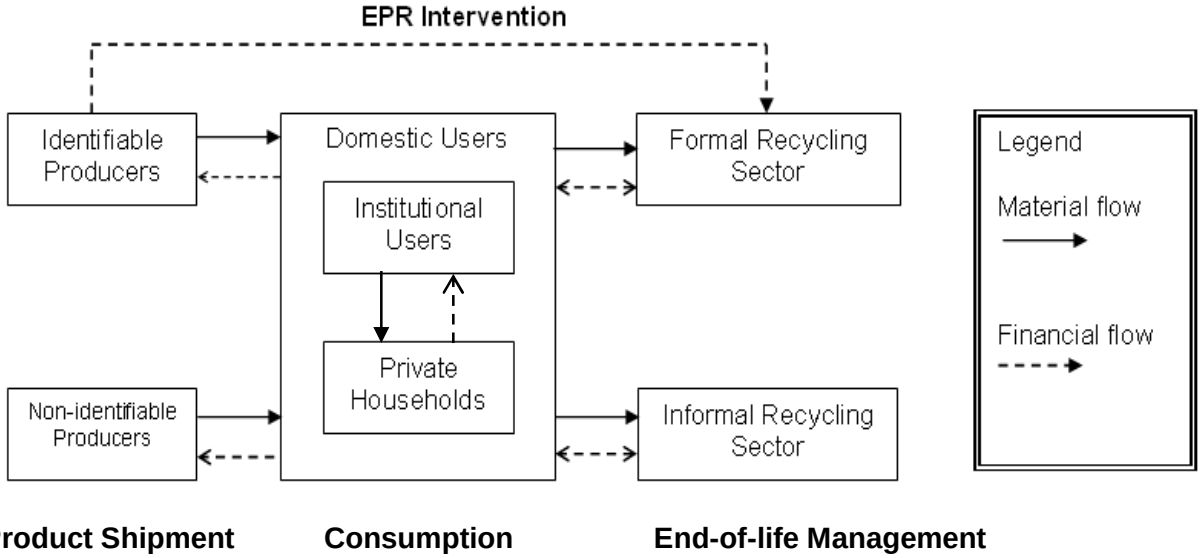


Figure 6.3: Simplified Value Chain Framework for EPR Intervention

Source: Manomaivibool et. al., Extended Producer Responsibility, Prospect of Extended Producer Responsibility: Waste Electrical and Electronic Equipment, Thai context and policy; Journal of Industrial Ecology, Volume 15, No. 2, 2011.

6.2.2 Proposed Policy and Regulatory Intervention

National Integrated Strategy for the Management of Waste Electrical and Electronic Equipment came into existence in 2007, which gives a 10-year road map for WEEE/E-waste management till 2017. The major objectives of this strategy are:

1. To manage domestic post-consumer WEEE in a scientific and systematic manner;
2. To establish an efficient and sustainable WEEE management system with cooperation from every sector of society;
3. To reduce hazardous wastes from EEE at the origin and to encourage environmentally friendly design and production;
4. To enhance the competitiveness and negotiation power of the country in international trade; and,
5. To have nationwide efficient and effective integrated WEEE management by 2017."

A list of ten priority products (1) CRTs (TVs and monitors), (2) digital cameras and camcorders, (3) portable media players, (4) mo- bile and cordless phones, (5) FPDs (TVs and monitors), (6) fluorescent lamps, (7) desktop and notebook computers, (8) printers and facsimiles, (9) unit-type air conditioners, and (10) refrigerators and freezers have been identified to be brought under new regulatory regime. Two regulations, the first one on Economic Instruments and a subordinate law for implementation have been envisaged to framed and implemented. The regulation on economic instrument is being drafted by the Ministry of Finance while the subordinate law is being drafted by ministry of Natural Resources and Environment. Therefore, an attempt has been made to channelize through the EPR intervention as shown in Figure 6.3. Further, this framework under the two new regulations is shown in Figure 6.4.

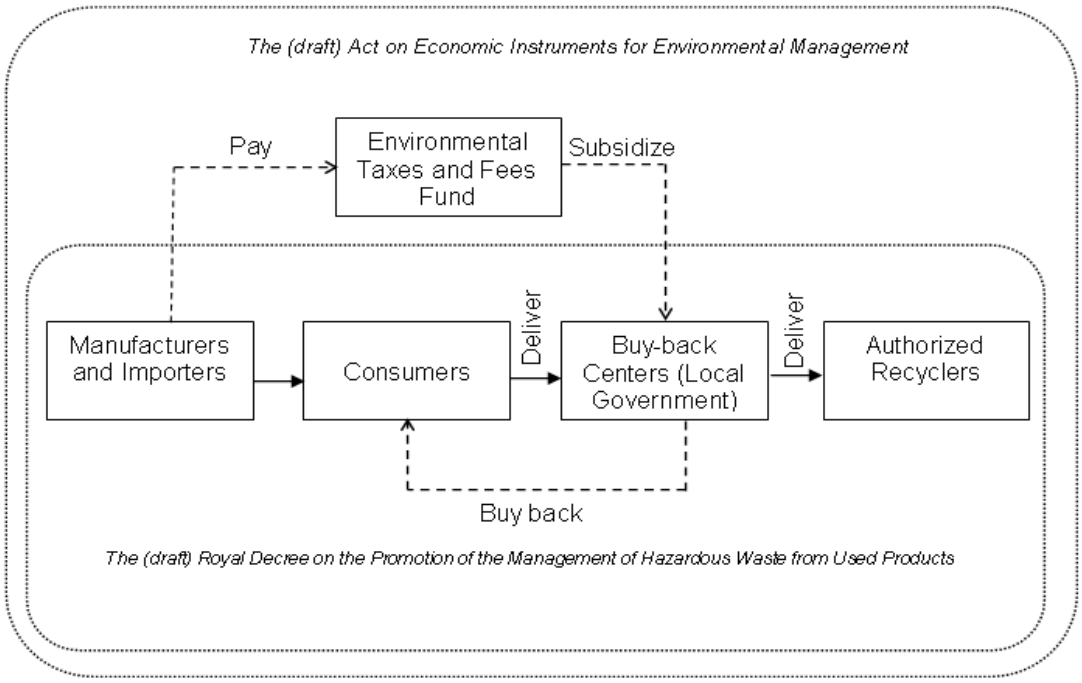


Figure 6.4: Future Management of WEEE/E-waste in Thailand

Source: Manomaivibool et. al., Extended Producer Responsibility, Prospect of Extended Producer Responsibility: Waste Electrical and Electronic Equipment, Thai context and policy; Journal of Industrial Ecology, Volume 15, No. 2, 2011.

6.2.3 Proposed Financing Model

Salient features of the financing model are given below.

- Government to create a market for used products containing hazardous waste by offering to buy them back.
- The buy-back activities to be financed through fees levied on new products.
- Establish a fund to administer the revenue from the product fees and pay out subsidies.
- The subsidies not only will consist of the money given back to consumers but also will cover the costs of storage, transportation, treatment, and disposal borne by the buy-back centers in the case that the recycling of collected WEEE is not profitable.
- In exchange for the subsidies, the buy-back centers have to comply with stricter standards than ordinary waste dealers, including a condition to forward intact WEEE to ATFs.
- The treatment and disposal will continue to be under the existing regime of the Factory.

It is proposed that part of the fees representing the buy-back cost is made visible to consumers at the point of sale in order to encourage greater participation, while keeping the remaining part of the fee as invisible. Therefore, the expected version is that of “Compliance Cost Model with part Visible Fee Model” in the short term transforming into “Compliance Cost Model with Visible Fee Model” in the long term.

6.2.4 Fee/ Economic Instrument/ Fee Structure

The two types of economic instrument i.e. a combination of product fees and recycling subsidies – are being proposed to finance the WEEE/E-waste management system.

A comprehensive product fee-setting methodology has been used through quantitative surveys and qualitative consultation with key stakeholders based on consumer behavior. The proposed fee covers three main cost components. The first component is the buy-back cost reflecting a level of consumers’ willingness to accept (WTA) buy-back rate based on the collection target set by the authority. WTA has been determined by an economic valuation study carried out through household survey based on sample size and WEEE/E-waste inventory in a particular geographic region. The second component is the technical cost which includes the cost of buy-back/ collection centers, the transportation cost, and the net recycling cost. The third component is the administrative cost of the system. The product fee has been set as a standard value for each product group reflecting the unit recycling cost of that product group on average. The proposed product fee and subsidy rates for different items is given in table 6.3.

Table 6.3: Product Fee & Subsidy Rates for Different Items

		Subsidy (THB/unit)		
Product/waste type	**Product Fee (THB/unit)**	**Buy-back**	**Operating[a]**	**Administrative[b]**
Television	389-730	150-250	156-423	33-62
Desktop Computer	306-453	250-300	0-164	3-26
Notebook PC	306	300	0	26
Air conditioner	900-1,200[c]	600-750	740-970	124-160
Refrigerator	325-1,000[c]	300-450	1,656-2,410	182-266
Printer/facsimile	253	50	182	22
Digital camera	69-71	60	3-5	6
Portable media player	33	30	0	3
Mobile phone	66-72	60	0-6	6
Fluorescent lamp	3-4[c]	1-2	3-5	0-1
Compact fluorescent lamp	2	1	1	0
Dry-cell battery	1-3[c]	1	1-2	0

Note: One THB (1 Thai Baht) ≈ US$0.03; [a]"Operating" denotes operating costs of storage, transportation, recycling, and final disposal. "Zero" implies that the recycling is profitable, and there is no need to subsidize the operating cost.[b]"Administrative" denotes administrative costs covering the expenses of fee-collecting agencies, the fund office, the local coordinators of buy-back networks, and the third-party auditors. [c]This figure is the fee rate after adjustment to 5% of product price.

Source: Manomaivibool et. al., Extended Producer Responsibility, Prospect of Extended Producer Responsibility: Waste Electrical and Electronic Equipment, Thai context and policy; Journal of Industrial Ecology, Volume 15, No. 2, 2011.

6.2.5 Funding for supply chain

The producers of regulated products are expected to pay the fees levied on new products they put on the market. The fees will have to be collected into a governmental fund. The fund should principally be used to subsidize the buy-back program, WEEE/E-waste recycling, and related activities. In the proposed "take back" program, similar type of material flow and financial has been shown in figure 6.5.

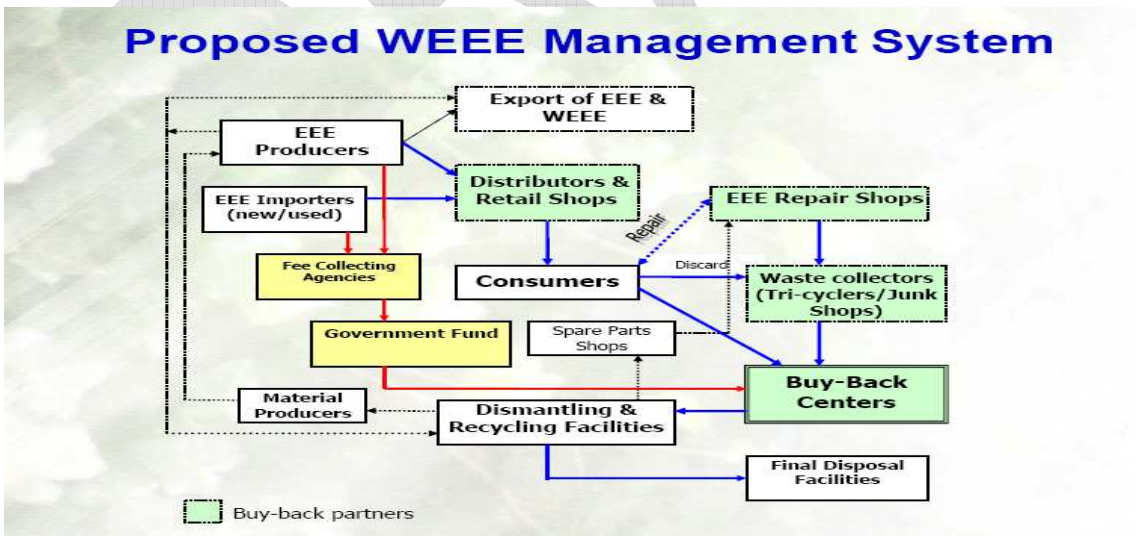


Figure 6.5: Proposed Financial Flow in WEEE/E-waste management system in Thailand

Source: Presentation, Surin Aree, WEEE Management in Thailand, Regional Workshop on WEEE/E-waste Management (6th – 9th July 2010), UNEP-DTIE-IETC in collaboration with the Global Environment Centre Foundation (GEC).

In the first year of the program, it is expected that the fund will have negative balance since the number of obsolete products bought-back in the program might exceed the number of new products placed in the market. In the long term the fund is expected to generate surplus funds due to the difference in the new EEE products placed in the market and WEEE/E-waste collected. Some of the strategies include building of reserve funds and government financing in the short term through discounted product price or usage of economic instrument like tax or subsidies while surplus is invested in other environmental activities in the long term.

The fund is expected to pay the subsidies only to authorized buy-back centers for the quantity of bought-back items verified by third-party auditing groups contracted by the fund manager.

The subsidies cover the buy-back cost and if recycling is not profitable, then it will cover technical cost. The buy-back centers then make a transaction with authorized transport companies and recycling enterprises which meet recycling standards and requirements. The fund will directly reimburse responsible agencies for their incurred expenditures as part of administrative costs. All authorized buy-back centers are entitled to get recycling subsidies from the fund.

6.2.6 Other Aspects

Sales data, stock of EEE in households and non household establishments and WEEE/E-waste inventory are crucial to the success of the program. Sales data and WEEE/E-waste data will be generated during the process of fee collection and auditing of buy-back centers. Second set of data on the stocks will be based on the penetration rate of targeted products in the country and can be a part of survey of consumer goods undertaken regularly by the National Statistical Office. The strengthening of data is expected to assist in the greater monitoring and regulatory controls not only to ensure compliance but also to strengthen the fund for WEEE/E-waste management.

6.2.7 Conclusions

The design and implementation of EPR for WEEE/E-waste management in a developing country offers a number of challenges. Similarly, Thailand, which is proposing EPR based WEEE/E-waste management system is expected to encounter these challenges. The design of the system indicates that conceptually, the elements of EPR are being internalized in the proposed management system. However, Government run buy-back system represents a type of “policy innovation” rather than complete transfer to “independently” run management system. This step may be treated as a precursor leading for future amendments in the system based on lessons learned during implementation.

Annexure 1

Definition/ Policies/ Laws/ Regulations/ Institutional Roles for WEEE/E-waste in European Union and Other European Countries

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
Austria	√		Verordnung des Bundesministers für Landund Forstwirtschaft, Umwelt undWasserwirtschaft über die Abfallvermeidung, Sammlung und Behandlung von elektrischen und elektronischen Altgeräten (Elektroaltgerätever ordnung (EAG-VO), April 2005	Local govt. to Organize collection free of-charge for consumers. Producers ompensate Municipalities with Infrastructure lum sum 1:1 take back at retailers Producer systems to set up at least one collection point per political district for free takeback from retailers and consumers	Dual use defined in scope guidelines available Producers to pay for historical non household WEEE if supplying replacement; otherwise enduser responsible	Environment Agency (Umweltbundesamt)	Elektroaltgeräte-Koordinierungsstelle Austria GmbH, industry owned and managed	UFH Altlampen UFH Elektroaltgeraet ERA EVA ERP
Belgium	√		Decree of the Flemish Government of 14 July 2004, modifying the Decree of the Flemish	Local govt. to organize free of-charge collection in container parks 1:1 take-back by retailers Recupel	Producers to pay for historical nonhousehold WEEE if supplying replacement;	Producers complying collectively to register with Recupel only Individually Complying	Not required, one system	Recupel (6 divisions); Currently no collection system for categories 7, 8, 9, 10 Individual

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
			Government of 5 Dec 2003. Decision of the Brussels Capital Government of 3 June 2004 modifying the decision of the Brussels Capital Government of 18 July 2002. Decree of the Walloon Government of 10 March 2005, modifying the Decree of the Walloon Government of 25 April 2002. Royal Decree on the prevention of hazardous substances in electrical and electronic equipment of 12Oct 2004; federal Level.	compensates retail and local governments for collection	otherwise enduser responsible	companies to register with 3 regional environmental agencies		compliance requires approval of 3 regional environmental agencies
Cyprus	√		Administrative Act No 668 of 2004, published in Official	Local govt. not obliged to collect WEEE Producers	As Directive	Producers must register with the Environment	Not required, one	EDHHA, founded by Chamber of Commerce in

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
			Gazette No 3888, Annex III (I), on 30 July 2004.	to finance entire WEEE management		Service of the Ministry of Agriculture, Natural Resources and Environment	system	Aug 2005, to be financed and owned by around 16 importers
Czech Republic	√		Act No. 7/2005 Coll., amending Act 185/2001 Coll. (the general waste management law of the Czech Republic) published on 6 Jan 2005. Decree 352/2005 published on 15 Sept 2005.	Producers to finance separate collection Municipalities may collect in which case producers must provide containers 1:1 take-back by retailers free-of-charge to consumers	Producer to register, but no guarantee New WEEE: Producer responsible, unless otherwise agreed with purchaser Historic WEEE only on a 1:1 basis	Environment Ministry responsible Producers to apply for registration by 12 Sept 2005.	Not yet required, only one system per category	Elektrowin, Ekolamp, Retela, REMA, Asekol Government to choose in December 2005 which system may handle which category
Denmark	√		Statutory order No. 591 of 9June 2006 and Statutory order no. 873 of 11th August 2006	Local govt. to Ensure sufficient free of- charge collection points, may organise pickup collection themselves or in collaboration with producers) Retailers accept WEEE on 1:1 basis	Producers responsible for new WEEE, unless alternative arrangements agreed Producers responsible for historic WEEE on 1:1 basis; otherwise, endusers pay	The WEEE System	The WEEE System	EPA Elretur Denmark to begin April 2006.

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
Estonia	√		Amendments to the Waste Act of 1May 2004. Regulation No. 376 of the Government of the Republic of 24 Dec 2004 on Requirements and Procedure for Marking Electrical and Electronic Equipment, Requirements, Procedure and Targets for Collection, Return to Producers and Recovery or Disposal of Waste Electrical and Electronic Equipment, and Time Limits for Reaching Targets, which entered into force on 1 Jan 2005. Minister of Environment Regulation No. 9 of	Producers to financing WEEE management Entirely 1:1 take-back by retailers; they must take back WEEE from any category they sell if no industry collection point within 10 km.	Producers responsible for WEEE on 1:1 basis	Environment Information Centre (EIC), to be under government control	Not provided for	EES-Ringlus Further system in Preparation

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
			9 Feb 2005 on Requirements for Treatment of Waste Electrical and Electronic Equipment, which entered into force on 20 Feb 2005. Regulation on the Central Register of Producers, which was adopted on 19 Jan 2006 and will enter into force after its publication in the Estonian State Gazette					
Finland	√	The scope of products includes luminaries in households, which have been excluded from the scope of products in the WEEE Directive	Act 452/2004 amending the Waste Act (1072/1993) adopted on 4 June 2004 and Government Decree on Electrical and Electronic Waste 852/2004 adopted on 9 September 2004.	1:1 take-back by retailers (or retailers must inform consumers about alternative collection) Producers responsible for organising & funding collection, may contract local authorities or waste management	Producers responsible for B2B WEEE placed on the market after 13 August 2005, unless alternative arrangements agreed Producers to bear the cost of pre 13 August	Only individual compliers must register with the Pirkanmaa Regional Environmental Centre	Not required, only one system per category	SERTY Oy (household WEEE) FLIP Py (lamps and lighting) ICT Producer Cooperative (ICT) SELT Ry (lighting, heaters, surveillance and control equipment)

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
				companies All collectable WEEE to be collected – not only 4 kg.	2005 WEEE if a replacement is purchased; otherwise, endusers pay			
France	√		TEXTES GÉNÉRAUX MINISTÈRE DE L'ÉCOLOGIE ET DU DÉVELOPPEMENT DURABLE Décret no 2005- 829 du 20 juillet 2005 relatif à la composition des équipements électriques et électroniques et à des déchets issus de ces équipements	Producer must either establish an individual system for separate collection or pay a clearing house which reimburses municipalities for extra costs for separate collection (extra cost not defined) 1:1 take-back at retailers, may delegate this to a compliance system	New EEE: producer responsible unless otherwise agreed. Historic B2B EEE: end-user Responsible even if replacement purchased, unless otherwise agreed Mandatory visible fee to be set for some large appliances	To be prepared and operated by ADEME (Environment Agency)	Not yet set up	4-8 collective producer systems expected competing in several categories, e.g. Recylum ECO-Systèmes Eco-Logic ERP
Germany	√		Electrical and Electronic Equipment Act, "Gesetz über das Inverkehrbringen, die Rücknahme	Local govt. to finance collection, may manage WEEE itself. Local govt. sends take back request to Clearing House	Treatment costs of historic B2B EEE to be borne by the final user, but users and	EAR Foundation, industry-managed; responsibilities designated by UBA 6 July 2005	EAR Foundation	Producers cannot transfer responsibility. (Purchasing) consortia restricted by

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
			und die umweltverträgliche Entsorgung von Elektround Elektronikgeräten (Elektro- und Elektronikgerätegesetz (ElektroG))vom 16. März 2005	which notifies producer with highest unfulfilled obligation to pick up container Retailer or producer may take-back from consumers	producers may negotiate their own agreements for different arrangements. Producers responsible for B2B WEEE placed on the market after 13 Aug 2005, unless alternative arrangements agreed.			competition authority, e.g ERP, ProReturn, ENE, LARS, Olav, BSH-Miele-Philips, Quelle Waste mgmt systems/services : ALBA, DSD, DHL, e-back, EGR, Entec, AVR, Fliege Cleanaway, Hellmann, Interseroh, Landbell, Pape, Remondis, TechProtect/ RENE, Take-EWay, Vfw, Zentek
Greece	√		Decree No 117/2004, Gazette No A82 on 5 March 2004	Local govt. to organize freeof-charge collection 1:1 take-back by retailers Collection to be coordinated by compliance scheme, in collaboration with local govt.	Producers responsible for new B2B WEEE, unless alternative arrangements agreed Producers responsible for historic B2B WEEE if a	Environment Ministry responsible for registration and data collection	Not required	All producers are expected to join the approved collective compliance scheme (Recycling of Appliances S.A.), but the law provides an individual

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
					replacement is purchased. otherwise, endusers pay			compliance option
Hungary	√		Government Decree 264/2004 on the take-back of WEEE of 23 September 2004, Ministerial Decree 15/2004 of 8 October 2004 Amendment 103/2004 to the Product Fee Act LVI.	Producers to bear costs of collection, must reimburse local govt. for collection & sorting Producers may establish and operate Collection centres 1:1 take-back by retailers above minimum selling area; mobile phone take back by retailer Product Fee (tax) payable on the Difference between the recovery targets and recovery achieved (members of collective system exempt)	New WEEE: producer responsible; no provision for other agreement Historic WEEE: producer only responsible on 1:1 replacement basis, otherwise last user responsible	National General Directorate of Environment and Water Management	None, obligated parties to prove achievement of collection targets as % of amount placed on market	Four competing systems, open to all producers on same terms: Elektro-Coord (all categories B2C, B2B) Ökomat Kht (all categories B2C, B2B, except mobile phones and refrigerators) Elektro-Waste Kht (IT) Re-Elektro Kht
Ireland	√		Statutory Instrument No.	Local govt. to finance collection	Producers responsible for	National WEEE Registration Body,	'Black Box'	ERP WEEE Ireland

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
			340 of 2005 on Waste Management (Waste Electrical And Electronic Equipment) Regulations 2005 defines E-waste/ WEEE as electrical and electronic equipment, which is waste within the meaning of article 1(a) of Council Directive 75/442/EEC of 15 July 1975	through delivery to civic amenity sites Distributors must either take back WEEE on a 1:1 basis or display a notice informing retailers about the available collection systems Producers to finance takeback from local govt. and other collection points	B2B WEEE placed on the market after 13 Aug 2005, Unless alternative arrangements agreed Producers responsible for historic WEEE on 1:1 replacement basis; otherwise, endusers pay	WEEE Register Ltd	system provides confidential clearing house service	Ltd
Italy	√		Decree 25 July 2005 n.151	Municipal govt. to Organize separate collection on their territory except for category 5. 4 kg target postponed by 2 yrs Producers to finance takeback from mun.	Producers responsible for new B2B WEEE, unless alternative arrangements agreed. Must provide financial guarantee. Producers responsible for	Activity code as EEE producers at Chamber of Commerce which will feed Register To be set up by 'Supervision and Control of WEEE Mgmt Committee' consisting of govt. representatives - sub-decree	Under 'Supervision and Control of WEEE Mgmt Committee'	8-10 systems competing in one or several categories expected, e.g. Ecolamp, Ecolight, Ecodom, Remedia, EcoR'It, ERP

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
				collection points on, may set up own collection 1:1 take-back by retailers.	historic WEEE on 1:1 basis if old EEE less than double weight of new			
Latvia	√		Law on Waste Management, as amended 19 February 2004, 2 December 2004 and 22 June 2005; Regulations of the Cabinet of Ministers No. 624 on Categories of EEE (adopted on 27July 2004); Regulations of the Cabinet of Ministers No. 736 on Requirements for the Labelling of EEE and on Providing Information (adopted on 24 August 2004); Regulations of the Cabinet of Ministers No. 923 on the	Producers responsible for separate collection	Producers responsible for new B2B WEEE, unless alternative arrangements agreed	Environment Ministry may delegate responsibility to organisation by producers that has been active for at least 5 years	Not planned	LZE (by LETERA, LDTA will cover IT, perhaps other categories) CECED Latvia may set up an organisation to cover household appliances

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
			Management of WEEE (adopted on 9 Nov 2004);					
Lithuania	√		Amendment No. X-279 to the Law on Waste Management, adopted on 28 June 2005; Order of Minister of Environment No. D1-481 on Rules on Management of WEEE, adopted on 10 September 2004 Government Resolution No. 1252 on National Strategic Waste Management Plan, adopted on 5 Oct 2004.	Legislation leaves several options, form coll. system to state run WEEE Management programme 1:1 mandatory take-back at retailers of all sizes Producers responsible for meeting collection targets through own and municipal systems	Producers are responsible for new WEEE and historic WEEE on 1:1 basis only – otherwise final holder responsible	Environment Ministry and Agency to operate register, regional environmental departments to register producers and importers	Not planned	System by INFOBALT (category 3, 4, excl TVs), system by CECED, Zaliasis Taskas (packaging compliance organisation) considering WEEE management
Luxembourg	√		Grand Duke's Decree 18 January 2005 Environmental Agreement between the Ministry of the Environment, Ecotrel and	Existing public Infrastructure to be used; producers to finance takeback at least from there on; they may set up separate	Producers responsible for new B2B WEEE through individual or collective system Producers responsible for	Administration of the Environment; Ecotrel (for producers complying through Ecotrel;	None	ECOTREL set up February 2004 by industry and retail federations: approved 28 October 2005 – fees payable

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
			professional associations (including the Luxembourg Chamber of Commerce, the Chamber of Trade and the Skilled Tradesmen's Federation) on 16 March 2006, which entered into force on 1April 2006	collection 1:1 take-back by retailers who may inform of alternatives if they have insufficient space	historic B2B WEEE on 1:1 replacement basis			from 1 Sept 2005, all Categories
Malta	√		RoHS Regulations adopted August 2004; Eco-tax imposed on EE from September 2004 Draft WEEE Regulations on October 2004 still not adopted;	Eco-tax on EEE: Environment Ministry empowered to grant full or partial exemption according to recovery rate achieved and/or for members of a compliance system Free of charge take-back at existing sites & new ones to be set up	Producers responsible for new B2B WEEE unless agreed differently Producers responsible for historic B2B WEEE on 1:1 replacement basis	Malta Environment and Planning Authority to be responsible	None	None (some WEEE currently collected by WasteServ, a governmentowned company)
Netherlands	√		BEA Decree and REA	1:1 take-back by retailers	Producers responsible for	Ministry of Housing, Spatial	None	ICT-Milieu (IT, office equipment,

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
			Regulation adopted in July 2004	Local govt. collection points take back household WEEE from households and distributors Producers may arrange their own takeback from households	new B2B WEEE unless agreed differently Final user responsible for historic B2B WEEE	Planning and the Environment		telecoms) and 6 non-competing systems under NVMP umbrella: VLEHAN - white goods FIAR - brown goods' VLA - ventilation equipment SVEG - electrical tools SMR - metal and electrical products Stichting Lightrec
Poland	√		WEEE ACT 9/05 adopted in July 2005 with 3 orders and certain articles coming into force in July 2006	Producers to finance WEEE from collection point operators (municipalities, retailers) Start date for take-back from municipal collection not defined 1:1 take-back at retailers from 1July 2006. No collection targets set yet	Producer responsible for historic B2B WEEE on 1:1 replacement basis Producers always esponsible for new B2B WEEE	Chief Inspector of Environmental Protection, may delegate to producer organisation with > 75% market share	References to Clearing House removed from Act as adopted	Elektro-Eko, single system by major associations CECED, KigEIT (competition authority approval pending) ERP
Portugal	√		Decree Law 230/04 adopted in Sept	Producers to set up collection	Producer responsible for	Register to be run by producer	None	Amb3E ERP

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
			2004, published in December 2004, plus amendment approved in Septe,mber 2005 and 25 Oct 2005 by Law Decree 174/2005	system which combines local authority WEEE collection centres and WEEE collected by retailers 1:1 take-back by retailers also on delivery of new products to private households	historic B2B WEEE on 1:1 replacement basis Producers responsible for new B2B WEEE unless agreed otherwise	associations and the compliance system (ANREE), under licence from the National Waste Institute		
Slovakia	√		Act 733/2004, amending the Waste Act 223/2001, adopted on 2 December 2004. Ministerial Decree 208/2005 regarding the management of WEEE, adopted on 29 April 2005	Producers to finance containers (7 types) and take back from municipal sites 1:1 take back at retailer only mandatory if retailer is producer Producer to reach annually increasing collection targets as % of EEE placed on market Product fee (tax) charged on Underachieved	There is a tax on EEE, linked to the recovery rate achieved	Environment Ministry	Provisions in place, but no operations yet	No approval required for collective systems. Ekolamp (Category. 5) Envidom (Category. 1, 2) SEWA (Category 3, 4) Etalux (Category 5) Individual compliance through waste management companies (Envi-Geos Nitra, Logos, Enzo, Brantner).

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
				quantities				
Slovenia	√		Decree 4871, 4 November 2004 with amendment published on 10 June 2005. A new "Decree on treatment of waste electrical and electronic equipment" (Official Journal of RS, No. 107/06) entered into force on 1 November 2006.This new decree in addition to transposition of EU directive also specified registration of producers and importers of WEEE	Tender to one system to be called in 2009 if recovery targets not met Local authorities currently operate Collection centres for WEEE – producers to provide containers There is a tax on EEE, linked to the recovery rate achieved	There will be a tax on EEE, linked to the recovery rate achieved	Ministry of Environment and Spatial Planning	Environment Ministry	Ekolamp, ZEOS (all other categories); Individual compliance: Slopak, Interseroh
Spain	√		Royal Decree 208/2005	1:1 take-back by retailers free-of-charge to consumers Local govt. collection points take back household WEEE from households and distributors	Producer responsible for historic B2B WEEE on 1:1 replacement basis Producers responsible for new B2B WEEE unless	The National Register of Industrial Establishments, but producer must also register with the competent body of	National Register of Industrial Establishments	ECOLEC (categories 1, 2) TRAGAMOVIL (mobile phones) ECOFIMATICA (office IT and reprographic) ECOASIMELEC ECOTIC (category. 4, air

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
				Producers may arrange their own takeback from households	agreed otherwise; local govt. may take back B2B if there is a voluntary agreement	the Autonomous Region where their head office is located		conditioners, medical equipment, toys) Ambilamp (category 5)
Sweden	√		Swedish Code of Statutes 2005:209, "Ordinance on producer responsibility for electrical and electronic products" Published: 26 April 2005	Local govt. responsible for collecting WEEE that has not been returned to a producers' collection system Producers to organize collection from municipal sites No new obligations for retailers – unchanged from previous (2000) legislation – i.e take-back optional	Producers to finance takeback of products placed on market after 12 August 2005, and of historical waste if a replacement is bought; otherwise, end-users to fund historical waste	The Environmental Protection Agency is to run the National Register Registration expected to start early 2006	None	El-Kretsen runs the El-Retur system jointly with local govt., and also operates a recovery system for ICT products El-Kretsen is revising its statutes to bring them into line with the requirements of the new Statutory Order
Norway	√	WEEE/ E-waste is defined as EE waste, where EE	relating to the recycling of Waste, 1 June 2004, Chapter 1	Retailers and Municipalities to take back free of charge. Producers to	Business can deliver to dealer on 1:1 take back. Producers are	Norwegian Pollution Control Authority	None	El-Retur AS RENAS AS Ragn-sells AS Veolia AS Eurovironment

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
		waste means scrap EE equipment. EE equipment is defined as EE equipment means products and components that depend on an electrical current or electromagnetic field in order to function correctly, as well as equipment for the generation, transfer, distribution and measurement of these currents and fields, including the components necessary for the cooling,		collect and take back from Municipalities and retail collection centers. Collection system to recover fee from producers and importers.	responsible for both historic and new.			

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
		heating, protection, etc., of the electrical or electronic components.						
Switzerland	√	The definition of WEEE/E-waste is identical to EU directives. However, equipment covered by this ordinance are electrically powered and fall under one of the following categories: - Entertainment electronics - Office, information, communication appliances - Household appliances	VREG:Ordinance on the return, the taking back and the disposal of electrical and electronic equipment (ORDEE)	Distributors, Retailers and manufacturers must take back free of charge (even if no equipment is purchased). Consumers fund the collection and recycling through ARF	Distributors, Retailers and manufacturers must take back free of charge (even if no equipment is purchased). Consumers fund the collection and Recycling through ARF	Responsibility of Environment ministry but no registry implementation. It is done by Swiss Cantons.	None	SWICO – ICT SENS – White goods SENS with SLG (Luminaries and Illuminants)

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
		- Fluorescents with lightbulbs - Fluorescents without light-bulbs - PCB containing fluorescents - Tools (Larger industrial tools excluded) - Sport/ entertainment appliances and toys - Components of the aforementioned						
United Kingdom	√		The Waste Electrical and Electronic Equipment Regulations 2006, to be enforced in 2007	Direct 1:1 take back by distributors from consumers free of charge If member of DTS, direct consumers to nearest DCF to dispose of their WEEE producers	Not a collective obligation. Individual producer responsibility. For non hazardous luminaries, producers take back where	UK environmental agencies to issue preliminary 2007 market share percentage to based on 2006 sales data submitted with producer's registration.	Environmental Agency	REPIC – White goods Valpak – IT and Office Equipment Lumicon – Non-Household Luminaries

Country/ Features	Identical Definitions to EU WEEE Directives	Variation	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collection Systems
				to finance in both cases	collective system will charge flat monthly fee per item of equipment.	Environmental gency to approve and give registration number to agency.		

Source: Prepared by modifying and updating table given in the section "Executive Summary" transposition of the WEEE and RoHS Directives in Other EU Member States", Perchards, United Kingdom, November 2005.

Annexure 2

Policies/ Laws/ Regulations/ Institutional Roles for WEEE/E-waste in Other Developed Countries

Country/ Features	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collective Systems
Australia	No Specific WEEE/E-waste regulation. Only Australian Capital Territory has regulation, placing a bevy on the disposal of TVs & PCs at landfill sites. Product stewardship initiative are under development	Municipal collection system exists for major household items. Voluntary mobile phone industry recycling program exists (take back at retailers)	No industry wide take back exists	Does not Exist	Does not Exist	Does not Exist
Canada	Canada's WEEE/ E-waste regulations are in being enforced at provincial level based on extended producer's responsibility/ stewardship. Alberta, Saskatchewan, British Columbia, Ontario and Nova Scotia have WEEE/ E-	Under development based on the principles of extended producer's responsibility/ stewardship	Under development	Does not Exist	Does not Exist	Under development

Country/ Features	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collective Systems
	waste regulations in place.					
Japan	Reduce; Rcycling; Recover, "The Law for Recycling of Specified Kinds of Home Appliances (Home Appliances Recycling Law)" 1998 and "The Law for Promotion of the Effective Utilization of Resources" 2000	1:1 take back for home appliances by retailers for free. In case of non replacement with new item, consumers to pay for disposal/ recycling charges and transportation. Collection points are located at retailers, collection centers or post offices (for direct delivery to OEM) OEM responsible for collection and transportation of WEEE/E-waste but generator to pay for collection and management costs.	Exists	Ministry monitors recycling rates	Does not Exist	Joint recycling services offered by companies eg. Hitachi and IBM Japan
Korea	Producer Responsibility/ Product Stewardship. Article 2 of Act for resource recycling of Electrical and Electronic Equipment and Vehicles adopted on 2nd	Municipality collect for old discarded and charge for collection and disposal of WEEE/E-waste (in case of no new purchase) 1:1 take back of household by retailers for limited items (new purchase)	1:1 limited mandatory free take back for WEEE (purchase of new product) by producers	Ministry of Environment, which announces the quantity of recycling based on amount market, previous records and given capacity of	Does not Exist	Mutual Aid Association on Recyclers

Country/ Features	Policies/ Laws/ Regulations	B2C WEEE Collection	B2B WEEE Responsibility	National Register	Clearing House	Collective Systems
	April 2007			recyclers.		
New Zealand	No specific legislation, which defines WEEE/ Ewaste in New Zealand. However, Imports and Exports (Restrictions) Order (No 2) 2004 covers WEEE/E-waste.	Drop off at retail stores, recycling/ refurbished centers; curbside collection centers; local authorities collection centers	Voluntary schemes developed by industry eg. HP, IBM, Dell, Fisher and Paykel, Vodafone, Telecom, Exide	Does not Exist	Does not Exist	Does not Exist
USA	No specific legislation at federal level. But twenty states have E-waste laws.	On going drop off at non profit institutions Ongoing drop off at retailers 1:1 take back by retailers in some states Sporadic collection events	Not clearly defined. States have different systems	Does not Exist	Does not Exist	Does not Exist

Annexure 3

[TO BE PUBLISHED IN THE GAZETTE OF INDIA, PART-II, SECTION-3, SUB-SECTION (ii)]

GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT AND FORESTS

NEW DELHI, the SEPTEMBER, 2010

MODIFIED DRAFT NOTIFICATION

S.O. ( ):- Whereas, the draft rules, namely the e-waste ((Management and Handling) Rules 2010 was published by the Government of India in the Ministry of Environment and Forests vide number S.O.1125 (E), dated 14th May, 2010 in the Gazette of India, Extraordinary of the same date inviting objection and suggestion from all persons likely to be affected thereby, before the expiry of the period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public;

AND WHEREAS copies of the said Gazette were made available to the public on the 14th day of May, 2010;

AND WHEREAS the objections and suggestions received within the said period from the public in respect of the said draft rules have been duly considered by the Central Government;

NOW, THEREFORE, in exercise of the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules, namely:-

CHAPTER I

GENERAL

1. **Short Title and Commencement.** –
(1) These rules may be called the e-waste (Management and Handling) Rules, 2010.
(2) They shall come into force with effect from 01.01.2012.

2. **Application.** –
(1) These rules shall apply to every producer(s), distributer(s), collection centre(s), refurbisher(s), dismantler(s), recycler(s), consumer(s) or bulk consumer(s) involved in the manufacture, sale, purchase and processing of electrical and electronic equipment or components as specified in Schedule-I and shall not apply to the following:-

(a) waste water and exhaust gases as covered under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) respectively and rules made there under;
(b) waste arising out of the normal operations from ships beyond five kilometers of the relevant baseline as covered under the provisions of the Merchant Shipping Act, 1958 (44 of 1958) and the rules made there under;
(c) radio-active wastes as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and rules made there under,
(d) ozone depleting substances (ODS) as covered under the Ozone Depleting Substances (Regulation and Control) Rules 2000 made under the Act; and
(e) batteries as covered under the Batteries (Management and Handling) Rules, 2001 made under the Act.

3. **Definitions.** - In these rules, unless the context otherwise requires, -

(a) 'Act' means the Environment (Protection) Act, 1986 (29 of 1986);
(b) 'authorisation' means permission for handling, collection, reception, storage, transportation, dismantling, recycling, treatment and disposal of e-waste granted under sub-rule (2) of rule 11;
(c) 'bulk consumer' means bulk users of electrical and electronic equipment such as Central or State Government Departments, public sector undertakings, banks, private companies, educational institutions multinational organizations and others that are registered under the Factories Act 1948, Companies Act 1956 or the Societies Registration Act 1860, and the Micro, Small and Medium Enterprises Development Act, 2006 including the international agencies;
(d) 'central pollution control board' means the Central Pollution Control Board constituted under sub-section (1) of section 3 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974);
(e) 'collection centre' means a centre established, individually or jointly to collect e-waste;
(f) 'consumer' means any person(s) using electrical and electronic equipment excluding the bulk consumers;
(g) 'distributer' means any person who receives electrical or electronic equipment or components thereof from the producer, who sells it to consumers or bulk consumers or other distributers or retailers on behalf of the producers or otherwise;
(h) 'dismantler' means any person engaged in dismantling of used electrical and electronic equipment into their components;
(i) 'disposal' means any operation which does not lead to recycling, recovery or reuse and includes physic-chemical or biological treatment, incineration and deposition in secured landfill;
(j) 'environmentally sound management of e-waste' means taking all steps required to ensure that e-waste are managed in a manner which shall protect health and environment against any adverse effects, which may result from hazardous substance contained in such wastes;
(k) 'electrical and electronic equipment (EEE)' means equipment which is dependent on electric currents or electro-magnetic fields to be fully functional including those used for the generation, transfer and measurement of such currents and fields falling under the categories set out in Schedule-I.

(l) 'e-waste' means waste electrical and electronic equipment, whole or in part included in, but not confined to equipment listed in schedule-I and scraps or rejects from their manufacturing process, which is intended to be discarded.

(m) 'extended producer responsibility' (EPR) means responsibility of any producer of electrical or electronic equipment, for their products beyond manufacturing until environmentally sound management of their end-of-life products.

(n) 'facility' means any location wherein the process incidental to the collection, reception, storage, segregation, refurbishing, dismantling, recycling, treatment and disposal of e-waste are carried out;

(o) 'Form' means forms appended to these rules;

(p) 'historical waste' means e-waste available in the market on the date from which these rules come into force.

(q) 'orphaned products' means non branded or assembled products as well as those produced by a company, which has closed the operation or stopped the product support;

(r) 'producer' means any person who, irrespective of the selling technique used;

(i) manufactures and offers to sale electrical and electronic equipment under his own brand; or

(ii) offers to sale under his own brand, the assembled electrical and electronic equipment produced by other manufacturers or suppliers; or

(iii) offers to sale imported electrical and electronic equipment;

(s) 'recycler' - means any person, who is engaged in processing e-waste for recovery of useful materials or reuse;

(t) 'refurbishment' means repairing of used electrical and electronic equipment to be put back to original use and selling the same in the market;

(u) ' refurbisher' means any agency/company who is engaged in refurbishment and is listed under the Company's Act, 1956;

(v) 'schedule' means the Schedules appended to these rules;

(w) 'state government'- in relation to a Union territory means, the Administrator thereof appointed under article 239 of the Constitution;

(x) 'state pollution control board'- means the concerned State Pollution Control Board or the Pollution Control Committee of the Union Territories constituted under sub-section (1) of section 4 of the Water (Prevention and Control of Pollution) Act, 1974;

(y) 'transporter' means a person engaged in the off-site transportation of e-waste by air, rail, road or water

Words and expressions used in these rules and not defined but defined in the Environment (Protection) Act 1986 shall have the meanings respectively assigned to them in that Act.

CHAPTER II

RESPONSIBILITIES

4. **Responsibilities of the producer.** – the producer shall be responsible for;-

(1) collection of e-waste generated during the manufacture of electrical and electronic equipment and channelizing the same for recycling or disposal.

(2) Collection of e-waste generated from the 'end of life' of their products in line with the principle of 'Extended Producer Responsibility' (EPR), and to ensure that such e-wastes are channelized to registered refurbisher or dismantler or recycler.

(3) setting up collection centers or take back system either individually or collectively for all electrical and electronic equipment at the end of their life.

(4) financing, and organizing a system to meet the costs involved in the environmentally sound management of e-waste generated from the 'end of life' of its own products and historical waste available on the date from which these rules come in to force. Such financing system shall be transparent. The producer may choose to establish such financial system either individually or by joining a collective scheme.

(5) providing contact details such as address, telephone numbers/helpline number and e-mail of distributers and authorized collection centers to consumer(s) or bulk consumer(s) so as to facilitate return of used electrical and electronic equipment.

(6) creating awareness through publications, advertisements, posters, or by any other means of communication and information booklets accompanying the equipment, with regard to the following:

(i) Information on hazardous constituents in e-waste electrical and electronic equipment;

(ii) information on hazards of improper handling, accidental breakage, damage and/or improper recycling of e-waste;

(iii) instructions for handling the equipment after its use, along with the Do's and Don'ts;

(iv) affixing the symbol given below on the products to prevent e-waste from being dropped in garbage bins containing waste destined for disposal;

(7) obtaining an authorization from the concerned State Pollution Control Board or Pollution Control Committee in accordance with the procedures prescribed under rule-11;

(8) maintaining records in Form 2 of the e-waste handled Such records should be available for scrutiny by the appropriate authority.

(9) filing annual returns in Form 3, to the concerned State Pollution Control Board or Pollution Control Committee, on or before the 30th day of June following to the financial year to which that return relates.

5. **Responsibilities of distributors.** –

(1) Every distributor shall be responsible to collect the e-waste by providing the consumer(s) a box, bin or a demarcated area to deposit e-waste.

(2) Every distributor shall make an application in Form 4 to the concerned State Pollution Control Boards or Pollution Control Committees for grant of one time registration;

(a) the State Pollution Control Boards or Pollution Control Committees shall register the distributor on a one time basis and registration would be considered as deemed if not objected to within a period of 60 days.

(b) the registered distributor shall be required to submit details of e-waste collected to the concerned State Pollution Control Board or Pollution Control Committees on yearly basis and registration would be liable for cancellation on failure to furnish these details to the State Pollution Control Boards or Pollution Control Committees:
Provided that the registration granted to the distributor shall not be cancelled unless he has been given a reasonable opportunity of hearing.

(3) Every distributor shall ensure that the e-waste thus collected is safely transported back to the producer or to authorized collection centre as the case may be.

(4) Every distributor shall file annual returns in Form 3 to the concerned State Pollution Control Board or Pollution Control Committee, on or before the 30th day of June following to the financial year to which that return relates.

(5) Every distributor shall maintain records of the e-waste handled in Form 2 and such records should be available for scrutiny by the appropriate authority.

6. **Responsibilities of refurbisher.** –

(1) Every refurbisher shall collect e-waste generated during the process of refurbishing and channelized the waste to producer or authorized collection center or dismantler or recycler.

(2) Every refurbisher shall make an application in Form 4 to the concerned State Pollution Control Boards or Pollution Control Committees for grant of one time registration;

(a) the State Pollution Control Boards or Pollution Control Committees shall register the refurbisher on a one time basis and registration would be considered as deemed if not objected to within a period of 60 days.

(b) the registered refurbisher shall be required to submit details of e-waste generated to the concerned State Pollution Control Board or Pollution Control Committees on yearly basis and registration would be liable for cancellation on failure to furnish these details to the State Pollution Control Boards or Pollution Control Committees:

Provided that the registration granted to the refurbisher shall not be cancelled unless he has been given a reasonable opportunity of hearing.

(3) Every refurbisher shall file annual returns in Form 3 to the concerned State Pollution Control Board or Pollution Control Committee, on or before the 30th day of June following to the financial year to which that return relates.

(4) Every refurbisher shall maintain records of the e-waste handled in Form 2 and such records should be available for scrutiny by the appropriate authority.

7. **Responsibilities of collection centers** – Any person(s) operating collection centre(s) individually or collectively shall,-

(1) obtain an authorization in accordance with the procedures prescribed under Rule -11 from the concerned State Pollution Control Board or Pollution Control Committee as the case may be and provide details such as address, telephone numbers/helpline number, e-mail, etc. of such collection centre(s) to the general public.

(2) ensure that the e-waste collected by them are stored in a secured manner till these are sent to producer(s) or refurbisher or registered dismantler(s) or recycler(s) as the case may be;

(3) ensure that no damage is caused to the environment during storage and transportation of e-waste; and

(4) file annual returns in Form 3, to the concerned State Pollution Control Board or Pollution Control Committee on or before the 30th day of June following to the financial year to which that return relates.
(5) maintain records of the e-waste handled in Form 2 and such records should be available for scrutiny by the appropriate authority.

8. **Responsibilities of consumer or bulk consumer.** –
(1) Consumers of electrical and electronic equipment shall ensure that e-waste are deposited with the distributer or authorized collection centers.
(2) Bulk consumers of electrical and electronic equipment shall ensure that e-waste are channelized to distributer or authorized collection centers or refurbisher or registered dismantler or recyclers or avail the pick-up or take back services provided by the producers; and
(3) Bulk consumers shall file annual returns in Form 3, to the concerned State Pollution Control Board or Pollution Control Committee on or before the 30th day of June following to the financial year to which that return relates.

9. **Responsibilities of dismantler** – Every dismantler shall,-
(1) obtain registration from the State Pollution Control Board in accordance with the procedures prescribed under the rule -13.
(2) ensure that no damage is caused to the environment during storage and transportation of e-waste;
(3) ensure that the dismantling processes do not have any adverse effect on the health and the environment;
(4) ensure that the facility and dismantling processes are in accordance with the standards or guidelines published by the Central Pollution Control Board from time to time; and
(5) ensure that dismantled e-waste are segregated and sent to the registered recycling facilities for recovery of materials;
(6) ensure that non-recyclable/non- recoverable components are sent to authorized treatment storage and disposal facilities.
(7) file a return in Form 3, to the State Pollution Control Board/Committee of Union Territories as the case may be, on or before 30th June following to the financial year to which that return relates.
(8) not process any e-waste for recovery or refining of materials, unless he is registered with State Pollution Control Board as the recycler for refining and recovery of materials.

10. **Responsibilities of recycler/ reprocessor** – Every recycler shall
(1) obtain registration from State Pollution Control Board in accordance with the procedures prescribed under Rule -13.
(2) ensure that the facility and recycling processes are in accordance with the standards laid down in the guidelines published by the Central Pollution Control Board from time to time;
(3) make available all records to the Central or State Pollution Control Board/ Committee of Union Territories for inspection;
(4) ensure that residue generated thereof is disposed of in a hazardous waste treatment storage disposal facility;
(5) file annual returns in Form 3, to the State Pollution Control Board or Committee of the UT as the case may be, on or before 30th June following to the financial year to which that returns relate.

CHAPTER III
PROCEDURE FOR SEEKING AUTHORIZATION AND REGISTRATION FOR HANDLING E-WASTES

11. **Procedure for grant of authorization.**–

(1) Every producer, collection centre, dismantler and recycler of e-waste shall require to obtain an authorization from the concerned State Pollution Control Board or Pollution Control Committee of Union Territories as the case may be.

(2) Every producer, collection centre, dismantler and recycler of e-waste shall make an application, within a period of three months starting from the date of commencement of these rules, in Form 1 to the State Pollution Control Board or the Pollution Control Committee for grant of authorization;

Provided that any person authroised under the provisions of the Hazardous Wastes (Management, Handling and Transboundary Movements) Rules, 2008, prior to the date of coming into force of these rules shall not require to make an application for authorization till the period of expiry of such authorization;

Provided further that a recycler of e-waste who has not been authorised under the provisions of the Hazardous Waste (management, Handling and Transboundary Movements) Rules, 2008, shall require to follow the procedure mentioned in sub rule (1) above.

(3) On receipt of the application complete in all respects for the authorization, the State Pollution Control Board or Pollution Control Committee of Union Territories may, after such enquiry as it considers necessary and on being satisfied that the applicant possesses appropriate facilities, technical capabilities and equipment to handle e-waste safely, grant within a period of one hundred and twenty days an authorization in Form-1(a) to the applicant to carry out safe operations in the authorized place only, which shall be valid for a period of five years.

(4) The State Pollution Control Board or Pollution Control Committee of the Union Territories after giving reasonable opportunity of being heard to the applicant shall refuse to grant any authorization.

(5) Every person authorized under these rules shall maintain the record of e-waste handled by them in Form-2 and prepare and submit to the State Pollution Control Board or Pollution Control Committee, an annual return containing the details specified in Form 3 on or before 30th day of June following to the financial year to which that return relates.

(6) An application for the renewal of an authorization shall be made in Form-1 at least two months (sixty days) before its expiry and the State Pollution Control Board or Pollution Control Committee may renew the authorization after examining each case on merit and subject to the condition that there is no report of violation of the provisions of the Act or the rules made there under or the conditions specified in the authorization.

(7) Every producer, collection centre, dismantler and recycler shall take all steps, wherever required, to comply the conditions specified in the authorization.

(8) The State Pollution Control Board in case of a respective State or the Pollution Control Committee in case of Union Territories shall maintain a register containing particulars of the conditions imposed under these rules for environmentally sound management of e-waste, and it shall be open for inspection during office hours to any person interested or affected or a person authorized by him on his behalf.

12. **Power to suspend or cancel an authorization**.-

(1) The State Pollution Control Board or Pollution Control Committee of the Union Territories may, if in its opinion, the holders of the authorization has failed to comply with any of the conditions of the authorization or with any provisions of the Act or these rules and after giving a reasonable opportunity of being heard and after recording reasons thereof in writing cancel or suspend the authorization issued under these rules for such period as it considers necessary in the public interest.

(2) Upon suspension or cancellation of the authorization, the State Pollution Control Board or Pollution Control Committee of the Union Territories may give directions to the persons whose authorization has been suspended or cancelled for the safe storage of the e-waste and such person shall comply with such directions.

PROCEDURE FOR REGISTRATION WITH STATE POLLUTION CONTROL BOARD

13. **Procedure for grant registration.** –

(1) Every dismantler or recycler of e-waste shall make an application, within a period of three months starting from the date of commencement of these rules, in Form-5 in triplicate to the Member Secretary of the State Pollution Control Board enclosing accompanied with a copy of the following documents for the grant or renewal of registration:-

(i) consent to establish granted by the State Pollution Control Board under Water (Prevention and Control of Pollution) Act, 1974, (25 of 1974) and Air (Prevention and Control of Pollution) Act, 1981(21 of 1981);

(ii) certificate of registration issued by the District Industries Centre or any other government agency authorized in this regard;

(iii) proof of installed capacity of plant and machinery issued by the District Industries Centre or any other government agency authorized in this behalf

(iv) in case of renewal, a certificate of compliance of effluent and emission standards, treatment and disposal of hazardous wastes as applicable from the State Pollution Control Board or Committee of the UT or any other agency designated for this purpose; and

Provided that any person registered under the provisions of the Hazardous Wastes (Management, Handling and Transboundary Movements) Rules, 2008, prior to the date of coming into force of these rules shall not require to make an application for registration till the period of expiry of such registration;

Provided further that a recycler of e-waste who has not been registered under the provisions of the Hazardous Waste (management, Handling and Transboundary Movements) Rules, 2008, shall require to follow the procedure mentioned in sub rule (1) above.

(2) The State Pollution Control Board, on being satisfied that the application is complete in all respect and that the applicant is utilizing environmentally sound technologies and possess adequate technical capabilities, requisite facilities and equipment to recycle and process e-waste, may grant registration to such applicants stipulating therein necessary conditions as deemed necessary for carrying out safe operations in the authorized place only.

(3) The State Pollution Control Board shall dispose of the application for registration within a period of ninety days from the date of the receipt of such application complete in all respects.

(4) The registration granted under these rules shall be valid initially for a period of two years and thereafter for a period of maximum five years on subsequent renewals from

the date of its issue, unless the operation is discontinued by the unit or the registration suspended or cancelled by the State Pollution Control Board.

(5) The State Pollution Control Board may after giving reasonable opportunity of being heard to the applicant, by order, refuse to grant or renew.

(6) The State Pollution Control Board shall monitor the compliance of conditions stipulated for granting registration.

(7) The State Pollution Control Board may cancel or suspend a registration granted under these rules, if it has reasons to believe that the registered recycler has failed to comply with any of the conditions of registration, or with any provisions of the Act or rules made there under, after giving an opportunity to the recycler to be heard and after recording the reasons there for.

(8) An application for the renewal of registration shall be made in Form-5 at least two months (sixty days) before its expiry and the State Pollution Control Board or Pollution Control Committee may renew the registration after examining each case on merit and subject to the condition that there is no report of violation of the provisions of the Act or the rules made there under or the conditions specified in the registration.

(9) The dismantler or recycler shall maintain records of the e-waste purchased and processed and shall file annual returns of its activities of previous year in Form 3 to the State Pollution Control Board or Pollution Control Committee on or before 30th day of June of every year

(10) The Central Government and the Central Pollution Control Board may issue guidelines for standards of performance for recycling processes from time to time.

CHAPTER IV

14. **Procedure for storage of e-waste.-**

(1) Every producer, distributer, collection centre, refurbisher, dismantler or recyclers may store the e-waste for a period not exceeding one hundred and twenty days and shall maintain a record of collection, sale, transfer, storage and segregation of wastes and make these records available for inspection:

Provided that the State Pollution Control Board may extend the said period in following cases, namely:

(i). Dismantlers and Recyclers up to six months of their annual capacity; or

(ii). Collection centers who do not have access to any registered dismantling or recycling facility in the concerned state; or

(iii). The waste which needs to be specifically stored for development of a process for its recycling, reuse.

CHAPTER V

REDUCTION IN THE USE OF HAZARDOUS SUBSTANCES (RoHS) IN THE MANUFACTURE OF ELECTRICAL AND ELECTRONIC EQUIPMENT

15. **Reduction in the use of hazardous materials in the manufacture of electrical and electronic equipment.**–

(1) Every producer of electrical and electronic equipment shall ensure that, new electrical and electronic equipment does not contain Lead, Mercury, Cadmium, Hexavalent

Chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

(2) The rule 15(1) shall not apply to applications listed in Schedule-II. Such reduction in use of hazardous substances in electrical and electronic equipment shall be achieved within a period of three years from the date of commencement of these rules.

(3) In the event of such reduction in the hazardous materials used in the electrical and electronic equipment, the detailed information on the constituents of the equipment shall be provided in the product information booklet.

(4) Imports or placement in the market for electrical and electronic equipment shall only be permitted for those which are RoHS compliant.

CHAPTER VI

MISCELLANEOUS

16. Every producer(s), distributor (s) collection centre(s), refurbisher(s), dismantler(s), recycler(s), consumer(s) or bulk consumer(s) shall not import used electrical and electronic equipment or components in India for use unless it is imported for the purpose of repair or refurbishment or to fulfill obligations under EPR. Such imports shall be governed as per Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008.

17. **Duties of Authorities.-** subject to the other provisions of these rules, the authority shall perform duties as specified in Schedule-III.

18. **Annual Report.-**

(1) The State Boards and the Committees shall prepare and submit to the Central Pollution Control Board an annual report with regard to the implementation of these rules by the 30th September every year in Form 6.

(2) The Central Pollution Control Board shall prepare the consolidated annual review report on management of e-waste and forward it to the Central Government along with its recommendations before the 30th December every year.

19. **Transportation of e-waste.** –

(1) The transportation of e-waste, when these are intact, shall be like any other electrical and electronic equipment.

(2) In case of transportation of e-waste for final disposal to a facility existing in a State other than the State where the waste is generated/collected, the transporter shall obtain 'No Objection Certificate' from the concerned State Pollution Control Board and shall intimate the State Pollution Control Board of State of transit.

(3) In case of transportation of e-waste for dismantling or for recycling in a State other than the State where the waste is generated /collected, the transporter shall intimate the concerned State Pollution Control Boards beforehand and the State Pollution Control Boards of the State of transit.

20. **Accident reporting and follow-up.-** where an accident occurs at the facility processing e-waste or during transportation of e-waste, the producer, transporter, dismantler, refurbisher or recycler, as the case may be, shall report immediately to the State Pollution Control Boards/Committees of Union Territories about the accident.

21**.** The collection, storage, transportation, segregation, refurbishment, dismantling recycling and disposal of e-waste shall be in accordance with the procedures prescribed in the guidelines published by the Central Pollution Control Boards from time to time.

22. **Appeal.** –

(1) Any person aggrieved by an order of suspension or cancellation or refusal of authorization or registration or their renewal passed by the State Pollution Control Board or Pollution Control Committee, may within a period of thirty days from the date on which the order is communicated to him, prefer an appeal in Form 7 to the Appellate Authority comprising of the Environment Secretary of the State.

(2) The appellate Authority may entertain the appeal after the expiry of the said period of thirty days if it is satisfied that the appellant was prevented by sufficient cause from filing the appeal in time.

(3) Every appeal filed under this rule shall be disposed of within a period of sixty days from the date of its filling.

SCHEDULE-I

(see rule 3(k) (l))

A. CATEGORIES OF E-WASTE covered under the rules

Sr. No.	**E-waste Categories**
i.	**IT and telecommunication equipment :** Centralised data processing: Mainframes, Minicomputers Personal computing: Personal Computers (CPU with input and output devices) Laptop (CPU with input and output devices) Notebook, Notepad etc., Printers including cartridges Copying equipment Electrical and electronic typewriters Pocket and desk calculators And other products and equipment for the collection, storage, processing, presentation or communication of information by electronic means User terminals and systems Facsimile Telex Telephones Pay telephones Cordless telephones Cellular telephones Answering systems And other products or equipment of transmitting sound, images or other information by telecommunications
ii.	**Consumer electrical and electronics:** Television sets (including LCD & LED), Refrigerator, Washing Machine, Air-conditioners

SCHEDULE-II

[See rule 15(2)]

Applications, which are exempted from the requirements of rule 15 (1)

1. Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.
2. Lead as an alloying element in steel containing up to 0.35% lead by weight, aluminum containing up to 0.4% lead by weight and a copper alloy containing up to 4% lead by weight.
3. Lead in high melting temperature type solders (i.e. lead based alloys alloys containing more than 85% lead by weight or more lead).

a. Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signaling, transmission as well as network management for telecommunication.

b. Lead in electronic ceramic parts (e.g. piezo-electronic devices).

4. Cadmium and compounds in electrical contacts and cadmium plating
5. Hexavalent chromium as an anti-corrosion of the carbon steel cooling system in absorption refrigerators.
6. Lead used in compliant pin connector systems.
7. Lead as a coating material for the thermal conduction module c-ring.
8. Lead and cadmium in optical and filter glass.
9. Lead in solders consisting of more than two elements for the connections between the pins and package of microprocessors with a lead content of more than 80 % and less than 85 % by weight.
10. Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit Flip Chip Packages.'
11. Lead and cadmium in printing inks for the application of enamels on borosilicate glass.
12. Lead as impurity in RIG (rare earth iron garnet) Faraday rotators used for fiber optic communications systems.
13. Lead in finishes of the fine pitch components other than connectors with a pitch of 0.65 mm or less with Ni-Fe lead frames and lead in finishes of fine pitch components other than connectors with a pitch of 0.65 mm or less with copper lead frames.
14. Lead in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors.
15. Lead oxide in plasma display panels (PDP) and surface conduction electron emitter displays (SED) used in structural elements; notably in the font and rear glass dielectric layer, the bus electrode, the black strip, the address electrode, the barrier ribs, the seal frit and frit ring as well as in print pastes.
16. Lead alloys as solder for transducers used in high-powered (designated operate for several hours at acoustic power levels of 125 dB SPL and above) loudspeakers.
17. Lead bound in crystal glass.
18. Cadmium alloys as electrical/mechanical solder joints to electrical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB (A) and more.
19. Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes.'
20. Lead in solders for the soldering of thin copper wires of 100 um diameter and less in power transformers.
21. Lead in cermet-based trimmer potentiometer elements.
22. Lead in the plating layer of high voltage diodes on the basis of a zinc borate glass body.

23. Cadmium and cadmium oxide in thick film pastes uses on aluminum bonded beryllium oxide

SCHEDULE III

[See rule 17)]

LIST AUTHORITIES AND CORREPONDING DUTIES

	AUTHORITY	**CORRESPONDING DUTIES**
1.	Central Pollution Control Board (CPCB) Delhi	(i) Coordination with State Pollution Control Boards/ Committees of UT (ii) Preparation of Guidelines for Environmentally Sound Management of e-waste (iii) Conduct assessment of e-waste generation and processing (iv) Recommend standards and specifications for processing and recycling e-waste (v) Documentation, compilation of data on e-waste and uploading on websites of CPCB (vi) Conducting training & awareness programmes (vii) Submit Annual Report to the Ministry (viii) Any other function delegated by the Ministry under these rules (ix) Enforcement of reduction in use of hazardous substances(RoHS) (x) Initiatives for IT industry for reducing hazardous substances, RoHS compliance (xi) Set targets for RoHS compliance (xii) Incentives and certification for green design/products
2.	State Pollution Control Boards/Committees of UT	(i) Inventorization of e-waste. (ii) Grant & renewal of Authorization (iii) Registration of recyclers of e-waste (iv) Monitoring compliance of authorization and registration conditions (v) Maintain information on the conditions imposed for authorization etc. (vi) Implementation of programmes to encourage environmentally sound recycling (vii) Action against violations of these rules (viii) Any other function delegated by the Ministry under these rules

FORM – 1

[*See rule 11(2)*]

APPLICATION FOR OBTAINING AUTHORIZATION FOR GENERATION/ COLLECTION/ TRANSPORT/STORAGE/DISMANTLING/RECYCLING/ DISPOSAL OF e-WASTE*

FORM – 1
[*See rule 11(2)*]
APPLICATION FOR OBTAINING AUTHORIZATION FOR GENERATION/ COLLECTION/ TRANSPORT/STORAGE/DISMANTLING/RECYCLING/ DISPOSAL OF e-WASTE*

From: .....
.....

To

The Member Secretary,
..... Pollution Control Board,…… Pollution Control Committee
.....
.....

Sir,
I / We hereby apply for authorization/renewal of authorization under rule 11(2) and 11(6) of the E-wastes (Management and Handling) Rules, 2010 for collection/ storage/ transport/treatment/disposal of e-wastes.

For Office Use Only

Code No. :
Whether the unit is situated in a critically polluted area as identified by Ministry of Environment and Forests (yes/no);

To be filled in by Applicant

Part A: General

1. (a) Name and full address, telephone nos. e-mail and other contact details of the unit :

   (b) Authorization required for (Please tick mark appropriate activity/ies*)
   - (i) Generation* □
   - (ii) Collection* □
   - (iii) Dismantling* □
   - (iv) Recycling* □

   (c) In case of renewal of authorization previous authorization no. and date

2. (a) Whether the unit is generating or processing e-waste as defined in the E-wastes (Management and Handling) Rules, 2010:
   - (i) generating* □
   - (ii) processing* □

*delete whichever is not applicable

3. (a) Total capital invested on the project :
   (b) Year of commencement of production:
   (c) Date of grant of the Consent to Establish:
   (d) Date of grant of the Consent to Operate:

Part B: e-waste

4. E-waste details:

(a)	Type of e-wastes generated as defined under the E-wastes (M&H)Rules, 2010:	
(b)	Total Quantity e-waste handled generated/collected/dismantled/ recycled :	
(c)	Mode of storage within the plant :	
(d)	Method of treatment and disposal :	
(e)	Installed capacity of the plant :	

Part C : Dismantling and Recycling Facility**

5. Detailed proposal of the facility (to be attached) to include:
   (i) Location of site (provide map).
   (ii) Details of processing technology
   (i) Type and Quantity of waste to be processed per day
   (iv) Site clearance (from local authority, if any)
   (v) Utilization of the e-waste processed
   (vi) Method of disposal of residues (details to be given)
   (vii) Quantity of waste to be processed or disposed per day
   (viii) Details of categories of e-waste to be dismantled/processed
   (ix) Methodology and operational details
   (x) Measures to be taken for prevention and control of environmental pollution including treatment of leachates
   (xii) Investment on Project and expected returns
   (xiii) Measures to be taken for safety of workers working in the plant

Place : _____

Date : _____

Signature _____
(Name_____)

Designation : _____

FORM 1(a)

[*See rule 11(3)*]

FORM FOR GRANTING AUTHORIZATION FOR GENERATION/COLLECTION/ TRANSPORTATION/STORAGE/REFURBISHMENT/DISMANTLING/ RECYCLING/DISPOSAL OF e-WASTE*

1. (a) Authorization and (b) date of issue ……

2. ……..……of……is hereby granted an authorization for generation, collection, storage, transport, refurbishment, dismantling, recycling and disposal of e-waste on the premises situated at…….

3. The authorization granted for generation, collection, storage, transport, dismantling, recycling and disposal of e-wastes.

4. The authorization shall be in force for a period from ……to …….

5. The authorization is subject to the conditions stated below and such conditions as may be specified in the rules for the time being in force under the Environment (Protection) Act, 1986.

Signature----------
Designation ---------- Date: ----------

Terms and conditions of authorization

1. The authorization shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the State Pollution Control Board or Committee of UT.
3. The person authorized shall not rent, lend, sell, transfer or otherwise transport the e-wastes without obtaining prior permission of the State Pollution Control Board or Committee of UT.
4. Any unauthorized change in personnel, equipment as working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorization.
5. It is the duty of the authorized person to take prior permission of the State Pollution Control Board or Committee of UT to close down the operations.
6. An application for the renewal of an authorization shall be made as laid down in rule 11 (6).

FORM – 2

[See rule 4(8), 5(5), 6(4), 7(6), 11(5) and 13(8)]

FORM FOR MAINTAINING RECORDS OF e-WASTE HANDLED

Quantity in Metric Tonnes (MT) or Kilograms (Kg) annually

1.	Name & Address: Producer /Collection Centre/Dismantler/ Recycler *		
2.	Date of Issue of Authorization* Registration *		
3.	Validity of Authorization* /Registration*		
4.	Types & Quantity of e-waste handled	Category	Quantity
		Item Description	
5.	Types & Quantity of e-waste stored	Category	Quantity
		Item Description	
7.	Types & Quantity of e-waste transported*	Category	Quantity
		Item Description	
	Name, address and contact details of the destination		
8.	Types & Quantity of e-waste refurbished*	Category	Quantity
		Item Description	
	Name, address and contact details of the destination of refurbished materials		
9.	Types & Quantity of e-waste dismantled*	Category	Quantity
		Item Description	
	Name, address and contact details of the destination		
10	Types & Quantity of e-waste recycled*	Category	Quantity
	Types & Quantity of materials recovered	Category	Quantity
		Item Description	
	Name, address and contact details of the destination		
11.	Types & Quantity of waste treated & disposed	Category	Quantity
		Item Description	

*Delete whichever is not applicable

FORM – 3

[*See rule 4(9), 5(4), 6(3), 7(4), 9(7), 10(5), 11(5) and 13(9)]*

FORM FOR FILING ANNUAL RETURNS OF SALE, COLLECTION, DISMANTLING & RECYCLING OF e-WASTE

[To be submitted by producer/collection centre/distributer/refurbisher/dismantler/ /recycler by 30th June following to the financial year to which that return relates].

Quantity in Metric Tonnes (MT) or Kilograms (Kg) annually

1	Name and address of the producer/distributer/ collection centre/ refurbisher/ dismantler/ recycler		
2	Name of the authorized person and complete address with telephone and fax numbers and e-mail address		
3	Total quantity e-waste sold/purchased/ sent for processing during the year for each category of e-waste listed in the Schedule (Attach list)		
	Details of the above	TYPE	QUANTITY
3(A)□	**DISTRIBUTERS**: Quantity of e-waste sold/purchased/sent to:		
3(B)□	**BULK CONSUMERS**: Quantity of e-waste sold/sent to:		
3(C)□	**REFURBISHERS**: Quantity of e-waste purchased/sent to:		
3(D)□	**DISMANTLERS**: Quantity of e-waste in MT purchased & processed and sent to:		
3(E)□	**RECYCLERS**: Quantity of e-waste in MT purchased/processed:		
4	Name and full address of the destination with respect to 3 (A-E) above		
5	Type and quantity of materials segregated/ recovered from e-waste of different categories as applicable to 3(D) &3(E)	TYPE	QUANTITY

Note: The applicant shall provide details of funds received (if any) from producers and its utility with an audited certificate

□ enclose the list of recyclers to whom e-waste have been sent for recycling.

□ delete whichever is not applicable

Place_____

Date_____ **Signature of the authorized person**

Form 4

[*See rule 5(2) and 6(2)]*

FORM FOR REGISTRATION OF DISTRIBUTERS AND REFURBISHERS

[To be submitted to the State Pollution Control Boards/Pollution Control Committees]

1	Name and Address of the Trader with Telephone and Fax Numbers (With proof):
2	TIN/VAT Number/Import Export Code
3	Category wise description of the e-waste collected:
4	Details of disposal of e-waste collected, if any:

Signature of the authorized person.

Place ……..
Date……..

FORM - 5

[see rule 13(1)]

APPLICATION FORM FOR REGISTRATION OF FACILITIES POSSESSING ENVIRONMENTALLY SOUND MANAGEMENT PRACTICE FOR RECYCLING e-WASTE

(To be submitted in triplicate)

1	Name and Address of the unit			
2	Contact person with designation, Tel./Fax			
3	Date of Commissioning			
4	No. of workers (including contract labour)			
5	Consents Validity	a. Water (Prevention & Control of Pollution) Act, 1974; Valid up to _____ b. Air (Prevention & Control of Pollution) Act, 1981; Valid up to_____		
6	Authorization validity	E-wastes (Management and Handling) Rules, 2010; Valid up to _____		
7	Manufacturing Process	Please attach manufacturing process flow diagram for each product(s)		
8	Products and Installed capacity of production in (MTA)	Products	Installed capacity (mta)	
9	Products manufactured during the last three years (as applicable)	Year	Product	Quantity
10	Raw material consumption during the last three years (as applicable)	Year	Product	Quantity
11	Water consumption	Industrial _____m3/day Domestic_____m3 / day		
	Water Cess paid up to (if applicable)			
	Waste water generation as per consent _____m3/day	Actual (avg., of last 3 months) Industrial _____m3 /day Domestic _____m3 /day		
	Waste water treatment (provide flow diagram of the treatment scheme)	Industrial Domestic		
	Waste water discharge	Quantity _____m3/day Location _____ Analysis of treated waste water for pH, BOD,COD, SS, O&G, any other parameter stipulated by SPCB/SPCC (attach details)		
12.	Air Pollution Control			
	a. Provide flow diagram for			

	emission control system(s) installed for each process unit, utilities etc.				
	b. Details for facilities provided for control of fugitive emission due to material handling, process, utilities etc				
	c. Fuel consumption	Fuel		Qty per day/month	
		(i)			
		(ii)			
	d. Stack emission monitoring	Stack attached to		Emission (SPM, SO2, NOx , Pb etc.) mg/Nm3	
		(i)			
		(ii)			
	e. Ambient air quality	Location Results ug/m3		Parameters SPM, SO2, NOx, Pb etc.) µg/m3	
		(i)			
		(ii)			
13.	Waste Management:				
	a. Waste generation in processing e-waste	SNo	Type	Category	Qty.
	b. Waste Collection and transportation (attach details)				
	c. Provide details of disposal of residue.	SNo	Type	Category	Qty.
	d. Name of TSDF utilized for				
	e. Please attach analysis report of characterization of hazardous waste generated (including leachate test if applicable)				
14.	Details of e-waste proposed to be procured through sale, contract or import, as the case may be, for use as raw material				
15.	Occupational safety and health aspects	Please provide details of facilities			
16.	Remarks:				
	Whether industry has provided adequate pollution control system / equipment to meet the standards of emission / effluent.	Yes/No If Yes, please furnish details			
	Whether industry is in compliance with conditions laid down in the Authorization	Yes / No			
17.	Any Other Information of relevance: i) ii)				

I hereby declare that the above statements /information are true and correct to the best of my knowledge and belief.
Signature

Date:_____ Name:_____
Place:_____ Designation:_____

Form - 6

[see rule 18]

FORM FOR ANNUAL REPORT TO BE SUBMITTED BY THE STATE POLLUTION CONTROL BOARD/COMMITTEES TO THE CENTRAL POLLUTION CONTROL BOARD

To,

The Chairman,
Central Pollution Control Board,
(Ministry of Environment And Forests)
Government Of India, 'Parivesh Bhawan',
East Arjun Nagar,
Delhi- 110 0032

1. Name of the State/Union territory 2. Name & address of the State Pollution Control Board / Committee 3. Number of authorised/ registered Producers, Distributers, Refurbishers, Collection Centres, Dismantler and Recyclers for management of e-waste in the State/Union territory under these rules 4. Categories of waste collected along with their quantities on a monthly average basis: 5. A Summary Statement on Category wise and product wise quantity of e-waste collected 6. Mode of treatment with details 7. Brief details of refurbishing, dismantling and recycling facilities 8. Any other information		Please attach as Annexure-I Please attach as Annexure-II Please attach as Annexure-III Please attach as Annexure-IV
9. Certified that the above report is for the period from …… …… ……		

Date: _____

Place : _____

Chairman or the Member Secretary
State Pollution Control Board/
Pollution Control Committee

Form - 7

[see rule 22]

FORM FOR APPLICATION FOR FILING APPEAL
AGAINST THE ORDER PASSED BY SPCB/PCC OF THE UNION TERRITORY

1. Name and address of the person making the appeal	:	
2. Number, date of order and address of the authority to which passed the order, against which appeal is being made	:	
3. Ground on which the appeal is being made	:	
4. Relief sought for	:	
5. List of enclosures other than the order referred in papa 2 against which the appeal is being filed	:	

Signature……
Date: Name and address ……..……

(Rajiv Gauba)
Joint Secretary to Government of India
(F No. 23-71/2009-HSMD)

Annexure 4

Elements	Material Recovered from Processing (%)															Selling Price of Material Recovered				
	PCs				TVs				Ref				Mobiles								
	Content (% of total weight)	Content (Kg)	75% Recoverable weight of element (kg)	Recoverable quantity per ton (kg)	Content (% of total weight)	Content (Kg)	75% Recoverable weight of element (kg)	Recoverable quantity per ton (kg)	Content (% of total weight)	Content (Kg)	75% Recoverable weight of element (kg)	Recoverable quantity per ton (kg)	Content (% of total weight)	Content (Kg)	75% Recoverable weight of element (kg)	Recoverable quantity per ton (kg)	Selling Price (Rs. per kg.)	Value of PC (Rs.)	Value of TV (Rs.)	Value of Ref Rs.)	Value of Mobile(Rs.)
Plastic	23.00	6.21	4.66	**174.38**	12.00	3.60	2.70	**93.62**	25.39	9.67	7.25	**190.45**	50.00	0.06	0.04	375.00	15.00	2615.73	1404.30	2856.81	5625.00
Lead	6.00	1.62	1.22	**45.49**	0.20	0.06	0.05	**1.56**					0.50	0.00	0.00	3.75	70.00				
Aluminum	14.00	3.78	2.84	**106.15**	1.20	0.36	0.27	**9.36**	3.20	1.23	0.92	**24.13**					98.00	10402.28	917.48	2364.43	
Germanium	0.00	0.00	0.00	**0.01**																	
Gallium	0.00	0.00	0.00	**0.01**																	
Iron	20.00	5.40	4.05	**151.64**	26.00	7.80	5.85	**202.84**	66.30	25.26	18.95	**497.56**	3.00	0.00	0.00	22.50	17.00	2577.83	3448.34	8458.59	382.50
Tin	1.00	0.27	0.20	**7.58**									1.00	0.00	0.00	7.50	720.00				
Copper	7.00	1.89	1.42	**53.07**	3.40	1.02	0.77	**26.53**	2.50	0.96	0.72	**18.87**	15.00	0.02	0.01	112.50	360.00	19106.23	9549.24	6792.54	40500.00
Barium	0.03	0.01	0.01	**0.24**																	
Nickel	0.85	0.23	0.17	**6.45**	0.04	0.01	0.01	**0.30**					2.00	0.00	0.00	15.00	810.00				
Zinc	2.00	0.54	0.41	**15.16**	0.30	0.09	0.07	**2.34**					0.50	0.00	0.00	3.75	70.00				
Tantalum	0.02	0.00	0.00	**0.12**									0.50	0.00	0.00	3.75					
Indium	0.00	0.00	0.00	**0.01**																	
Vanadium	0.00	0.00	0.00	**0.00**																	
Terbium	0.00	0.00	0.00	**0.00**																	
Beryllium	0.02	0.00	0.00	**0.12**									0.10	0.00	0.00	0.75					
Gold	0.00	0.00	0.00	**0.01**	0.00	0.00	0.00	**0.01**					0.04	0.00	0.00	0.30	1200000.00	14557.13	9362.00		360000.00
Europian	0.00	0.00	0.00	**0.00**																	
Tritium	0.02	0.00	0.00	**0.12**																	
Ruthenium	0.00	0.00	0.00	**0.01**																	
Cobalt	0.02	0.00	0.00	**0.12**									4.00	0.00	0.00	30.00	890.00				
Palladium	0.00	0.00	0.00	**0.00**									0.02	0.00	0.00	0.11	6000				

	Material Recovered from Processing (%)																Selling Price of Material Recovered				
	PCs				TVs				Ref				Mobiles								
Elements	Content (% of total weight)	Content (Kg)	75% Recoverable weight of element (kg)	Recoverable quantity per ton (kg)	Content (% of total weight)	Content (Kg)	75% Recoverable weight of element (kg)	Recoverable quantity per ton (kg)	Content (% of total weight)	Content (Kg)	75% Recoverable weight of element (kg)	Recoverable quantity per ton (kg)	Content (% of total weight)	Content (Kg)	75% Recoverable weight of element (kg)	Recoverable quantity per ton (kg)	Selling Price (Rs. per kg.)	Value of PC (Rs.)	Value of TV (Rs.)	Value of Ref Rs.)	Value of Mobile(Rs.)
																	0.00				
Manganese	0.03	0.01	0.01	**0.24**													50.00				
Silver	0.02	0.01	0.00	**0.14**	0.00	0.00	0.00	**0.02**					0.40	0.00	0.00	3.00	15000.00	2149.45	234.05		45000.00
Antinomy	0.01	0.00	0.00	**0.07**																	
Bismuth	0.01	0.00	0.00	**0.05**																	
Chromium	0.01	0.00	0.00	**0.05**									0.50	0.00	0.00	3.75					
Cadmium	0.01	0.00	0.00	**0.07**									0.50	0.00	0.00	3.75					
Selenium	0.00	0.00	0.00	**0.01**																	
Niobium	0.00	0.00	0.00	**0.00**																	
Yttrium	0.00	0.00	0.00	**0.00**																	
Rhodium	0.00	0.00	0.00	**0.00**																	
Mercury	0.00	0.00	0.00	**0.02**																	
Arsenic	0.00	0.00	0.00	**0.01**																	
Silica	24.88	6.72	5.04	**188.64**	53.00	15.90	11.93	**413.49**	0.74	0.29	0.21	**5.61**	15.00	0.02	0.01	112.50	2.00	377.28	826.98	11.23	
		26.71				**28.84**															
Oil									0.53	0.21	0.15	**4.04**									
CFC+Hydrocarbons									1.12	0.43	0.32	**8.41**									
										38.03											
Total Elements Recovered																					
Material Lost																					
Total Weight of the Scrap	1.00								1.00				1.00					**51785.93**	**25742.37**	**20483.61**	**451507.50**

Annexure 5

Guiding principles for design and formulation of technical specifications of WEEE/E-waste collection points

The following features mentioned in WEEE EU directive provide guidance on a conceptual approach for establishing collection points and storage areas:

1. Appropriate measures should be adopted to minimize the disposal of WEEE/ E-waste as unsorted municipal waste and to achieve a high level of separate collection of WEEE/ E-waste.
2. Availability and accessibility of the necessary collection facilities should be ensured taking into account in particular the population density.
3. The collection and transport of separately collected WEEE/ E-waste shall be carried out in a way, which optimizes reuse and recycling of those components or whole appliances capable of being reused or recycled.
4. Ensure that a rate of separate collection of at least four kilograms on average per inhabitant per year of WEEE/ E-waste from private household is achieved.
5. Private households not to dispose of WEEE/ E-waste as unsorted municipal waste and to collect such WEEE/ E-waste separately.
6. Sites for storage (including temporary storage) of WEEE/E-waste prior to their treatment should have impermeable surface for appropriate areas with the provision of spillage collection facilities and where appropriate, decanters and cleanser-degreasers.

Sites for storage (including temporary storage) of WEEE/E-waste prior to their treatment should have weatherproof covering for appropriate areas.An effort has been made to define principles for designing and formulation of technical specifications of collection points/ storage area by taking recourse to “Code of Practice for Collection of WEEE from Designated Collection Facilities (DCF)”, dti, Government of UK, February 2007, “Guidance on Best Available Treatment, Recovery and Recycling Techniques (BATRRT) and Treatment of Waste Electrical and Electronic Equipment (WEEE)”, Department of Environment, Government of UK and other sources.

As per Annex 1 - Designated Collection Facilities of “Code of Practice for Collection of WEEE from Designated Collection Facilities (DCF)”, a DCF should:

1. Enable household WEEE to be collected from the DCF by the following five streams

A – Large household appliances (category 1) other than cooling appliances
B – Cooling appliances in category 1
C – Display Equipment containing Cathode Ray Tubes
D – Gas discharge lamps
E – All other WEEE

This means being able to **accommodate** if required containers, of a size and type appropriate to the site, for C-E, and hard standing or containers for A and B. Where this is not possible because of the size, policy requirements, layout or accessibility of the site, EITHER fewer streams may be collected, provided that:

- Those streams which are collected should be segregated from each other on site
- Sites able to receive the other streams from the public are within a reasonable distance in the Local Authority area and accessible to all on an equal basis

OR streams may be mixed, so long as C and D remain separate from other streams and each other, and B can be readily identified for uplifting separately.

2. If intended to take household WEEE direct from members of the public:

- be **accessible** to members of the public with household WEEE
- have **signs** to direct members of the public depositing household WEEE to the relevant container or area
- **Accommodate** a minimum volume capacity of 3m^3 for D and1 m^3 for E.

3. Be run using reasonable endeavors to **prevent the mixing** of WEEE with other waste or its contamination by other hazardous material, so as to make it unsafe or disproportionately difficult to treat or to exceed the levels in Annex 2 or otherwise agreed with the producer collecting from that site;

4. Under its operating and collection contracts allow producers to arrange collection of household WEEE from the site and treatment.

As per Annex 2 - contamination with non-WEEE hazardous and non-hazardous material, "Code of Practice for Collection of WEEE from Designated Collection Facilities (DCF)", a DCF should include:

Part I: Unacceptable levels of contamination

1. The following should be considered as unacceptable levels of contamination of WEEE:

(a) The presence in a container provided to take WEEE of:

(i) 15% or more by weight of material other than that for which the container is designated, whether or not WEEE

(ii) Any of the following prohibited items regardless of weight:

a. Food waste
b. Hazardous waste of a type other than that for which the container is designated
c. Liquid wastes other than water

(b) The presence in, on or with any items of WEEE not containerized, such that they are either not evident when the item is collected or cannot readily be separated from the item for collection, of the material listed in (a)(i) and (ii).

Some recommendations as per "Guidance on Best Available Treatment, Recovery and Recycling Techniques (BATRRT) and Treatment of Waste Electrical and Electronic Equipment (WEEE)", Department of Environment, Government of UK, are given below.

<u>Impermeable surfaces</u>

The type of impermeable surface required depends on a number of factors. Major factors are given below:

- The type and quantity of WEEE/E-waste being stored including whether the WEEE/ E-waste contain hazardous substances and fluids
- The type and volume of other materials dealt with
- The type and level of activity undertaken on the surface
- The length of time the surface is meant to be in service
- The level of maintenance.

The impermeability of the surface will depend on how it is constructed and its usage. A surface will not be considered impermeable, if for example,

- It has slabs or paving not properly joined or sealed
- It is composed solely of hard standing made up of crushed or broken bricks or other types of aggregate even if the WEEE is also stored in containers
- Spillages or surface water will not be contained within the system.

The impermeable surface should be associated with a sealed drainage system and may be needed even where weatherproof covering is used. This means a drainage system with impermeable components which does not leak and which will ensure that:

- No liquid will run off the pavement other than via the system

- All liquids entering the system are collected in a sealed sump except where they may lawfully be discharged.

Spillage collection facilities

Spillage collection facilities include the impermeable pavement and sealed drainage system as the primary means of containment. However, spill kits to deal with spillages of oils, fuel and acids should be provided and used as appropriate.

Weatherproof covering

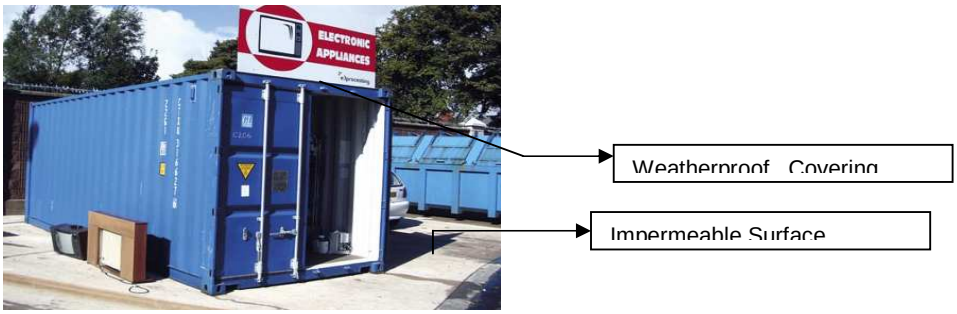
The purpose of the weatherproof covering for storage is

- To minimize the contamination of clean surface and rain waters, to facilitate the reuse of those whole appliances and components intended for reuse

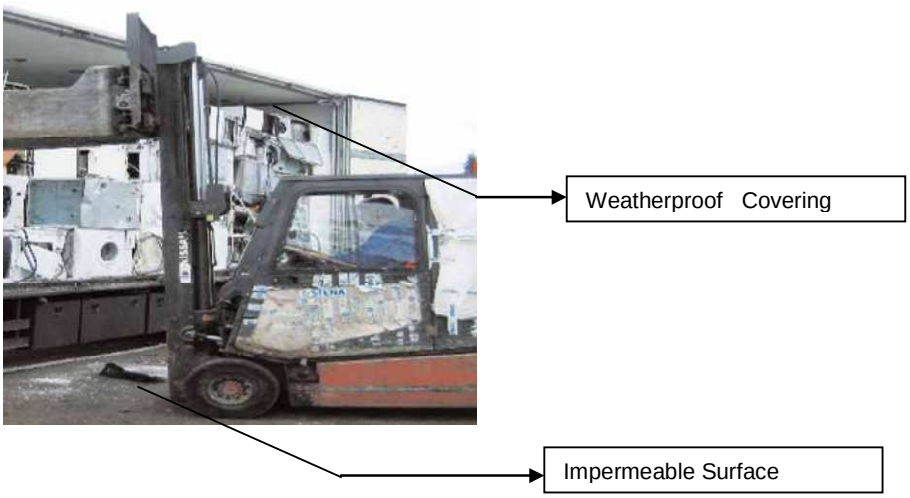
- To assist in the containment of hazardous materials and fluids

The areas that are likely to require weatherproof covering will therefore include those storing hazardous or fluid containing WEEE/ E-waste or whole appliances or components intended for reuse.

The type of weatherproof covering required will depend of the types and quantities of waste and the storage activities undertaken. Weatherproof covering may in some circumstances simply involve a lid or cover over a container but in others it may involve the construction of a roofed building. An example of impermeable surfaces and weatherproof covering is given in figure 1.



Source: Waste Electrical and Electronic Equipment (WEEE) Pilot Scheme Report, www.ehsni.gov.uk



Source: ElRetur, www.elretur.no

Figure 1: Examples of WEEE/E-waste collection system (impermeable surface & weatherproof covering) at a collection facility

The following insights have been drawn with respect to specifications from the analysis of code of practice, BATRRT and other sources of literature.

Layout of Collection Point/ Storage Area

1. Collection point/ storage area should be easily accessible i.e the identification of their location is very important
2. Area of the collection point/ storage should be able to accommodate separated/ sorted WEEE/ E-waste with respect to size
3. Collection point/ storage area should have impermeable surface with sealed drainage system
4. Weatherproofing of collection point/ storage area.

Area of Collection Point/ Storage Facility

Area of collection point and storage facility is an important feature for fixing up layout of storage area. For instance in Austria, only retailers with sales area greater than 150 m^2 are

obliged to take back WEEE/ E-waste, while in Canada, feasibility study for WEEE/ E-waste collection system has been carried out considering 1000 ft^2 of collection facility. Different steps to fix up area of collection point/ storage facility are given below:

1. Calculate the WEEE/ E-waste capture rate for the geographical area served
2. Calculate volume of each of the separated WEEE/ E-waste item based on tonnage captured eg. In Canada, the assumptions taken for for different WEEE/ E-waste items are given below.

    - Cellphone – 0.613 m^3/ tonne
    - Telephone – 2.08 m^3/ tonne
    - Stereos – 6.502 m^3/ tonne
    - Computers – 3.851 m^3/ tonne
    - Monitors – 4.952 m^3/ tonne
    - Peripherals – 4.049 m^3/ tonne
    - TV – 6.146 m^3/ tonne

3. Based on captured WEEE/ E-waste items calculate the bin/ container/ cage/ Gaylord container size and their numbers. Examples of containers are shown in figure 1.

The types of bins/ cages used for WEEE/ E-waste collection are shown in figure 2.

Source: www.sens.ch

Different Types of Bins used by SENS in Switzerland

Cages

Source : Waste Electrical and Electronic Equipment (WEEE) Pilot Scheme Report, www.ehsni.gov.uk

Figure 2: WEEE/E-waste collection bins/ cages

4. Fix up the area based on container size and numbers.

Number of Collection Point/ Storage Facility

Collection target defines the number of collection points. The number of WEEE/ E-waste collection points will vary from country to country. An example of local collection facilities per population some European countries are given in table 1.

Table 1: Local authority collection facilities per population in 2003

Country	Population (million)	Local authority collection facilities	Ratio (facilities/person)
The Netherlands	16.0	600	1/27 000
Sweden	8.8	600	1/15 000
Norway	4.5	400	1/11 000

Source: EPA Ireland 2003, Waste electrical and electronic equipment (WEEE) collection trials in Ireland. Authors: Wilkinson, S. and Duffy, N. Environmental Protection Agency, Wexford, Ireland

In Canada[4], the feasibility of WEEE/E-waste collection has been carried out by using the following assumptions.

Urban Areas: One collection point per city of 50,000 population and one additional collection point for cities with a metro population of 200,000 or more.

Rural Areas: One collection point per 10,000 people or 50 km radius.

Different steps to determine number of collection points/ storage facilities are given below:

1. Calculate the population served
2. Calculate each of the WEEE/E-waste capture rate per inhabitant per year
3. Calculate the number of collection points required to achieve the target rate
4. Fix up the final number of collection points after studying the study area/ land use/ geography after deciding the location.

[4] Annex J, Table No J1, Electronics Waste Recovery Study, Prepared for Resource Recovery Fund Board, Nova Scotia, by PHA Consulting Associates, 31st March 2006.

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