

Consultation Paper No. 02/2073/074

Consultation Paper
on
Regulatory Framework for E-waste Management



Nepal Telecommunications Authority

Kamaladi, Kathmandu

Nepal

April, 2017

Preface

This consultation paper concerns the increased use of technology especially in Telecom/ICT, low initial cost, and unplanned obsolescence of electrical and electronic equipment has led to an e-waste generation problem for Nepal. E-wastes are considered dangerous, as certain components of some electronic products contain materials that are hazardous, depending on their condition and density. The hazardous content of these materials pose a threat to human health and environment. Discarded computers, monitors, televisions, VCRs, stereos, copiers, fax machines, electric lamps, home appliances, cell phones, audio equipment, game consoles and batteries if improperly disposed can leach lead and other substances into soil and groundwater. Many of these products can be reused, refurbished, or recycled in an environmentally sound manner so that they are less harmful to the ecosystem.

This consultation paper explores the Specific objectives of the regulation include:

- ✓ To enhance environmental protection from e-waste.
- ✓ To establish a basis for a policy and regulatory frameworks on e-waste management.
- ✓ To raise public awareness on sustainable management of e-waste in Nepal.
- ✓ Formulate appropriate mechanism and system for e-waste collection, transportation, storage, recycling & disposal.
- ✓ Define the role and responsibilities of the concerned stakeholders including the manufacturer/producer, collectors, recycler, and disposer.

Nepal Telecommunication Authority (NTA) would like to request the concerned stakeholders, experts, researchers and any other interested parties to send their comments/ suggestions or inputs either in electronic form or in written form on the various issues raised in consultation paper within 30 days from the first date of the publication of this notice. The comments and inputs will be incorporated in the final document if deemed appropriate. The consultation paper shall be available on NTA's website (www.nta.gov.np). In case any further clarification or information is needed, please write to ntra@nta.gov.np or contact Mr. Min Prasad Aryal, Deputy Director, NTA (Email: mparyal@nta.gov.np, Tel: 977-1- 4255474) or Mr. Achutananda Misra, Assistant Director, NTA (Email: anmistra@nta.gov.np, Tel: 977-1- 4255474)

Mr. Digambar Jha

Chairman, NTA

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References

1. Introduction

1.1 Background

"E-wastes are considered dangerous, as certain components of some electronic products contain materials that are hazardous, depending on their condition and density. The hazardous content of these materials pose a threat to human health and environment. Discarded computers, monitors, televisions, VCRs, stereos, copiers, fax machines, electric lamps, Home appliances, cell phones, audio equipment, game consoles and batteries if improperly disposed can leach lead and other substances into soil and groundwater. Many of these products can be reused, refurbished, or recycled in an environmentally sound manner so that they are less harmful to the ecosystem.

1.2 Exponential growth of e-waste

Today, e-waste is one of the fastest growing waste streams. According to "Recycling — from E-Waste to Resources", a report released by the United Nations Environment Programme in February 2010, China's e-waste from old computers will have jumped 200-400 per cent by 2020 from 2007 levels, and 500 per cent in India. Also, e-waste from discarded mobile phones in China will be about 7 times higher by 2020 than the 2007 level, and 18 times higher in India.

In the United States in 2007, Americans owned almost 3 billion electronic products. The United States is one of the largest producers of e-waste in the world. In 2005, approximately 61 per cent or 107 500 tonnes of the cathode ray tubes, monitors and televisions collected for recycling were exported for "remanufacture and refurbishment". But there is now a lack of basic data on shipments of electronics from the United States to other countries. In the United Kingdom, an average person is likely to consume three tonnes of electrical and electronic equipment in their lifetime.

Paradoxically, it is the success of telecommunications and ICT that has spurred the increase in e-waste. New devices are needed, for example, because of the transition from analogue to digital terrestrial television, the migration from second generation mobile communication networks to third generation (and soon fourth generation) networks, and — in the computing and information sub-sector — the demand for equipment with faster processing speed, larger memory and thinner (liquid crystal or thin film technology) display units.

In a 2011 report, "Ghana E-Waste Country Assessment", it had identified that of 215,000 tons of electronics imported to Ghana, 30% were brand new and 70% were used. Of the used product, the study concluded that 15% was not reused and was scrapped or discarded. This contrasts with published but uncredited claims that 80% of the imports into Ghana were being burned in primitive conditions.

An estimated 50 million tons of E-waste are produced each year. The USA discards 30 million computers each year and 100 million phones are disposed of in Europe each year. The Environmental Protection Agency estimates that only 15-20% of e-waste is recycled, the rest of these electronics go directly into landfills and incinerators. In the United States, an estimated 70% of heavy metals in landfills come from discarded electronics.

Rapid changes in technology, changes in media (tapes, software, MP3), falling prices, and planned obsolescence have resulted in a fast-growing surplus of electronic waste around the globe. According to a report by UNEP titled, "Recycling - from E-Waste to Resources," the amount of e-waste being produced - including mobile phones and computers - could rise by as much as 500 percent over the next decade in some countries, such as India. The United States is the world leader in producing electronic waste, tossing away about 3 million tons each year. China already produces about 2.3 million tons (2010 estimate) domestically, second only to the United States. And, despite having banned e-

waste imports, China remains a major e-waste dumping ground for developed countries.

The stored volume of e-waste in Ethiopia is still relatively small (an estimated 4,300 tones of non-functioning computers, televisions, mobile phones and refrigerators) and generally confined to urban areas, particularly the city of Addis Ababa. The report notes that “there are some hints that e-waste is disposed of in an uncontrolled manner”, though most of it is simply stored in households and offices, as it is considered to be an asset rather than waste electrical and electronic equipment to be discarded.

1.3 Objective

The objective of this study is to formulate a national policy and regulatory framework for e-waste management in Nepal.

1.4 Scope of work

The study was focused based on the following scope

- Study the e-waste management system being adopted by different agencies in Nepal if they exist.
- Study the international best practice in e-waste management including legal provisions.
- Identify the best practices in the Transportation, collection, sorting, accident reporting, recycling and any other issues related to e-Waste management
- Identify the responsibilities of various stakeholders including the producers of electrical and electronic equipments; consumer or bulk consumers; distributors, whole sellers, retailers etc; in the management of e-waste
- Identify categories of electrical and electronic equipments to be included under e-waste management framework

- Identify the institutional mechanics required for the implementation of e waste management.
- Suggest best practices on procedure for storage of e waste
- Collect and analyze view/suggestion from different stakeholders including telecommunication service provider
- Prepare regulatory framework/guideline/regulation for e waste management for Nepal
- Prepare and submit an action plan regarding e waste management.

1.5 Methodology

- Data Collection
- Questionnaire Survey
- study on existing scenario in the context of Nepal
- Qualitative and Quantitative Research as appropriate
- Literature Review
- Study on different international trends and practice
- Discussion with Different Stakeholders (e.g. Operators, NTA) to receive Feedback
- Actual Fact Findings and Analysis

1.6 Work Plan

The work plan was consistent with the technical approach/methodology, showing consistency with the TOR and ability to translate them into a feasible working plan. It was necessary to coordinate with the different concerned stakeholders to collect the data and also to receive the feedback on the future strategies and action plan to meet the e-waste management plan and policies in various sectors. The questionnaires were structured for the collection of data through survey either from the primary or secondary method. The qualitative and quantitative

analysis method was used for this research project. The possibilities of the future strategies were explored in each of the specified target along with the action plan for the implementation of the same to meet the predefined targets. Site visit/field visit by our personnel was also sought important for the collection of actual data to find the status and also analysis of the same to explore the way forward to meet the specified target in a timely manner. The major tasks/activities carried out during the period of Assignment are explored as follows:

- Preliminary Study and Submission of Inception Report
- Study the existing scenario relating to the e-waste management.
- Study the international trends and practices
- Study and analysis relating to Transportation, collection, sorting, accident reporting, recycling and any other issues related to e-Waste management
- Identify the responsibilities of various stakeholders
- Develop and submit Midterm Report
- Study and identify the categories the equipments to be included under e-waste management framework
- Identify the institutional mechanics
- Study and analysis in connection with the procedure for storage of e waste
- Stakeholders Discussion/Meeting
- Develop regulatory framework/guideline/regulation relating to the e waste management in the context of Nepal
- Preparation and submission an action plan for the implementation of the identified Framework.

1.7 Major Issues

The issues considered and recognized relating to the e-waste management is mentioned hereunder:

- a) The government has an important role to play in limiting e-waste by formulating appropriate strategies, policies and legislation
- b) The telecommunications/ICT sector should have a major contribution for alleviating the adverse impact of e-waste
- c) Ongoing international studies and best practices are important on environmental protection and recycling of Telecom/ICT equipment/facilities are important to consider.
- d) Proper strategies and policies for the proper disposal or reuse of telecommunication/ICT waste material are important to be taken into account.
- e) The large quantities of used, old, obsolete and unserviceable telecommunication/ICT hardware and equipment are exported to developing countries for supposed reuse if not controlled through the principle accepted in the Basel Convention.
- f) Many developing countries are suffering from severe environmental hazards, such as water pollution and health risks, due to e-waste, for which they may not be responsible,
- g) Pursue and strengthen the development of e-waste activities in regard to handling and controlling e-waste from telecommunication and information technology equipment and methods of treating it;
- h) The handling and controlling of e-waste to contribute global effort designed to deal with increasing hazards which arise there from.
- i) The collaboration and coordination with the relevant stakeholders, including academia and relevant organizations, and to coordinate activities relating to e-waste is very important for e-waste management.

j) Awareness of the hazards of e-waste and methods of treating it through appropriate activities including organizing seminars and workshops.

k) Development of relevant document including the legislative regulatory provisions for handling and controlling e-waste resulting from telecommunications/ICT and methods of treating and recycling it and dissemination of the same to the concerned stakeholders plays vital role;

l) Recommendations, methodologies relating to handling and controlling e-waste resulting from telecommunications/ICT and methods of treating it , in order, in particular, to foster awareness of the environmental hazards of e-waste and the actions to manage the e-waste keeps high value to the society ;

m) The principles could be addressed in a supplier procurement policy and/or in an e-waste supplier scorecard. Furthermore, in order to successfully combat the rise of e-waste, telecom carriers must make “reduction” a strategic priority with rigorous targets and deadlines (and provide appropriate disclosure on these metrics to ensure accountability).

n) The carriers should be transparent about which e-waste recyclers are used and should ensure that collected e-waste is not shipped to developing countries which do not have treatment facility through certified recyclers.

o) Regular monitoring, auditing and compliance mechanisms should be enforced to ensure collectors, transporters, and recyclers are behaving responsibly. As the global e-waste recycling industry is expected to grow to meet demand, telecom carriers could create partnerships with recyclers in finding better ways to address the e-waste issue.

Telecom carriers have for the most part enjoyed prominent positions in many responsible investment (RI) portfolios and have avoided scrutiny from

responsible investors. However, scrutiny is on the rise as the industry's exposure to a variety of environmental, social and governance (ESG) issues – ranging from labor rights to health and safety to a host of environmental issues – becomes more apparent. Driven by growth in mobile phone subscribers, the shortening cycles of technological upgrades and product diversification, the generation of electronic waste or e-waste, is becoming the main issue.

1.8 Work Schedule

Tasks	Months					Remark
	1	2	3	4	5	
Preliminary data collection and inception report						
Study on existing status in Nepal and Data collection						
Literature Review						
Study on International Trends and practice						
Stakeholder Feedback						
Submit Mid Term Report						
Analysis in different perspectives to formulate national strategy and policy						

as well as regulatory Framework			■	■		
Discussion, Analysis and Findings			■	■		
Preparation of National Regulatory Framework for e-waste management			■	■		
Submission of Draft Final report.	■	■	■	■		
Conduct meeting					■	
Submission of Final report.						■

2. Literature Review

2.1 Introduction

As we know all discarded materials termed as waste and normally we keep them far away so that hazards of wastes do not harm to us. There is a proverb “*If we are unable to drive machine, machine itself will drive us*”. Like that unmanaged waste may cause serious health and pollution problems. Waste could be categorized item wise and here it is focused only on electrical & electronic waste or e-waste. E-waste describes discarded electrical or electronic devices. Used electronics which are destined for reuse, resale, salvage, recycling or disposal are also considered as e-waste.

E-waste is the hot potato of the technology industry – no one wants to be the last one holding it. The pathway for electronics is largely one-way, from producer to retailer to consumer to government with no pass-backs. Initiatives aimed at controlling disposal and e-waste trafficking have been introduced by developing nations but lack the teeth of enforcement.

E-Waste is any refuse created by discarded electronic devices and components as well as substances involved in their manufacture or use. The disposal of electronics is growing problem because electronic equipment frequently contains hazardous substances. E-waste is one of the fastest growing waste streams in the world. In developed countries, it equals 1% of total solid waste on an average. Almost 85 percent of population in Nepal are using mobile and 30% is using internet or data and this percentage is increasing rapidly. This volume of devices associated are replaced yearly and turnout to be e-waste. The increasing market penetration of electronic gadgets, quick replacement market and high obsolescence rate make WEEE/E-waste one of the fastest waste streams. There is a pressing need to address e- waste management in Nepal. The presence of valuable recyclable components attracts

informal and unorganized sector. The unsafe and environmentally risky practice adopted by them poses great risks to health and environment.

The Telecom operators have for the most part enjoyed prominent positions in many responsible investment (RI) portfolios and have avoided scrutiny from responsible investors. However, scrutiny is on the rise as the industry's exposure to a variety of environmental, social and governance (ESG) issues – ranging from labor rights to health and safety to a host of environmental issues – becomes more apparent. Driven by growth in mobile phone subscribers, the shortening cycles of technological upgrades and product diversification, the generation of electronic waste or e-waste, is becoming the main issue.

For effective WEEE/E-waste management, we need to quantify and characterize this waste stream, identify major waste generators, and assess the risks involved. A scientific, safe and environmentally sound management system, including policies and technologies, needs to be developed and implemented.

The lifespan of many electronic goods has been substantially shortened due to advancements in electronics, attractive consumer designs and marketing and compatibility issues. For example, the average lifespan of a new computer has decreased from 4.5 years in 1992 to an estimated 2 years in 2005 and is further decreasing resulting in much greater volumes of computers for either disposal or export to developing countries. While difficult to quantify the volume of e-waste generated globally, Bushehri (2010) presented an overview of the volume of e-waste generated in a range of categories in China, Japan and US based on available information for the period 1997–2010 (shown below in Table 1). This report estimates that over 130 million computers, monitors and televisions become obsolete annually and that the annual number is growing in the United States. Around 500 million computers became obsolete between 1997 and 2007 in the United States alone and 610 million computers had been discarded in Japan by the end of December 2010. In China

5 million new computers and 10 million new televisions have been purchased every year since 2003, and around 1.11 million tons of e-waste is generated every year, mainly from electrical and electronic manufacturing and production processes, end-of-life of household appliances and information technology products, along with imports from other countries. It is reasonable to assume that a similar generation of e-waste occurs in other countries.

Table 1: The quantity of e-waste annually generated in the United States of America, Japan and China

Countries	Products	Quantity (million)	Classification	Years	References
United States	Computers	500	E-waste	1997–2007	Bushehri (2010)
Japan	Computers	610	E-waste	2010	Bushehri (2010)
China	Computers	5	New products	Every year	Hicks et al. (2005)
	Televisions	10	New products	Since 2003	

E-waste generation in some developing countries is not such a cause for concern at this stage because of the smaller number and longer half-life of electronic goods in those countries due to financial constraints, on both local community and national scales. The major e-waste problem in developing countries arises from the importation of e-waste and electronic goods from developed countries because it is the older, less ecologically friendly equipment that is discarded from these Western countries 80% of all e-waste in developed countries is being exported (Hicks et al., 2005). Limited

safeguards, legislation, policies and enforcement of the safe disposal of imported e-waste and electronic goods have led to serious human and environmental problems in these countries. Concern arises not just from the large volume of e-waste imported into developing countries but also with the large range of toxic chemicals associated with this e-waste. Numerous researchers have demonstrated that toxic metals and polyhalogenated organics including polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) can be released from e-waste, posing serious risks of harm to humans and the environment (Czuczwa and Hites, 1984, Robinson, 2009 and Williams et al., 2008).

A review of published reports on e-waste problems in developing countries, and countries in transition, showed that China, Cambodia, India, Indonesia, Pakistan, and Thailand, and African countries such as Nigeria, receive e-waste from developed countries although specific e-waste problems differ considerably between countries. Social and human health problems have been recognized in some developing countries and it is worth noting that China, India, and some other Asian countries have recently amended their laws to address the management and disposal of e-waste import. Moreover, some manufacturers of electronic goods have attempted to safely dispose of e-waste with advanced technologies in both developed and developing countries. Problems associated with e-waste have been challenged by authorities in a number of countries and steps were taken to alleviate them with the introduction of management tools and laws at the national and universal levels. Life Cycle Assessment (LCA), Material Flow Analysis (MFA) and Multi Criteria Analysis (MCA) are tools to manage e-waste problems and Extended Producer Responsibility (EPR) is the regulation for e-waste management at the national scale.

This review provides an overview of the risk that e-wastes poses to human and environmental health from recycling and landfill disposals together with tools for the

management of such wastes. Human toxicity of hazardous substances in e-waste is based on published case studies from e-waste recycling in China, India and Ghana.

2.2 Central principles of waste management

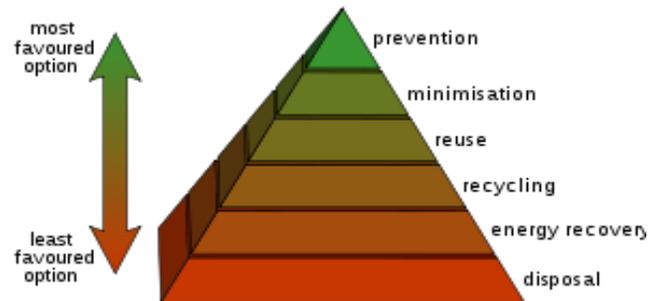


Figure: Diagram of the waste hierarchy

There are a number of concepts about waste management which vary in their usage between countries or regions. Some of the most general, widely used concepts include:

1. Waste hierarchy - The waste hierarchy refers to the "3 Rs" reduce, reuse and recycle, which classify waste management strategies according to their desirability in terms of *waste minimization*. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste. The waste hierarchy is represented as a pyramid because the basic premise is for policy to take action first and prevent the generation of waste. The next step or preferred action is to reduce the generation of waste i.e. by re-use. The next is recycling which would include composting. Following this step is material recovery and waste-to-energy. Energy can be recovered from processes i.e. landfill and combustion, at this level of the hierarchy. The final action is disposal, in landfills or through incineration without energy recovery. This last step is the final resort for waste which has not been prevented, diverted or recovered. The waste hierarchy

represents the progression of a product or material through the sequential stages of the pyramid of waste management. The hierarchy represents the latter parts of the life-cycle for each product.

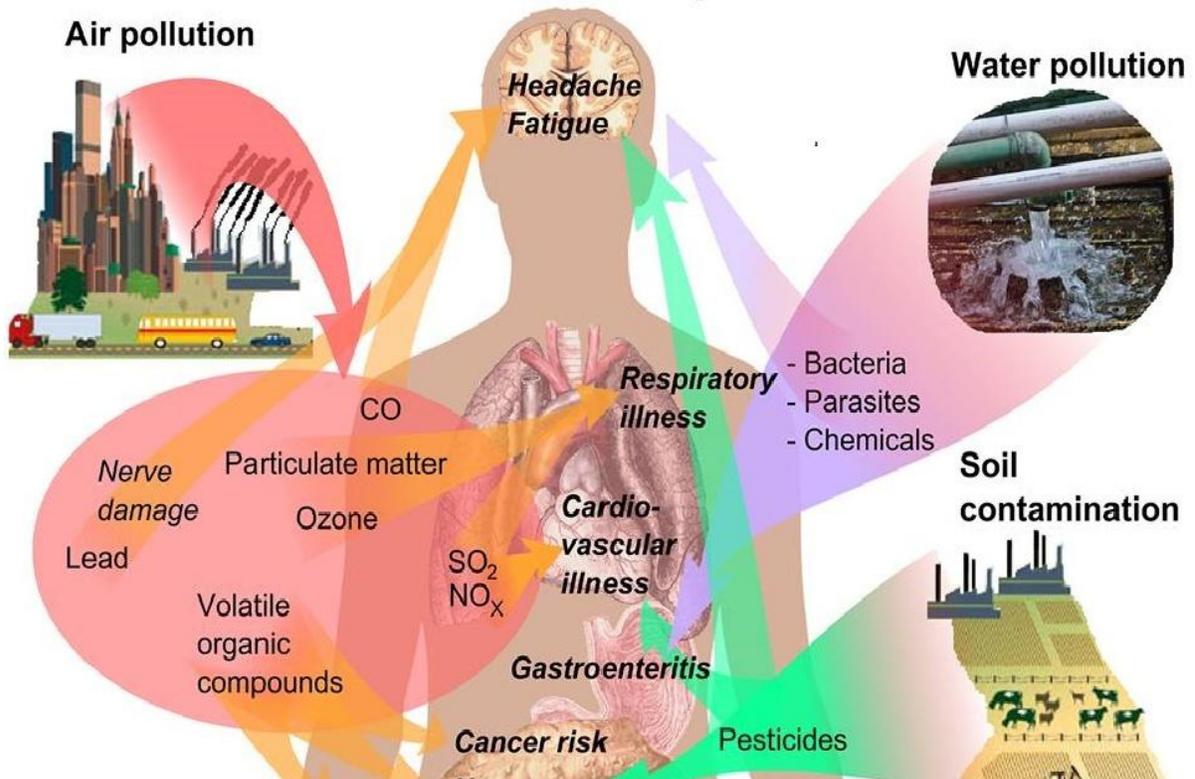
2. Life-cycle of a Product - The life-cycle begins with design, then proceeds through manufacture, distribution, use and then follows through the waste hierarchy's stages of reuse, recovery, recycling and disposal.

3. Resource efficiency - the current, global, economic growth and development cannot be sustained with the current production and consumption patterns. Globally, we are extracting more resources to produce goods than the planet can replenish. Resource efficiency is the reduction of the environmental impact from the production and consumption of these goods, from final raw material extraction to last use and disposal. This process of resource efficiency can address sustainability.

4. Polluter pays principle - the Polluter Pays Principle is a principle where the polluting party pays for the impact caused to the environment. With respect to waste management, this generally refers to the requirement for a waste generator to pay for appropriate disposal of the unrecoverable material.

2.3 Hazardous or toxic components of e-waste

Health effects of pollution



Informal processing of electronic waste in developing countries may cause serious health and pollution problems, as these countries have limited regulatory oversight of e-waste processing. Computer monitors and older TV picture tubes contain an average of four pounds of lead. In addition to lead, electronics can contain chromium, cadmium, mercury, beryllium, nickel, zinc and brominated flame retardants. When electronics are not disposed of or recycled properly, these toxic materials can present problems. Even in developed countries recycling and disposal of e-waste may involve significant risk to workers and communities and great care must be taken to avoid unsafe exposure in recycling operations and leaking of materials such as heavy metals from landfills and incinerator ashes.

Electronic waste often has hazardous or toxic components that can impact the environment once the materials end up in a landfill or if they are improperly managed and disposed. Below is a list of hazardous or toxic components of e-waste and where they may be found:

- Antimony trioxide - a flame retardant, added to cathode ray tube monitor (CRT) glass, found in printed circuit boards and cables
- Arsenic - in older cathode ray tubes and in light emitting diodes Barium - in the CRT
- Beryllium - often allied with copper to improve copper's strength, conductivity and elasticity. Old motherboards, contact springs found in printed circuit boards, relays, and in the mirror mechanism of laser printers. In power supply boxes which contain silicon controlled rectifiers and x-ray lenses
- Cadmium - circuit boards and semiconductors, rechargeable NiCd-batteries, fluorescent layer (CRT screens), printer inks and toners, photocopying-machines (printer drums)
- Chlorofluorocarbon (CFC) - Cooling unit, Insulation foam
- Chromium - in steel as corrosion protection, Data tapes, floppy-disks, circuit boards, photocopying-machines (printer drums)
- Cobalt - component in steel for structural strength and magnetivity
- Lead - cathode ray tubes, solder, batteries, printed wiring boards (circuit boards), solder on components
- Lithium - batteries
- Mercury - switches (mercury wetted) and housing, fluorescent lamps providing backlighting in liquid crystal displays (LCDs) for monitors and laptops, batteries, printed circuit boards
- Nickel - batteries, electron gun in CRT , printed circuit boards

- Polybrominated flame retardants (including polychlorinated biphenyls (PCB), polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), and tetrabromo bis-biphenol-a (TBBA))- plastic casings, cables, and circuit boards, condensers, transformers
- Polyvinyl chloride (PVC) - Cable insulation
- Selenium - circuit boards as power to supply rectifier, photocopying-machines (printer drums)
- Zinc - interior of CRT screens, printed circuit boards

2.4 Benefits

E-Waste is not something that should be discarded or disposed of with no regard for future use. If addressed correctly, it can be a valuable resource. With rational and consistent e-waste management practices, there is an opportunity for a range of benefits. The associated major benefits include the followings:

- **Economic** - If the e-waste is managed through the means of resource use, treatment and disposal creating markets for recycles and recovery of valuable materials for reuse, the economical efficiency would be increased with the opportunities of new business and job.
- **Social** - The Proper waste management assists to reduce the adverse health effects to the people and other social advantages including new source of employment and lifting the poverty of the concern community.
- **Environmental** - The proper e-waste management (i.e. appropriate reusing, recycling) helps for the preservation of environment with reducing or eliminating the adverse impacts and improve the surroundings including air, soil, and water quality.

- **Inter-generational Equity** – The effective waste management can provide subsequent generations a more robust economy, a fairer and more inclusive society and a cleaner environment.

2.5 Current Scenario of Nepal

The Environment Protection Act, 2053 (1997) has been formulated and implemented effective from the Jan 30, 1997 (17 Magh 2053 B.S). The preamble of the act is to expedite to make legal provisions in order to maintain clean and healthy environment by minimizing, as far as possible, adverse impacts likely to be caused from environmental degradation on human beings, wildlife, plants, nature and physical objects; and to protect environment with proper use and management of natural resources, taking into consideration that sustainable development could be achieved from the inseparable inter-relationship between the economic development and environment protection.

The act has provisioned for Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) to be performed by a proponent. The provision for prevention and Pollution control has been stated in the Act. The provision for the corresponding Environment Inspector with function, duties and powers has been defined in the Act. The GoN, Ministry of Environment Science and Technology has specified different 22 officials on 2069.01.14 comprising the expert from different entities of the GoN as Environment Inspectors to carry out the tasks specified in the section 8 of the Environmental protection . Protection of national heritage, environmental protection act, establishment of laboratory has been also provisioned in the Act. The power to constitute **Environmental protection council** has been also provisioned to provide policy guidance and suggestion to Government of

Nepal with regard to environment protection, and also to have coordination among different agencies at national level.

The high level environmental protection council is formed on 2065.11.5 in the chairmanship of the Prime Minister of Nepal. The structure of Environmental Protection Council and its functions is attached in Annex herewith.

The provision for compensation and fine up to one hundred thousand has been mentioned in the act instead of voidance of the Environmental protection Act. Power to formulate Guidelines and rules in connection with the followings has been provisioned by the GoN:

- Proposal
- Conduction of Initial Environmental Examination or Environmental Impact Assessment,
- Sources, standards, prevention and control of pollution,
- Biological diversity and the protection of National Heritage,
- Water, air, noise, soil pollution,
- Management and transportation etc. of wastes,
- Operation of the Environment Conservation Fund,
- Other necessary matters.

Although there have been provisions to formulate guidelines and Rules as stated relating to the Environmental protection, it seems that there has not been any regulation, guidelines/directives in connection with the e-waste management. It seems that GoN, Ministry of environment, Science and Technology has made a study relating to the identification and quantification of electronics products that will convert into e-waste in Nepal in 2007. Although the following recommendations have

been done to perform necessary action through the Study Report, it seems that there has not been significant effort relating to the e- waste management in Nepal later on:

- Formation of a taskforce at national level on e-waste with a focal point
- Awareness rising on hazards of e-waste
- Formulation of policy by involvement of all stakeholders: government, NGOs, Waste dealers, and Producers/suppliers of Electronic Products
- Define hazardous materials and e-waste under Environment Protection Act and Environment Protection Regulation
- Prohibition on import of e-waste or old electronic equipment
- Licensing/registration and promotion of good E-waste dealers
- Assisting the licensee in proper storage, possible recycling and proper disposal
- Requiring waste dealers to furnish information on e-waste generation, storage, transportation and disposal
- Ban on outdated recycling technologies such as open burning, simple incineration, rough extraction of metals from e-waste using acids
- Promotion of recycling units and require them to practice EMS leading to ISO 14001
- Promotion of Cleaner production and 3R in Electric and Electronic Equipment Manufacturing/ assembling units to reduce the use of hazardous materials
- Promotion of 3R for consumers
- Exploring alternatives for infeasible recycling products due to low volume
- Requesting the Central Bureau of Statistics to include information on producers of Electrical and Electronic Equipment in the regular Census of Manufacturing Establishment and to cover information on e-waste in population census;
- Requesting the Department of Customs to improve the data on imports of electronic products and CKD assemblies imported by assembly units
- Networking with international and regional agencies for improving knowledge base and for capacity building

2.5.1 Statistics of E-Products:

Voice Telephony Subscription:

As per the Statistics of NTA MIS Jan 15, 2017, there are altogether 33825840 subscription of voice telephony in Nepal. The number of voice telephony subscribers associated with different voice operators are mentioned hereunder:

- Nepal Telecom: 16485134
- Ncell Pvt. Ltd: 15025834
- United Telecom: 526845
- Smart Telecom:1411630
- Nepal Satellite Telecom Pvt. Ltd:371668
- STM Telecom Sanchar Pvt. Ltd:2987

The different technologies PSTN, WLL, GSM, CDMA, and WCDMA are being used for the provision of telephone services.

Among different telecom voice services, the teledensity is shown below:

- Fixed: 3.24%
- Mobile: 121.23%
- Others(Limited Mobility, GMPCS): 3.2 %

Data Penetration:

Similarly there are more than 45 internet service providers operating the internet email services to the public. Internet penetration has reached 1,45,79,889 which results 55.03% internet penetration. Different types of technologies including PSTN,

ISDN, ADSL, Wireless Modem, WiFi, Cable Modem, Optical, GPRS, EDGE, WCDMA, LTE CDMA 2000 1x, WiMAX, VSAT are being used for the provision of internet services.

2.5.2 Type Approval of Radio Telecommunication CPEs

The Authority is established with a view to managing and regularizing the telecommunications service and making it reliable and easily available to the public by Telecommunication Act, 2053 (1997). In exercise of the powers conferred by Clause (f) of Section 13 and Section 14 of the Act, the Authority determines and/or approves the standard and quality standard of the plant and equipment relating to the telecommunications and the telecommunications service. All the concerned manufacturers/authorized agents/representatives requires to apply and get type approval for the radio telecommunication CPEs under the provisions of type approval (mentioned hereunder) procedure from the Authority prior to import and/or sale in Nepal. Local representative in Nepal shall apply on behalf of the manufacturer to the Authority (in future, it can also contact authorized organization/laboratory if any) requesting Type Approval on its products. If manufacturer is in Nepal then it does not have to have local representative to carry out type approval process.

Equipments Identified for Type Approval:

The Authority facilitates Type Approval for following Radio telecommunications equipments.

- a) Customer site Terminals that connect to public switched Network
 - i) GSM/IMT-2000/ IMT Advanced
 - ii) CDMA
 - iii) GMPCS

iv) Other telecom devices used to connect to mobile or PSTN network

b) Low Power Devices (LPDs) or Short Range Devices (SRDs) WLAN - WiFi, Bluetooth, and other 802.11x standard devices having 4W (max. EIRP) & 1 W Max. transmitter output power, Frequency bands: 2.4 GHz, 5.1 GHz and 5.8 GHz

It is noted that the e-products as identified for the Type Approval can be recorded by the NTA through the arrangement of database associated with the importer/manufacturer/distributor through the means of inventory. It is known that till date NTA has not had inventory of the quantities of all the Type Approved Radio Telecommunication including the mobile handset and LPDs/SRDs. It is suggested to collect the formal data of all the type approved equipments and store the same in database.

2.5.3 Questionnaire

A questionnaire was developed and to circulate to the concerned stakeholders to receive feedback and get data in connection with the usage of e-products and associated e-waste management activities (The structured Questionnaire is attached in Annex-1).

2.5.4 List of Electronic Products

The list of main electric and electronic products being imported in the country is presented below:

S. N.	Product	S. N.	Product
1	AC Parts	38	Machinery quality test tools
2	Adapter	39	Metal detector siren
3	Air Conditioner	40	Microphone
4	Air cooler	41	Microwave
5	Alarm parts	42	Pager, Mobile, Wireless Phone
6	Amplifier	43	Photo develop machine
7	Arial and reflector	44	Photo voltage module
8	Binocular	45	Photo wash machine
9	Calculator	46	Photocopy Machine
10	Camera and projector parts	47	Photocopy Machine Parts
11	Camera film	48	Printed circuit
12	Camera photo	49	Printer
13	Camera tube, photo converter	50	Projector
14	Coffee maker	51	Projector Parts
15	Computer	52	Radio
16	Computer Accessories	53	Radio parts
17	Computer Monitor	54	Radio, cassette player
18	Electric alarm	55	Radio, cassette player
19	Electric bulb, board, Accessories	56	Radio, cassette, video parts

S. N.	Product	S. N.	Product
20	Electric capacitor	57	Refrigerator
21	Electric circuit	58	Refrigerator Parts
22	Electric circuit board	59	Remote control
23	Electric conductor	60	Satellite receiver
24	Electric resister	61	Speaker
25	Electric semiconductor	62	Stabilizer
26	Electric transformer	63	Stabilizer Parts
27	Electric tube light	64	Survey Equipment
28	Electric tube light and bulb parts	65	Tape recorder
29	Emergency Light	66	Telephone camera
30	Fan	67	Telephone Equipment
31	Fax Machine	68	Telephone parts
32	Film processor and developer	69	Telephone Set
33	Floppy disk	70	Toaster machine
34	Hard disk	71	Transformer
35	Headphone	72	Transformer Parts
36	Inverter	73	Transmitter
37	Iron (cloth press)	74	TV
75	TV, Radio Parts	83	Walkman

S. N.	Product	S. N.	Product
76	UPS	84	Washing Machine
77	Vacuum Cleaner	85	Washing Machine Parts
78	VCD, Cassette Player, Radio	86	Watch
79	Video Camera	87	Watch Parts
80	Video project	88	Wireless phone CDMA
81	VSAT Equipment	89	X-ray Machine
82	Walkie-talkie		

The quantities of aforementioned e-products associated with the import from the different Customs is attached in **Annex-3 and Annex-4**

At the moment, retailer's/ producer's take back system and producer's/ retailer's transportation system is nonexistent in Nepal. Further, there is no exclusive municipal collection and transportation system for E-waste. There is a limited usage of existing municipal solid waste collection and transportation system for E-waste while dismantler's in informal sector have their collection and transportation system.

There is no company/enterprise in formal sector that collects/purchases E-waste from households and offices in Nepal. Nepal has no modern technology to carry out repair/ dismantling /refurbishing. Most E-waste residues generated from repairing and/or dismantling shops are disposed in dustbin and later at urban dumpsite by domestic waste collection service. Some areas where waste-collection trucks are not available, such kind of E-wastes are disposed improperly at sites close to/behind the repairing/dismantling shops, and are finally burnt.

It has been assessed that current E-waste collection, transportation, treatment and disposal are inadequate both in terms of capacity and environmentally sound management. Since the existing toxic footprint covers areas, which are commercial along the main streets, its expansion is likely to further impact air, water and soil conditions in its area of influence. Therefore, a need for environmentally sound management of E-waste has to be identified in order to reduce its volume as well as its toxic footprint. The criteria for planning / design / implementation, which have to be identified for environmentally sound E-waste management system, are given below.

1. ICT will continue to drive the E-waste management system including E-waste recycling in the country.
2. E-waste collection and transportation mechanism is diverse in nature ranging from hand driven cart to light commercial vehicles.
3. Both the households and the commercial sector look for best monetary and exchange value of their old product. Therefore, any E-waste management system should factor in the salvage value of the waste product. The best monetary and exchange value of the old product can be determined by understanding the E-waste composition and its recyclability.
4. Recyclability of E-waste is driven by electric component, copper and precious metal recovery. Therefore, E-waste collection, transportation and treatment are different from conventional solid waste collection, transportation and treatment system due to its composition and recyclability.

The consumer behavior indicates that the only viable mechanism under the existing regulatory mechanism appears to be to capture E-waste at the point of generation. Since the majority of E-waste is generated in the commercial sector e.g. corporate/

business/ etc., and both the households and commercial sector prefers the best value of their waste, it is recommended that the E-waste collection facilities should be at retailers and at commercial sector e.g. corporate/ business etc. Salient features of this collection mechanism are given below.

1. There is a need for separate collection facilities for ICT and white goods.
2. Location of collection facilities need to be near E-waste collection hubs. This need is projected on account of following reasons.
 - Ensure minimal movement of products
 - Efficient collection mechanism
 - Minimize manual handling
 - Avoid unsorted municipal waste
3. Each of the retailers's/ market association/ group can identify a place/ area as E-waste collection point. This place can serve as a place where retailers/ consumers can get value of their old product. The authorized E-waste recycler can collect from retailer's collection facilities and transport E-waste to their recycling facility.
4. E-waste from households can be routed through already existing municipal waste collection mechanism. Each of the localities can identify a place/ area as E-waste collection point in their premises. This place can serve as a place where retailers/ consumers can get value of their old product. There is a need to initiate public awareness campaign to collect E-waste at authorized collection facility and only give to authorized recycler for treatment and disposal.

2.6 Definition of E-waste / what is e-waste?

Electronic items or products are produced to facilitate and enhance the quality of life of the people by increasing comfort and productivity. Therefore, we often refer to the present time as the electronic age. Electronic products find their use at home, in offices, for communications, for entertainment and so on. Due to high investment in research and development in the electronic products and ever growing innovations, a large quantity of electronic products are discarded as they become obsolete leading to fastest growing waste stream. E-waste is the general term used to describe old electronic products after their useful life. In other words, it is a generic term used to denote various types of wastes containing electronic components. UNEP, production and consumption unit has defined e-waste as given below:

E-waste is a generic term encompassing various forms of electronic and electrical equipment (EEE) which are old, end-of-life electronic appliances and which have ceased to be of any value to their owners. OECD has included all the electrical equipment as well under the category and e-waste is synonymously used as Waste Electrical and Electronic Equipment (WEEE).

2.7 Need to Consider E-waste

E-waste is Hazardous in Nature

Electronic equipments are manufactured using different substances such as plastics, metals, glass, and organic as well as inorganic compounds.

Five especially hazardous materials used in the electronic products are:

- a. Brominated Flame Retardants
- b. Lead

- c. Mercury
- d. Cadmium
- e. Hexavalent Chromium

These substances have extremely serious health and environmental impacts. Polybrominated diphenyl ether used as fire retardant is a dangerous persistent organic compound. They give rise to liver, thyroid and nervous system disorders due to bio-accumulation through the food chain. Lead especially found in solders and cathode ray tubes; hexavalent chromium found in electroplated parts, cadmium compounds found in Nickel Cadmium batteries, polyvinyl Chloride used for sheathing of wires etc. are other hazardous items used in electronic products.

Improper disposal can result in environmental and health damage

Generally wastes are disposed in land-fills. But the land-fills are prone to leaking and if e-wastes are mixed with domestic solid wastes, the leachates can contain heavy metals and other hazardous materials. Electronic circuit boards contain significant amount of lead and they can contaminate the ground water sources if disposed improperly. The incineration of e-waste at low temperature can lead to toxic emissions such as Polychlorinated Biphenyls (PCBs), Polybrominated Biphenyles (PBBs) and Polybrominated Diphenyl Ethers (PBDEs).

E-waste is also valuable

E-waste can also be valuable as it contains valuable or precious metals and other high-tech materials. E-waste is used to recycle and recover the costly metals from the products. However, the processes used in recycling and for recover have to be proper and given adequate consideration so that necessary health and safety checks are in place and toxic emissions are prevented.

E-waste is increasing at a very fast rate

Use of Electronic products is increasing very fast also in developing countries. Nepal is not an exception. Therefore, soon e-waste will be one of the significant wastes in the domestic and institutional wastes.

Trans-boundary movement of e-waste

Basel Ban under Basel Convention for control of trans-boundary movement of the hazardous waste and their disposal calls for the ban on the trade of e-waste from developed to the developing countries. The problem of export of e-waste from developed countries is especially high in Asia. These are brought to recycling centres for exploiting the cheap labour and lax environmental laws. The obsolete products are being exported to the Asian and African countries under disguise of donations. Basel Action Network calls it as an Environmental Injustice.

2.8 Where do the e-wastes go in Nepal?

Almost all of these repair shops have been found to store the electronic equipment after the useful life and abandoned by the owners for a few years. The purpose of such storage is to reuse some of the parts from such equipment to repair similar electronic items with defect in other parts.

The plastic parts are sold to Kabadis, who collect or purchase waste items to be sold to waste dealers. Electronic sub-assemblies are stored for long time so that some of the components can be taken out and used for repairing other electronic equipment. Some units disassemble all the components from the sub-assemblies and keep them in store to be used again for the repair similar or other electronic products. The soldering iron is used to extract the components from the sub-assemblies. In case of

the monitors, if they are broken, they find their course together with the Municipal waste to the dumping site. The copper wire and metal is first removed and sold to kabadis. The kabadis come and purchase the unbroken but faulty monitors at a very small amount. A few years back, the faulty electronic components used to be collected free of charge by the kabadis. But now they pay some nominal amount on weight basis. The kabadis pay Rs. 100 to Rs. 200 per defective monitor.

It is said that all the items so collected go ultimately to the neighboring country for further recycling. There is no recycling unit for e-waste in the formal sector in Nepal. Only the repair shops reuse some of the components as described above and rest is sold to kabadis.

2.9 E-Waste Categories

There are different categories of electronic and electrical appliances, the e-waste resulting from them and their levels of toxicity. It's important to note that these elements may be found in combination with others. It is appropriate to understand different types of electrical and electronic equipment so that they may be disposed of appropriately through sorting, collection, dismantling, treatment and disposal. There are two broad categories of e-waste based on mode of operation and function and based on elemental composition.

2.9.1 Categorization based on mode of operation and function

The classification of equipment is based on the mode of operation and function. It reveals the composition of physical components before dismantling in order to facilitate sorting.

2.9.2 Categorization based on element composition

This category is based on the physical, chemical and gaseous components found in the electrical and electronic appliances. They include epoxy resins, fiber glass, Polychlorinated biphenyls (PCBs), (polyvinyl chlorides) (PVC), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), thermosetting plastics, lead, tin, copper, silicon, beryllium, carbon, iron and Aluminum. They also vary in quantity.

3. International Trends and Practices

3.1 International Waste Movement

Basel convention and Bamako conventions

The Conventions recommend that signatories ensure that the generation of hazardous waste and other waste within a country are reduced to a minimum, taking into account social, technological and economic aspects. Secondly, where a country exporting hazardous waste does not have the technical capacity, necessary facilities or suitable disposal sites to dispose of the waste in question in an environmentally sound and efficient manner, steps must be taken to minimize pollution and its consequences for health.

The waste transport within a given country falls under national regulations; trans-boundary movement of waste is often subject to international treaties. A major concern to many countries in the world has been hazardous waste. The Basel Convention, ratified by 172 countries, deprecates movement of hazardous waste from developed to less developed countries. The provisions of the Basel convention

have been integrated into the EU waste shipment regulation. Nuclear waste, although considered hazardous, does not fall under the jurisdiction of the Basel Convention.

Internationally, initiatives have been taken under Basel Convention that deals with hazardous materials/waste. The items of e-waste included under the convention are CFCs; Metal and alloy wastes such as cadmium, lead, mercury; waste batteries; electrical and electronic assemblies, mercury switches, glass from CRTs, and PCB-capacitors. The main activities under the initiatives are the awareness and promotion of the response measures on e-waste. EU has developed a legislation on e-waste (WEEE Directive) based on the Extended Producer Responsibility. Japan enforced Home Appliance Recycling Law in 2001. PC manufacturers are mandated now to follow Reduce, Reuse and Recycle (3Rs). Manual dismantling is common in Asia and the Pacific Region countries including China, India, and Pakistan.

3.2 E-Waste Management- International Trends

The e-waste management along with its regulatory aspects for different countries is described hereunder:

3.2.1 India

Initiation of national level policy on e-waste management was kicked off in March 2004 with a workshop of stakeholders conducted by the Central Pollution Control Board (CPCB). Hazardous Waste Management and Handling Rules, 2000; Batteries Rules, 2001; Amendment in the Hazardous Waste Rules, 2003; Exim Policy 2002-07 control the imports, prescribes the responsibility, lists down the hazardous materials generated from electronic industries, and provisions on the import of second hand goods.

Draft rules, namely e-waste (Management & Handling) Rules, 2010 were published by the Government of India in the Ministry of Environment and Forests dated 14th May, 2010 in the Gazette of India inviting objections and suggestions from all persons likely to be affected thereby. In exercise of the powers conferred by the sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the central Government hereby makes the following rules e-waste (Management & Handling) Rules, 2011 effective from 1st May 2012. The rules apply to every producer, consumer or bulk consumer involved in the manufacture, sale, purchase and processing of electrical and electronic equipment or components as specified in Schedule-I, collection centre, dismantler and recycler of e-waste. This rule shall not apply to

- Batteries as covered under the Batteries (Management and Handling) Rules, 2001 made under the Act.
- Micro and Small enterprises as defined in the Micro, small and Medium Enterprises Development Act, 2006 (27 of 2006); and
- Radio-active wastes as covered under the provisions of the Atomic Energy Act, 1962(33 of 1962) and rules made there under.

In the e-waste (Management & Handling) Rules, 2011, the responsibilities of the producer, collection centers, bulk consumers, dismantlers, recycler, has been defined well. Further, the procedure for seeking authorization and registration for handling e-waste has been defined in the regulation. There has been some amendment in 2015 in the e-waste (Management & Handling) Rules through the Gazette Notification. The E-waste (Management and Handling) Rules 2011 is most recent attempt to regulate e-waste in India. The scope of the Rules include all the stakeholders involved in e-waste handling with focus on producers, dealers, refurbishers, collection centres, consumers, dismantlers and recyclers. The Rules states that e-waste producers have to ensure that their waste products causes no harm and their products have been

produced in line with the RoHS in the manufacture of electrical and electronic equipment requirements. The requirement of unique serial number or individual identification code and take responsibility for all previously generated waste branded with their name was mandated. Producers are responsible for implementing and financing an effective take-back system only involving authorized stakeholders. E-waste dealers, refurbishers, dismantlers, recyclers and collection centers are required to register with the relevant State Pollution Control Board (SPCB) or Pollution Control Committee (PCC). It is also required to detail the provisions on how to handle the e-waste to ensure that they do not create any health hazards or harm the environment. Dealers of electrical equipment are responsible for collecting e-waste by providing collection box and share information about the e-waste collected to the SPCB and/ or PCC. The liability on consumer has also been fixed in form of requirement to dispose of e-waste by taking it to authorized dealers and collection centers, large consumers are at liberty to auction their waste with the restriction that may only auction it to authorized collection centers, dismantlers, recyclers or to the collection services offered by the producers. The rules assign all responsibility for ensuring enforcement to the respective SPCB or PCC. Every institution registered by the authorities has to submit annual report to concerned SPCB or PCC.

3.2.2. China

As a result of increased Chinese and worldwide consumption and turnover of EEE, China is now facing serious e-waste problems from both growing domestic generation and foreign imports. Legislative developments related to e-waste management in China, including five key domestic policies concerning the ban on transboundary shipments of e-waste into China, principles of domestic e-waste management, restrictions on the use of hazardous materials in electronic products, licensing of

formal recyclers and treatment standards, and the establishment of a national e-waste collection system and recycling infrastructure. The Chinese government has issued a variety of environmental laws, regulations, standards, technical guidance and norms related to e-waste management over the past decade. Five of the most important ones are shown in Figure given below:



Note:

MEP: Ministry of Environmental Protection

MIIT: Ministry of Industry and Information Technology

NDRC: National Development and Reform Commission

NPC: National People's Congress

Figure: Key national legislation and policies related to e-waste management in China

Since 2011, China's legislative focus has been the national e-waste legislation titled "Regulations on the Administration of Recycling and Treatment of Waste Electrical and Electronic Equipment", which attempts to formalize e-waste recycling in China by creating formal e-waste collection channels, issuing treatment licenses and providing subsidies to the formal sector. The central government is in the pivotal position to regulate, manage and coordinate the collection, treatment and disposal of e-waste, while local governments are responsible for implementation. Producers provide important financial support to the formal management of the system by paying the treatment fees stipulated in the national e-waste legislation. While formal collectors and recyclers are still limited in size and remain heavily dependent on government supports and subsidies, the scope and influence of informal collectors, refurbishers and backyard recyclers is still considerable.

On February 25, 2009, the State Council (Cabinet, hereafter SC) of the People's Republic of China (PRC) promulgated the Regulations for the Administration of the Recovery and Disposal [i.e., recycling] of Waste Electric and Electronic Products. The Regulations will not be in force until January 1, 2011. In 2011 alone, 56.6 million televisions, 58.1 million refrigerators, 53.0 million washing machines, 94.8 million air conditioners and 73.9 million computers were sold in the formal market of China, along with 250 million mobile phones. Also in 2011, an estimated 1.2 million tonnes of televisions, 0.44 million tonnes of refrigerators, 0.32 million tonnes of washing machines, 0.99 million tonnes of air conditioners and 0.67 million tonnes of computers were discarded. Collectively, these five types of discarded products amounted to 3.62 million tonnes of waste in 2011. As of 2007, it was estimated that around 0.44 million people were engaged in informal e-waste collection, and around 0.25 million people were engaged in informal e-waste recycling. Informal recycling focuses on extracting re-use and scrap values from e-waste without environmental

protection measures, emissions controls or measures to protect the health and safety of workers. Consequently, such activities have caused serious damage to local environments and the health of workers in locations such as Guiyu in Guangdong Province and Taizhou in Zhejiang Province. In contrast to the large volumes of e-waste processed in the informal sector, formal collection and recycling in China are so far limited in size and capacity. National e-waste legislation enacted since 2011, the formal sector has shown significant growth. As a result, around 61 million major home appliances were collected and treated by the formal sector in 2011. Under article 2 of the Regulations, disposal of waste electric and electronic products (WEEP) is defined as comprising the following activities: disassembling waste electric and electronic products, extracting therefrom substances to be used as raw materials or fuel, reducing the quantity of existing waste electric and electronic products through changing their physical and chemical properties, reducing or eliminating their hazardous elements, and disposing of them in landfills that are in compliance with environmental protection requirements, excluding activities of product maintenance or reconditioning and use of such products after reconditioning.

The Ministry of Environmental Protection (MEP), along with the National Development Reform Commission (NDRC) and the Ministry of Industry and Information Technology (MIIT), are to administer the disposal of WEEP, the Ministry of Commerce is responsible for administering WEEP recovery. The basic framework for WEEP recycling established by the Regulations is "multichannel recovery and centralized treatment". The Regulations mandate the formulation of a WEEP Recovery and Disposal Catalog by the NDRC, in cooperation with the MEP and the MIIT, and its submission to the SC for approval before implementation. The Regulations also prescribe the establishment of a special fund to subsidize the costs of recycling the waste products. Electric and electronic product manufacturers and

consignees of electric and electronic product imports or their agents will be obligated to contribute to the fund. The state will enforce a licensing system for disposal of WEEP. The environmental protection departments of local governments at the districted municipality level will examine and approve the qualifications of disposal enterprises as set forth in written applications and supporting materials.

Waste recovery operators who intend to engage in the disposal of the waste products have the stipulated qualifications; those without such qualifications must deliver the products to qualified disposal enterprises for handling. Potential licensees must have the suitable WEEP treatment facilities; have appropriate plans for the use or disposal of the products that cannot be completely treated; have sorting, packing, and other equipment suited for the treated products; and have relevant safety, quality, and environmental protection professional technical personnel.

Any recycled products sold after repair or restoration must conform to mandatory requirements of national technical norms guaranteeing human health and safety of the person and of property. In addition, the label "second-hand good" must be affixed in a prominent position. On October 9, 2008, the MIIT had issued the Procedures for Formulating Key Management Catalogs with Respect to Electronic Information Product Pollution Control.

3.2.3 Sri Lanka

Sri Lanka has a long history about generation and management of e-waste since the electrical and electronic appliances are entered the Sri Lankan market. However, there was no efficient e-waste management system in Sri Lanka until 1992. Sri Lanka approved the Basel Convention on the Control of Trans-boundary Movements of Hazardous Waste and their Disposal in 1992 and had taken many steps to ensure implementation of its provisions. Like other developing countries in Asia and Africa,

Sri Lanka is now confronted with the huge problem of e-waste both locally generated and internationally imported. Trading of used electronic items has become a common practice and the number of sales centers had increased notably within past few years. While there have been some initiatives to set policies and regulations for e-waste management, overall, these hazardous wastes are currently disposed hap hazard manner in roadsides dump yards and sometimes in home gardens. A significant increase in the importation of electrical and electronic appliances to the country has been observed within the past few years. In this aspect, Sri Lanka is increasingly pulling ahead of the flock. A national policy on e-waste management has already been drafted and plenty of **public private partnerships** have been established to manage the e-waste in a sustainable way. The Ministry of Environment and Renewable Energy and the CEA (Central Environment Authority) are heading the efforts as policy makers and enforcers of the law. In addition to achieving a draft policy for e-waste management, the next best thing that Sri Lanka engaged in was the “Electronic Waste Management Project” implemented under the purview of the CEA. This project has been able to sign MOUs with 14 partner organizations in an effort to manage the e-waste in Sri Lanka. The partner organizations comprised of telecommunications industry (Telecom, Mobitel, Dialog, Etisalat, Hutch, and Lanka Bell), home appliances industry (Singer and Abans), office appliances industry (Metropolitan, E-Wis, Virtusa, and ABC Trade & Investments), and service providers (Geo Cycle and Green Link).

Sri Lanka has implemented “Electronic Waste Management Project” under the purview of the CEA. Under this project, CEA has signed agreements with some companies in telecommunications industry, home appliances industry, office appliances industry, and service providers. Presently, e-waste in Sri Lanka comprises of personal computers, printers, televisions, mobile phones, refrigerators, air-conditioners, photocopying machines, washing machines, and batteries. The best

method that can be adopted to control the generation of e-waste is **“polluter pays principle” (PPP)**. Some of the e-waste management practices in Sri Lanka under the “Electronic Waste Management Project” are described below. Softlogic PLC together with Think Green, which is an exporter of e-waste approved by the CEA, has taken steps to implement environmentally friendly e-waste disposal mechanisms. The products under consideration here are mobile phones and their accessories, and they are being collected at the designated services centers of the Soft Logic PLC. There are 140 service points all around the country and the first batch of waste was estimated at 483 kg. In addition, these organizations are increasingly involved in community awareness campaigns which motivate the consumers to participate in the programs effectively. Singer Sri Lanka together with the CEA implemented the “National Cooperate e-waste Management Initiative”. Singer Sri Lanka was the first to collect e-waste in Sri Lanka, and now has collected over 60 tonnes since its involvement. They also conduct public awareness campaigns to attract more consumers to their activities. Singer does these mainly through its nationwide outlets. With initiatives to save electricity, especially through the use of energy saving bulbs, Sri Lanka recorded a high demand for CFL bulbs. As suggested by CEA, over a million of CFL bulbs are being used in Sri Lanka every month. Higher demand for consumption has resulted in a higher.

Electronic products use and hence imports are rising fast in Nepal as well. Although the defectives are repaired till they are repairable and due to lower purchasing power, the obsolescence rate in Nepal is expected to be much lower than developed countries and other more prosperous developing countries, the e-waste will continuously increase also in Nepal. However, the low purchasing power in Nepal also has another effect that the imports are of low quality with higher chances of failure. Due to hazardous nature, the e-waste should not be dumped together Municipal

Solid Waste (MSW). Before it is too late, initiatives for proper management of e-waste must be commenced in the country.

3.2.4 Pakistan

The major Regulations / Legislations / Provisions have been made such that no person shall import hazardous waste into Pakistan and its territorial waters, Exclusive Economic Zone and historic waters. There are legislative provisions for handling of hazardous substances. Subject to the provisions of the Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except (a) under a license issued by the Federal Agency and in such manner as may be prescribed; or (b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party. National Policy, Legislation and Regulatory System in Pakistan include National Environment Policy 2005, Import Policy Order 2009, Day to day orders of Ministry of Commerce and Federal Board of Revenue (FBR) controls imports and exports. The regulating powers of Ministry of Industries and Production oversees manufacturing addresses e waste, As and when needed steps initiated by Ministry of Environment oversees environmental protection and controls import/export of restricted chemicals and waste.

Pakistan imports a amount of electronic large equipment from developed countries, and Generates a large amount of e-waste. However, the e-waste stream is not addressed by specific policy, and there are no environmental institutions responsible for its management. The responses suggest that negligence of e-waste can be partly explained by a lack of technical understanding of its health and environmental hazards, and safe means of treatment and disposal. Institutional capacity, in terms of the enactment of a

policy, the delegation of tasks, and the procurement of technology and funds, needs to be built regarding e-waste.

Cheap labor and lenient rules/regulations are the main factors causing increased flooding of e-waste in Asian countries and Pakistan is one of the most vulnerable countries among this list. This dumping of electronic waste has become a critical environmental as well as human health issue in Pakistan. More recently, e-waste recycling is emerging as a cottage industry. One of the challenges in this industry is that people involved with recycling are not trained nor prepared to handle the recycling process, hence causing additional damage to the environment. In a recent study by IESE, NUST, Karachi, Lahore, Peshawar, Faisalabad and Rawalpindi were identified as major hubs of e-waste in Pakistan. In addition to these cities, breaking/dismantling activity is also being carried out in Kamonke and Gujranwala cities near Lahore. The survey results showed that the recycling system includes people using open plots and big houses in congested areas/ communities to break down, segregate and by burning/heating of various components of computers, printers, screens and power supply units etc.

3.2.5 Bangladesh

No inventory has been made to assess the extent of E-waste problem Bangladesh. Total number of PCs, TVs and Refrigerators in the year 2006 was 600,000, 1,252,000 and 2,200,000. The total number of Mobile Phone active subscribers in Bangladesh was 58.36 million at the end of May 2010. Reuse of E-equipment is a common practice in Bangladesh. E-equipment recycling and dismantling is a growing business. No E-waste dismantling facility in formal sector. All the recycling is being carried out by the informal sector. Bangladesh is a signatory to Basel convention prohibiting trans-boundary of hazardous waste. Import of any kind of waste requires Government permission.

Bangladesh adopted its National Environmental Policy in the year of 1992 highlighting the regulating all activities that pollute and destroy the environment. The Environment conservation act, 1995 authorize the Director General to undertake any activity necessary to conserve and enhance the quality of environment and to control, prevent and mitigate pollution. Medical Waste Management Rules, 2008 addresses the waste management issue for the medical sector including E-waste. No regulations specifically dealing with E- waste in Bangladesh. Government already prepared draft National 3R (Reduce, Reuse & Recycle) Strategy and in that draft e-waste issues were addressed. Hazardous Waste Management Rules is under preparation and still time to incorporate E-waste management issues for proper management of E-waste among others.

3.2.6 Thailand

342,000 tons or more than 15 million units of e-waste were expected in 2011 as per the PCD (Pollution Control Board). There were 41 formal e-waste recycling/dismantling facilities in 2011. There were 9,000 junk shops in Thailand in 2010. No data are available for informal waste collectors. There are mainly two types of E-waste management:

- Formal

- Informal

The sources of e-waste in Thailand are i) Industry: Off-spec products & Excess scraps from manufacturing ii) Household/Commercial/Services: discarded/broken electrical and electronic devices iii) Legal & Illegal Import: Used EEE, Wastes/scraps/junks. National Integrated E-waste Management Strategy (2007-2011) was formulated and draft national Integrated E-waste Management Strategy (2014-2021) with the following

Objectives:

- ✓ To establish e-waste collection system;
- ✓ To develop information systems concerning the quantity of e-waste;
- ✓ To promote environmentally sound dismantling and recycling facility;
- ✓ To promote eco-friendly design;
- ✓ To raise awareness among the public;
- ✓ To strengthen import controls for low-quality EEE and prevent illegally import/export of e-waste.

As per the statistics of PCD, April 2012, the pathway of e-waste are divided into different categories as stated below:

- ✓ Sell: 51.27%
- ✓ Keep at Home: 25.32%
- ✓ Throw away: 15.16%
- ✓ Donate/Give a way: 7.84%

The followings are the problems faced in Thailand in connection with the Mishandling of WEEE:

- ✓ Pollution and residue waste from improper practices by informal waste collectors/dismantlers
- ✓ Non-valuable e-waste is discarded with general waste
- ✓ Keeping e-waste at home/office – loss of recycling opportunity
- ✓ No waste segregation/mixed waste

- ✓ Lack of awareness/knowledge: Producers, importers, Consumers, Local administrations, Waste collectors, processors
- ✓ Lack of law and regulations: No specific laws and regulations, Lack of enforcement

Followings are the E-Waste Legislation in Thailand:

Draft Act on “Promotion of the Management of Hazardous Substances from Used Products” (2004 – 2005) - cancelled

- Draft Act on “Fiscal Measures for Environmental Management”[Fiscal Policy Office, Ministry of Finance] (2007 – 2012)
- Draft Royal Decree Prescribing Rules, Procedures, Conditions and Management of Revenue Generated from Product Fees, Formulated by Pollution Control Department pending (2013)
- Proposed new e-waste law by implementing “Extended Producer Responsibility, (EPR)” concept [Ministry of Natural Resources and Environment]: ongoing (2014)

Industrial Product Standards Act, 1968 aims at setting industrial product standards useful for industrial promotion, safety, or damage prevention to the people or industrial business or the nation’s economy. Export and Import of Goods Act, 1979 authorizes the state to collect special fees for certain goods imported or exported. It made provisions to implement international trades to be in perfect order to national economics and securities, and reliable to overseas. This act is a tool for import and export control that allows only safe goods can be imported. Products take back by producer or importer is confirmed by the Act. The Enhancement and Conservation of the National Environmental Quality Act (NEQA) 1992 is aimed at environment and pollution

degradation by participation of government, people and private organizations in environmental promotion. It aims at supporting the framework of environmental policies, determination and maintenance of environmental quality standards, environmental quality management planning, determination of environmental impact assessment etc. Factory Act 1992 aims at appropriately supervision of factory activities.

Substance Act 1992 was promulgated to regulate the dangerous substances which were utilized in numerous varieties of activities may severely harm humans, animals, plants, properties, and environment It was agreed to adjust the hazardous substance Acts for the coverage expansion of all hazardous substances; setting up criteria and methods to more appropriately control hazardous substances; and management set up of coordination between relevant hazardous substance control offices. Economic Instruments for Environmental Management Act and draft strategic plan 2007 is an effort to deal with the environmental issues and has e waste implications.

3.2.7 THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

The European Union of Countries (EU) have addressed to the e waste problems and from nineties decade have comprehensive and progressive e-waste legislations. The main approaches are: The Waste Shipment Regulation (WSR) passed in 1993 and amended in 2007 was the first dedicated e waste regulation. It emphasizes that no EU member state is allowed to export e-waste classified as hazardous to non-OECD (Organization for Economic Cooperation & Development) countries. As number of e waste components didn't fall under the WSR's definition of hazardous substance, these components continued to be exported to non-OECD countries under other

provisions. In 2003 the EU has passed e-waste Directive / legislation for changing product designs and increasing recycling rates of discarded WEEE and Restriction of the use of certain hazardous substances (RoHS). The RoHS Directive addresses the beginning of the EEE life cycle by attempting to eliminate hazardous substances such as mercury, lead and fire retardants in domestically produced or imported electrical and electronic products. The WEEE Directive concentrates on the end-of-life stages of EEE. The Directive intends to encourage product designs that facilitate the recycling, repair, disassembly and reuse of WEEE by introducing the concept of Extended Producer Responsibility (EPR). EPR deals with the financial responsibility for collecting and managing WEEE in line with the Directive to the producers. Individual Producer Responsibility (IPR) applies for the management of new products put on the market. For historical waste, i.e. products put on the market before 13 August 2005, the financial responsibility is divided among producers in proportion to their market share of a specific type of equipment (WEEE Directive, Article 8). *The rationale behind producer responsibility is the —polluter pays// principle, which intends to include the costs of disposal and treatment in a product's price, thus reflecting the product's environmental effects.* To deal with the Directive's insufficient effectiveness and efficiency, the European Commission proposed a revision in 2008. Several modifications were affected and have helped to reduce illegal e-waste exports to non-OECD countries. The provision of higher mandatory collection target for e-waste, establishing minimum monitoring requirements for WEEE shipments and introduction of legally binding provision for the distinction between new, used or waste products to tackle the false labeling of WEEE as used EEE have been effected.

A number of substantial changes are to be made to Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE). The objectives of the Union's environment policy are, in particular, to preserve, protect and improve the quality of the environment, to

protect human health and to utilize natural resources prudently and rationally. That policy is based on the precautionary principle and the principles that preventive action should be taken, that environmental damage should, as a priority, be rectified at source and that the polluter should pay. EC had made Directive 2002/96/EC of the European Parliament and of the Council of 27 Jan 2003 on WEEE.. A number of substantial changes are to be made to Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on WEEE and developed modified Directive 2012/19/EU relating to the WEEE management in the European member states. The objectives of the Union's environment policy are, in particular, to preserve, protect and improve the quality of the environment, to protect human health and to utilize natural resources prudently and rationally. That policy is based on the precautionary principle and the principles that preventive action should be taken, that environmental damage should, as a priority, be rectified at source and that the polluter should pay.

This Directive supplements the general waste management legislation of the Union, such as Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste. It refers to the definitions in that Directive, including the definitions of waste and general waste management operations. The definition of collection in Directive 2008/98/EC includes the preliminary sorting and preliminary storage of waste for the purposes of transport to a waste treatment facility. Directive 2009/125/EC of the European Parliament and of the Council establishes a framework for setting ecodesign requirements for energy-related products and enables the adoption of specific ecodesign requirements for energy-related products which may also be covered by this Directive. Directive 2009/125/EC and the implementing measures adopted pursuant thereto are without prejudice to the waste management legislation of the Union. Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous

substances in electrical and electronic equipment requires the substitution of banned substances in respect of all electrical and electronic equipment (EEE) within its scope.

The purpose of this Directive is to contribute to sustainable production and consumption by, as a first priority, the prevention of WEEE and, in addition, by the re-use, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste and to contribute to the efficient use of resources and the retrieval of valuable secondary raw materials. It also seeks to improve the environmental performance of all operators involved in the life cycle of EEE, e.g. producers, distributors and consumers and, in particular, those operators directly involved in the collection and treatment of WEEE. In particular, different national applications of the 'producer responsibility' principle may lead to substantial disparities in the financial burden on economic operators. Having different national policies on the management of WEEE hampers the effectiveness of recycling policies. For that reason, the essential criteria should be laid down at the level of the Union and minimum standards for the treatment of WEEE should be developed.

It mentioned WEEE as one of the target areas to be regulated, in view of the application of the principles of prevention, recovery and safe disposal of waste. The purpose of this Directive is to contribute to sustainable production and consumption by, as a first priority, the prevention of WEEE and, in addition, by the re-use, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste and to contribute to the efficient use of resources and the retrieval of valuable secondary raw materials. The provisions of this Directive should apply to products and producers irrespective of selling technique, including distance and electronic selling.

The producer responsibility is one of the means of encouraging design and production of EEE which take into full account and facilitate its repair, possible upgrading, re-use, disassembly and recycling. Member States should adopt appropriate measures to

minimize the disposal of WEEE as unsorted municipal waste and to achieve a high level of separate collection of WEEE. Users of EEE from private households should have the possibility of returning WEEE at least free of charge. Producers should finance at least the collection from collection facilities, and the treatment, recovery and disposal of WEEE.

There are different articles including the followings in the EC Directive:

- Product design,
- Separate Collection
- Disposal and Transport of collected WEEE
- Collection Rate
- Proper Treatment
- Shipment of WEEE
- Recovery targets
- Financing in respect of WEEE from private households
- Financing in respect of WEEE from users other than private households
- Information for users
- Information for treatment facilities
- Registration, information and reporting
- Authorized representative
- Administrative cooperation and exchange of information
- Adaptation to scientific and technical progress

3.2.8 USA

Federal Legislative Mandates for Electronics Recovery: At present, there is no Federal mandate to recycle e-waste. There have been numerous attempts to develop

a Federal law. However, to date, there is no consensus on a Federal approach. **State Mandatory Electronics Recovery Programs:** Many states have instituted mandatory electronics recovery programs.

Governing Management of Used Electronics

Some electronics (such as color CRT computer monitors, color CRT TV tubes, and smaller items such as cell phones and other hand-helds) test **hazardous** under Federal law. If so, they are subject to special handling requirements under Federal law, subject to certain exemptions. It is the generators' responsibility to determine if their materials are hazardous waste. EPA encourages reuse and recycling of used electronics, including those that test hazardous. To facilitate more reuse and recycling of these products, Environmental Protection Agency (EPA) has less stringent management requirements for products bound for reuse and recycling. Specifics follow:

Resale or Donation: Computer monitors and televisions sent for continued use (i.e. resale or donation) are not considered hazardous wastes. **Federal Regulatory Requirements for Recycling of CRTs:** EPA encourages recycling of CRTs. Thus, CRTs sent for recycling are subject to streamlined handling requirements. For more information on the CRT Rule, including export requirements and frequent questions please see Cathode Ray Tubes Final Rule.

Federal Regulatory Requirements for Circuit Boards within the United States: Circuit Boards are subject to a special exemption from Federal hazardous waste rules.

- **Whole unused circuit boards** are considered unused commercial chemical products, which are unregulated.

- **Whole used circuit boards** meet the definition of spent materials but also meet the definition of scrap metal. Therefore, whole used circuit boards that are recycled are exempt from the hazardous waste regulations.
- **Shredded circuit boards** are excluded from the definition of solid waste if they are containerized (i.e., fiberpaks) prior to recovery. These shredded circuit boards cannot contain mercury switches, mercury relays, nickel-cadmium batteries, or lithium batteries. If these materials are not treated this way, then they are considered hazardous waste and must be treated as such.

Federal Regulatory Requirements for Disposal CRTs and Other Electronics that Test Hazardous

- **Large Quantities Sent for Disposal:** Wastes from facilities that generate over 100 kilograms (about 220 pounds) per month of hazardous waste are regulated under Federal law when disposed. CRTs from such facilities sent for disposal (as opposed to reuse, refurbishment or recycling) must be manifested and sent as **hazardous waste** to a permitted hazardous waste landfill.
- **Small Quantities Exempt:** Businesses and other organizations that send for disposal (as opposed to reuse, refurbishment or recycling) less than 100 kilograms (about 220 pounds) per month of hazardous waste are not required to handle this material as hazardous waste. If a small-quantity generator wishes to dispose of a small quantity of CRTs or other used electronics that test hazardous under Federal law, these materials can go to any disposal facility authorized to receive solid waste (e.g. a municipal landfill), unless state law requires more stringent management (e.g. CA).
- **Household Exemption for Electronics Sent to Disposal:** Used computer monitors or televisions generated by households are not considered hazardous waste and are not

regulated under Federal regulations. State laws may be more stringent as regards electronics from households (e.g. CA).

State Regulatory Requirements for Disposal of Electronics that Test Hazardous

State regulatory requirements for e-waste can be more stringent than the Federal requirements, and vary from state to state. California considers CRTs to be spent materials and regulates all CRT as hazardous waste, i.e. they are banned from landfills. Other states, such as Massachusetts and Florida, have taken steps to streamline hazardous waste regulations for CRTs, reducing special handling requirements if these products are directed to recycling. Many states are developing Universal Waste exemptions for CRT which also streamline management of CRTs bound for recycling. If you are planning on disposing used CRTs (or other electronics that test hazardous under state or Federal law), check relevant state requirements, which might be different from federal regulatory requirements.

3.2.9 Kenya

Increased use of technology especially in ICT, low initial cost, and unplanned obsolescence of electrical and electronic equipment has led to an e-waste generation problem for Kenya. UNEP estimates the current e-waste generated annually in Kenya at 11,400 tonnes from refrigerators, 2,800 tonnes from TVs, 2,500 tonnes from personal computers, 500 tonnes from printers and 150 tonnes from mobile phones (Press Release UNEP, 2010). This high rate of accumulation of ewaste stems not only from the rapid pace of emerging technologies but also from e-waste disposal by developed countries in the form of used electronic equipment with short life-spans.

Kenya like other countries has embraced ICT in both public and private sectors. The country is facing the challenge of accumulated e-waste whose handling and disposal

has not been substantively addressed by the present environmental laws. An estimated 50 million tones e-waste from computers, monitors, printers, mobile phones, fridges and batteries among others. Lack of segregation and poor disposal systems has led to mixing of e-waste with ordinary waste in the dumpsites. The e-waste guidelines have been developed to streamline the procedures of handling and disposal of e-waste generated by various sectors. The e-waste guidelines provide a framework for identification, collection, sorting, recycling, and disposing of e-waste. The guidelines provide the basis for developing legal instruments to enhance enforcement of the procedures. It is necessary to address e-waste to encourage separation to enhance material recovery and promote recycling. Kenya welcomes the provisions to ship e-waste back to the country of origin whenever such consignments are detected. The management of e-waste is in line with the provisions of vision 2030 which calls for a clean and healthy environment for development. The guidelines are also in line with the vision of Ministry of Environment & Mineral Resources that aspires for a clean, secure and sustainably managed environment and mineral resources to support national prosperity.

The guidelines have been developed with the strategic objective of providing a framework for the development of regulations and policies in Kenya. Specific objectives of the guidelines include:

- To enhance environmental protection from e-waste.
- To establish a basis for a policy and regulatory frameworks on e-waste management.
- To raise public awareness on sustainable management of e-waste in Kenya.

Included in the guidelines are approaches to enhance environmental protection; policy and regulatory frameworks; environmental awareness; categories of e-waste and target groups; ewaste treatment technologies; and disposal procedures. It is

important to note that the guidelines are not a panacea for Kenya's e-waste problems, but will provide a basis for the development of e-waste regulations and an e-waste policy in Kenya.

A number of recycling centers employing many young Kenyans have come up in different parts of the country, but recycling e-waste can result in harmful effects in the air, water, soil and pose environmental hazard. The growing challenges of e-waste require policy responses to address the issue and guide the collection, disposal and recycling activities. The Environmental Management and Coordination Act (EMCA 1999) and the Waste Management Regulations (2006) do not sufficiently address the emergent issue of e-waste. It is intended to bridge the legislative gap and minimize the impacts of the unsafe disposal of electronic products on public health and the environment and chart way forward in dealing with e-waste management in line with the Basel Convention and other international frameworks.

3.2.10 Cambodia

Inventory studies carried out showed that E-waste generation potential ranges from 6792 metric tons in 2008 to 22,443 metric tons in 2019. Further, the results of extensive field work highlighted that the E-waste trade value chain consists of stakeholders, who use twelve processes during E-waste management. These processes are carried out in an environmentally unsound manner, which need to be addressed both at national and city level. It is expected that the projected E-waste is going to arrive at different stakeholders in future who will use the twelve identified processes for dismantling and recycling. The mapping of these processes in the trade value chain shows that these processes are part of level 1 and 2 E-waste management

and consist of primary and secondary E-waste generators. Therefore, there is a need for environmentally sound management of these processes while planning for future interventions. Some of the specific needs which are relevant from E-waste management perspective include need to strengthen, monitor and manage imported EEE; Need to improve operating practices of repairing and dismantling of EEE, which are being done manually; Need for proper E-waste collection and transportation system; Need for proper occupation health and safety system in E-waste management. An effort has been made to address these needs by building the national capacity to assess the specific needs.

Ministry of Environment, Government of Cambodia received a support from UNEP-DTIE-IETC to implement the project, “E-waste Management in the Phnom Penh Municipality” in 2009. The objective of the proposed project was to formulate, design and implement an integrated E-waste management pilot project in PPM. It was expected that after augmentation of local capacity, the level of effort could be scaled up to the national level and replicated in other countries.

3.2.11 Korea

The estimated e-waste in Korea grew up to 9455 thousand tons by 2010. Besides the acts and initiatives related to industry environment and pollution controls which have provisions for indirect regulations for EEE the specific available initiatives for e products and e wastes are as follows: In 1992 the Waste Deposit-Refund System was introduced. The deposit is levied on products sold for their collection and recycling, and refunded based on the amount of products recycled. Guideline for Improvement of Material/Structure of Products for Stimulating Recycling was introduced in 1993 with aims for framing guideline on restriction of use of hazardous substances and recyclability rate. Extended Producer Responsibility System was introduced in 2003 as —Act on the promotion of saving and recycling of resources with aim of producers to

recycle E-waste for themselves and report the results to the government. With aim to supplementation and extension of existing initiatives the —Act on resource recycling of electric electronic equipment and vehicles came in 2008. The act have provisions for design and production considerations of recycling with aim to Elimination of hazardous substances, Design of product to easy to dismantle and use of easy-to-recycle substance in Environment friendly collection, treatment & recycling atmosphere. The act consists of precautionary and end-of-pipe regulation along with life cycle of the product.

3.2.12 Japan

The Electronic product manufacturer leader, producing high percentage of worldwide produces, was one to confront the overwhelming amount of hazardous electronic waste. They have limited regulations aiming at e wastes. As an initiative of E waste management in 1998, Japan enacted the Specified Home Appliance Recycling Law (SHARL). The law requires recycling rates of between 50-60 per cent by weight, which could be addressed by reusing and recycling product and its components. The amended Home Appliance Recycling Law in 2001 has ensured the proper treatment of waste home appliances. The Waste Treatment Law was enacted to address the e waste management specially EEE having hazardous substances. The country advocates heavily on incineration and continued use based on cost comparisons to material recycling. Japan enacted the Revised Law for Promotion of Effective Utilization of Resources (LPUR), which requires manufacturers of e products including computers and similar items, large electrical home appliances, which were not covered under SHARL to design for disassembly, recycling and waste reduction and longevity of use. Manufacturers are at liberty to charge consumers for e waste

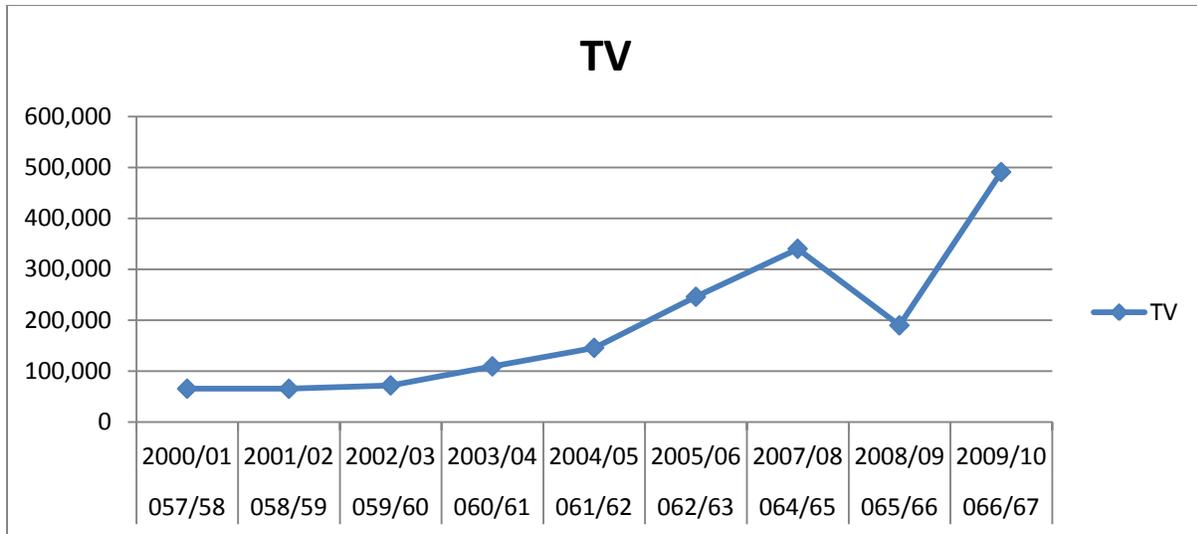
management costs. It is noted that LPUR has voluntary efforts of manufacturers while SHARL imposes the mandatory obligations on manufactures.

4. Discussion, Analysis and Recommendation

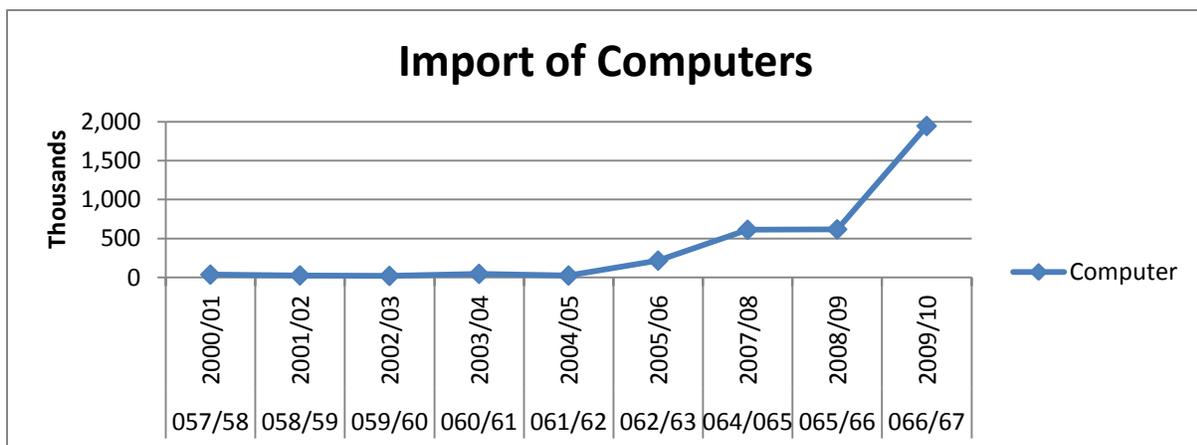
E-Waste has disparate nature of hazardous ingredients last longer than solid waste violating an environment chemically and spreading various unpredictable diseases around surrounding lives. Development of science and technology contributed to make life easier and we consume more because they provide comparatively more forbearance and insist additional consumption.

The usage of the IT/ ICT, Telecom products is being increased along with the development of new technologies and services to improve the quality of life. The trends of import of different electrical and electronics products with its quantity are attached in the Annex. The scenario of import of TV, Computers and telephone sets is mentioned in the table given below with graphical analysis.

Fiscal Year	057/58	058/59	059/60	060/61	061/62	062/63	064/65	065/66	066/67	Total
	2000/0 1	2001/0 2	2002/0 3	2003/0 4	2004/0 5	2005/0 6	2007/08	2008/09	2009/10	
TV	65,316	65,134	71,798	109,194	145,577	245,908	340,085	189,785	490,868	1,723,665
TV, Radio Parts	114383 9	133926 2	430215 3	140556 5	113002 1	323607	3,388,283	4,846,558	6,337,884	24,217,172

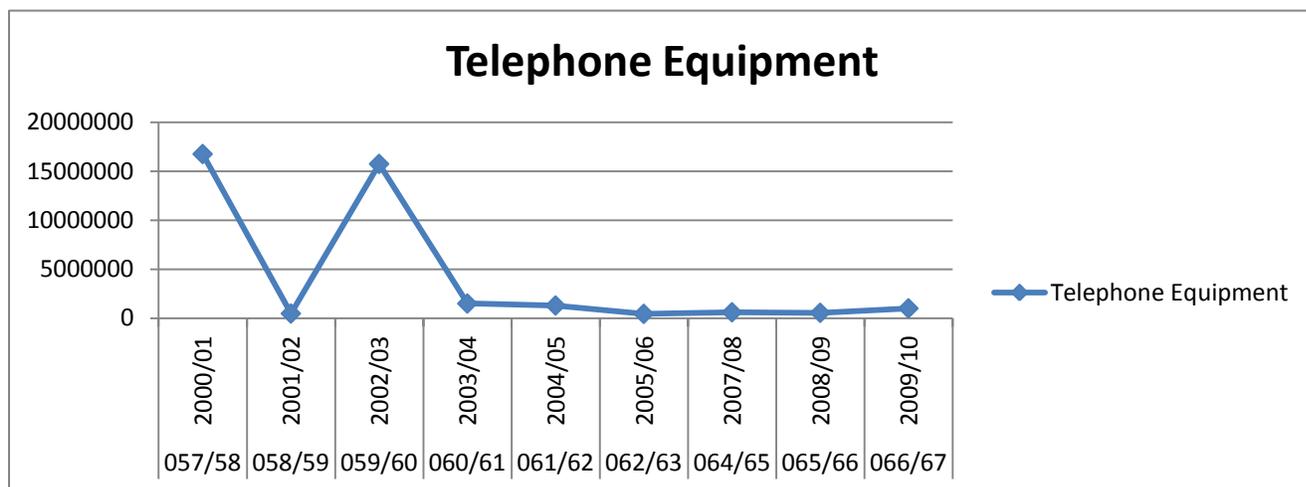


Fiscal Year	057/58	058/59	059/60	060/61	061/62	062/63	064/65	065/66	066/67	Total
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2007/08	2008/09	2009/10	
Computer	37,073	26,526	20,777	46,566	25,238	216,713	612,751	618,221	1,945,395	3,549,260
Computer Accessories	7,533,276	1,219,875	851,538	1,325,175	3,284,255	29,496	3,373,253	3,759,722	7,277,399	28,653,989
Computer Monitor		22,546	3,035	73,310	46,828		1,228,943	157,780	903,179	2,435,621



Fiscal Year	057/58	058/59	059/60	060/61	061/62	062/63	064/65	065/66	066/67	Total
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2007/08	2008/09	2009/10	
Telephone	16754340	477690	15745333	1500973	1301300	444639				38394682

Equipment							608,339	554,097	1,007,971	
Telephone parts						356092				356092
Telephone Set	287,285	321,558	335,920	409,910	1,047,654	251,145				2,653,472



Many of the electronic products or devices contain individual components made with hazardous constituents. Cathode ray tubes (CRTs) used in televisions and computers contain significant amount of lead. Printed circuit boards used in most electronic items contain lead, chromium, and silver. Many types of electronic devices contain batteries that contain nickel, cadmium, lithium or sealed lead acid. Therefore, it is necessary to give higher attention to these electronic wastes.

A Questionnaire was prepared and circulated to all the concerned telecom operators in order to get the data/information and the feedback, the response was not received in spite of repetitive follow up to collect the same from the stakeholders. It is requested to the NTA to follow up and coordinate to receive the response on the disseminated structured questionnaire from the telecom/ICT Players as well as the concerned Department of the GoN.

Although there have been provisions to formulate guidelines and Rules as stated relating to the Environmental protection, it seems that there has not been any regulation, guidelines/directives in connection with the e-waste management. It

seems that although GoN, Ministry of environment, Science and Technology has made a study relating to the identification and quantification of electronics products that will convert into e-waste in Nepal in 2007 and some recommendations have been done to perform necessary action through the Study Report, there have not been significant effort relating to the e- waste management in Nepal later on. It seems necessary to **formulate the National Regulation and Directives** for the management of e-waste in Nepal including the collection, recycling and disposal of e-waste appropriately. It is also necessary to aware the public and other different stakeholders in relation to the e-waste management activities. It is necessary to **define the roles and responsibilities of the concerned stakeholders** including manufacturer/producer, importer, transporter, collector, recycler, disposer, and consumer through the means of **E-waste Management Regulation**. It seems also necessary to develop appropriate mechanism/system for the management of e-waste. Proper monitoring and enforcement mechanism with fine and punishment provision shall be developed and implemented in timely manner.

It is also appropriate to make **registration and authorization mechanism** to manage the e-waste appropriately. It might be appropriate to establish a fund for the e-waste management. If the manufacturer is not responsible for Different concerned manufacturer, producer, importer, distributor, shall have the responsibility of funding in the **E-waste management Fund**. The fund can be utilized for establishing appropriate mechanism for collection, recycling, and disposal. In Nepal it seems that almost all the e-waste collection, disposal and recycling activities happens informally, and no formal mechanism and system is developed and implemented with special focus for e-waste management.

If we study and analyze on the international trends and practices in connection with the e-waste management different activities including the development of appropriate regulatory Framework, action plan and program. It is necessary to identify the different plan and programs for the e-waste management in Nepal. Although the Environmental protection act and Regulation has been formulated and implemented, it seems Ministry of Environment, Science and Technology (MoEST) intends to identify and quantify e-waste generated in the country. For this as a first step MoEST would like to conduct study to identify and quantify the related products being imported and / or manufactured/assembled in the country with the potential to contribute ultimately as e-waste.

Recommendations

In order to ascertain proper management of e-waste in Nepal, following actions have been recommended:

1. It is necessary to **Formulate Regulation and Directives** relating to the Environmental protection in connection with the e-waste management incorporating the different provisions including the provisions for formal process for registration and authorization for collectors, recyclers, disposers identifying the **roles and responsibilities of the concerned stakeholders**. The Draft Regulation is hereby prepared and attached herewith. It is suggested to forward this draft Regulation to the Ministry of Environment, Science and Technology via the Ministry of Information & Communication, since it is the prime responsibility of the MOEST to formulate the necessary legislation for e-waste management and enforce to implement the in effective and efficient manner. It is suggested to forward this regulation to the high level environmental protection council to have necessary policy or principle decision. The environmental protection act has the provision of the Council which was formed on 2065.11.5 B.S in the chairmanship of the Prime Minister of Nepal. Annex 2
2. It is hereby recommended to make **sufficient awareness program** for awareness to the public and other different stakeholders in relation to the e-waste management activities and rising on hazards of e-waste.
3. It is also recommended to make **registration and authorization mechanism** to manage the e-waste appropriately.
4. It is hereby recommended to establish a **fund for the e-waste management**. The funding shall be provided by the concerned manufacturer, producer, importer, distributor, and other e-waste generators. The fund should be utilized for establishing appropriate mechanism/system for collection, recycling, and disposal of e-waste.

5. It is hereby recommended to formulate a taskforce at national level comprising the representative/s of different concerned stakeholders as follows in order to assist to the environmental Protection council in relation to the e-waste management policy and legislation and other applicable activities:

- | | |
|---|------------------|
| a. Representative of Ministry of Environment Science, and Technology (Gazetted First Class) | Coordinator |
| b. Representative of MOIC | Member |
| c. Representative of Ministry of Energy | Member |
| d. Representative of Local Authority of GoN | Member |
| e. Representative of NTA | Member |
| f. Representative of Nepal Electricity Authority | Member |
| g. 2 no. of Expert nominated by MOEST | Member |
| h. Representative of MOEST | Member-Secretary |

6. It is hereby recommended for prohibition on import of e-waste or old electronic equipment.

7. It is also recommended for Promotion of Cleaner production and 3R in Electric and Electronic Equipment Manufacturing/ assembling units to reduce the use of hazardous materials

8. It is recommended to capacitate the related institutions and human resources with appropriate HRD program taking into account the networking with international and regional agencies for improving knowledge base and for capacity building.

9. It is recommended to strengthen, monitor and manage imported EEE. It is also needed to improve operating practices of repairing and dismantling of EEE, which are being done manually. Proper E-waste collection, transportation, recycling and disposal system shall be arranged and managed properly.

Regulatory Framework on E-waste Management

E-waste Regulation

5.1 Definition:

In this Regulation, unless the context otherwise requires:

“Act” Act means the Environment Protection Act 1997

“Authorization” means permission for handling, collection, reception, storage, transportation, dismantling, recycling, treatment and disposal of e-waste granted as per the rule and regulation of GoN

“Collection Centre” means a centre established, individually or jointly or a registered society or a company or an association to collect e-waste

“Collectors” means a person who receives e-waste directly from a residence for recycling or processing for reuse. “Collector” includes, but not limited to, manufacturers, recyclers, and refurbishers who receives e-waste directly from the public.

“Electrical and electronic Equipment” means equipment which is dependent on electric currents or electromagnetic fields in order to work properly

“e-waste” means waste electrical and electronic equipment, whole or in part or rejects from their manufacturing and repair process, which are intended to be discarded.

“Consumer” means any person using EEE excluding the bulk consumers

“dismantler” means any person or registered society or a designated agency or a company or an association engaged in dismantling of used EEE into their components

“disposal” means any operation which does not lead to recycling, recovery or reuse and includes physiochemical, or biological treatment, incineration and deposition in secured landfill

“ distributor” means any natural or legal person in the supply chain, who makes an EEE available in the market. This definition does not prevent a distributor from being, at the same time, a producer

“ recycling” means the processing of used materials (waste) into new products to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, reduce energy usage, reduce air pollution and water pollution by reducing the need for “ conventional” waste disposal or producing a new product from a recyclable material.

“ recycler” means any person who is engaged in recycling or reprocessing of used EEE or assemblies or their component

“ transporter” means a person engaged in the off-site transportation of e-waste by air, rail, road or water

“Producer” means any person who, irrespective of the selling technique used;

- Manufactures and offers to sell electrical and electronic equipment under his own brand; or
- Offers to sell under his own brand, assembled electrical and electronic equipment produced by other manufacturers or suppliers; or
- Offers to sell imported electrical and electronic equipment

“MOEST” means Ministry of Environment Science and Technology of Nepal

5.2 Background

This Regulation will provide a regulatory framework to enable proper collection, recycling and to set the required standards for e-waste management. These Rules will provide vital information to aid the development of a management framework. They will also ensure that health and safety aspects of the people involved in the

operations are protected, along with issues of emissions and waste emerging from such operations. The existing e-waste management systems from different stakeholders will be streamlined and attract recyclers who make the recycling process safe and efficient. The rules will further enhance the development of economic instruments such as land, financial subsidies etc. to ensure an efficient collection and recycling system.

5.3 Introduction

The usage of Electrical and Electronic Equipment is being exponentially increased with the development and expansion of different new technologies in connection of electronics and Electrical products. As the market continues to expand and innovation cycles become even shorter, the replacement of equipment accelerates, making EEE a fast growing source of waste. There is necessity to manage and handle such EEE in particular to preserve, protect and improve the quality of environment, to protect human health and to utilize natural resources prudently and rationally. The achievement in sustainable development calls for significant changes in current patterns of development, Production, consumption, and behavior. It seems necessary for the reduction of wasteful consumption of natural resources and the prevention of pollution. The WEEE is one of the target areas to be regulated, in view of the application of the principles of prevention, recovery and safe disposal of waste. It is aimed to contribute effectively to reduce hazardous substances contained in new EEE, hazardous substances such as mercury, cadmium, lead, hexavalent chromium and polychlorinated biphenyls (PCBs) and ozone-depleting substances will still be present for many years. The content of hazardous components in EEE is a major concern during the waste management phase, and recycling of WEEE is very important to be addressed appropriately. It is realized that it seems necessary to fulfill specified obligations by the different stakeholders including producers,

collectors, recyclers and disposers. However, it is equally important that the administrative burdens should be reduced by simplifying registration, authorization and reporting procedures. The producers should take full responsibility for the WEEE collection throughout the entire waste chain taking into account the principle “polluter pays”.

5.4 Objectives

The objective of introduction of this Regulatory Framework is in particular to preserve, protect and improve the quality of environment, to protect human health and to utilize natural resources prudently and rationally. The objective of these Regulation is to contribute to the sustainable production and consumption by, as a first priority, the prevention of WEEE, in addition, by the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste and to contribute to the efficient use of resources and the retrieval of valuable secondary raw materials. It is also intended to improve the environmental performance of all stakeholders involved in the life cycle of EEE, e.g. producers, distributors, consumers, collectors, and recyclers, or disposers.

5.5 Strategies

The following strategies shall be taken into account:

Strengthening of import/export control

It is applicable to have provision for formal registration of e-product importer/exporter. The strategy for the strict provision of import of standard-complied product plays vital role in e-waste management.

1. Promotion of eco-friendly e-products with the focus on public procurement

The GoN/Authority shall promote testing and certification of eco-product. It seems necessary to have strong mandatory provision in public procurement such that the e-products shall be handled and managed effectively minimizing possible adverse health effects the e-waste.

2. Development of E-waste database

Database is one of the key for e-waste management. There is lack of data in connection with e-products and associated e-waste collection, recycle and treatment in developing countries including Nepal. In this connection, significant efforts shall be taken for e-products including e-waste database. The data shall be collected timely and the consequent reporting system shall be created.

3. Development of e-waste segregation, collection, storage and transport for local government

It is necessary to formulate necessary legislative provision for handling and management of e-waste. The role and responsibilities of different stakeholders including collectors, recyclers, transporters, manufacturers, consumers, and Government/Authority shall be clearly defined. The capacity building shall be developed for the concerned stakeholders with special focus to local government in relation with the collection, recycling, and treatment of e-waste products. Laws shall be formulated on product fee and/or Extended Producer Responsibility (EPR) for effective e-waste management.

4. Upgrade/Develop of dismantling and recycling facility

There shall be provision for develop/upgrade of R & D facilities relating to recycling technology. The support for environmentally sound recycling shall be promoted through sufficient funding.

5. Promotion of public awareness on e-waste

People are not aware on e-waste products and its associated impacts including measures to handle/manage the e-waste products and disseminate e-waste knowledge to all stakeholders.

6. Polluter pays Principle

The producers should take full responsibility for the WEEE management throughout the entire waste chain taking into account the principle” polluter pays”.

5.6 Components of E-waste Management

E-waste management is to be described in terms of its components, which include collection, sorting & transportation, treatment and disposal system.

Components of E-waste Management:

- E-waste collection, sorting and transportation system
- E-waste treatment system
- E-waste disposal system.

5.7 Role & Responsibilities for Target Groups

E-waste has to be managed through a carefully organized system and existing actors should be part of the proposed system. The target groups do have a collective responsibility for managing and handling the e-waste at different stages in its life-cycle.

5.7.1 Responsibilities of the Producer/manufacturer

The producer of electrical and electronic equipment listed in Annex 1 shall have the following responsibilities:

The producers shall be responsible to collect the e-waste generated during the manufacture of electrical and electronic equipment and channelizing it for recycling or disposal

- ✓ Collection of e-waste generated from the 'the end of life' of their products and to ensure that such e-wastes are channelized to registered dismantler or recycler. The producer shall, as necessary, ensure collection and channelization by authorizing collection agencies.
- ✓ Implement individual take back schemes or get organized into sectoral or sub-sector Producer Responsibility Organizations(PRO) that encompass Extended Producer Responsibility(EPR)
- ✓ Setting up collection centers or take back systems either individually or collectively.
- ✓ Providing the Contact details of authorized collection centers to consumers so as to facilitate return of used EEE
- ✓ Clearly label products for easy identification and to show the constituents of the product

- ✓ Creating awareness through publications, advertisements, posters, or by any other means of communication and information booklets accompanying the equipment/product
- ✓ Comply with the Nepalese norms and standards in the manufacture of EEE if applicable
- ✓ 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 Guidelines come into force. The producers should finance at least the collection facilities, and the treatment, recovery and disposal of WEEE.
- ✓ Each Producer should, when placing a product on the market, provide financial guarantee to prevent costs for the management of WEEE from orphan products from falling on society or the remaining producers.
- ✓ Obtaining necessary authorization from the concerned Government agency/ies
- ✓ Maintaining records of the e-waste handled and make such records available for scrutiny by the Ministry of Environment Science & technology or other designated entity of GoN
- ✓ Filling Annual returns to the MOEST on or other designated entity on or before the deadline specified by the GoN

5.7.2 Responsibilities of Collection Centers

The operation of a collection system requires storage and transportation infrastructure. Collection infrastructure requires establishment of e-waste collection points and storage areas. The following are obligations for establishing collection points and storage areas.

The collection Centers shall:

- ✓ Obtain an necessary authorization in accordance with the provision of Rules and Regulation of GoN and provide details of such collection centers to the public
- ✓ Establish storage and transportation infrastructure
- ✓ Provide sorting infrastructures to effectively separate e-waste from other waste
- ✓ Collection mechanisms for e-waste in terms of packaging, labeling and transportation shall be as per the legislative provision of Waste Management.
- ✓ Collection centers shall store the e-waste after sorting it into various categories for easier access by downstream users as well as to facilitate record keeping on the quantities of various categories of waste.
- ✓ Be responsible to make collection facilities available and accessible taking into account the population density
- ✓ Ensure that no damage is caused to the environment during storage and transportation of e-waste
- ✓ Collection and transport of separated e-waste should be done in such a way that enables reuse and recycling of those components or whole appliances.
- ✓ Sites for storage of 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 of e-waste prior to their treatment should have weatherproof covering for appropriate areas.
- ✓ Maintaining records of the e-waste handled and make such records available for scrutiny by the Ministry of Environment Science & technology or other concerned entity of GoN
- ✓ Filling Annual returns to the MOEST or other concerned authority entity on or before the deadline as specified by the MOEST

5.7.3 Design and technical specifications of e-waste collection points

A Licensed Collection Facility (LCF) shall:

- ✓ Enable household e-waste to be collected from the LCF in streams of either large household appliances other than cooling appliances and display equipment containing CRTs amongst other waste.
- ✓ Be accessible to members of the public.
- ✓ Have signs to direct members of the public to deposit e-waste to the relevant container or area prevent mixing of e-waste with other waste or allow contamination with hazardous material
- ✓ State the maximum quantity that can be deposited on the site.
- ✓ Have impermeable surface with a sealed drainage and impermeable drains which do not leak to ensure that all liquids are in a sealed sump except where they may be lawfully discharged.
- ✓ Have a weatherproof cover
- ✓ Have a Collection Point and Storage Facility adequate to serve the geographical area and the volume of separated e-waste tonnage captured.
- ✓ Have adequate collection points and storage facilities to serve the population size.
- ✓ Be located where it meets the requirements of the collection option identified (i.e. retailer take back collection centre, municipal collection centre or other) and able to handle the number of trucks or trailers of different capacities required to transport the e-waste.

5.7.4 Responsibilities of Consumers or Bulk Consumers

- The consumers or bulk consumers shall ensure that e-waste generated by them is channelized to authorized collection center(s) or registered dismantler(s) or

recycler(s) or is returned to the pick up or take back services provided by the producers;

- Separate e-waste from other wastes to facilitate collection, treatment and recycling
- The bulk consumers shall maintain the records of e-waste generated by them in the specified format and make such records available for scrutiny by the MOEST or other designated agency
- Be aware on their role to reuse, recycling , disposal and other forms of WEEE as applicable and also the potential effects on the environment and human health as a result of the presence of hazardous substances un the EEE.
- Be responsible for following recommended disposal methods or procedures especially dates of expiry or end of usage period of the product

5.7.5 Responsibilities of Dismantlers

Every Dismantler shall:

- ✓ Obtain necessary authorization and registration from the MOEST or designed concerned Authority of GoN
- ✓ Ensure that the dismantling processes do not have any adverse effect on the health and environment
- ✓ Ensure that no damage is caused to the environment during storage and transportation of e-waste
- ✓ Ensure that the facility and dismantling processes are in compliance with the standards or guidelines published/specified by the MOEST from time to time
- ✓ Ensure that the dismantled e-waste are segregated and sent to the registered recycling facilities for recovery materials

- ✓ Ensure that the non-recoverable/non-recyclable components are sent to the authorized treatment storage and disposal plants/facilities
- ✓ Maintaining records of the e-waste handled and make such records available for scrutiny by the Ministry of Environment Science & technology or other designated entity of GoN
- ✓ File a return to the MOEST or other concerned designated entity on or before the deadline specified by the GoN in each and every financial year
- ✓ Not process the e-waste for recovery or refining of materials unless he is registered as recycler from the concerned agency of GoN

5.7. 6 Responsibilities of recyclers

Recyclers need to:

- ✓ Obtain necessary authorization from the concerned agency of GoN
- ✓ Ensure that the recycling facility and processes are in compliance with the norms and standards
- ✓ Establish recycling infrastructure and environmentally sound technologies to manage
 - ✓ electrical and electronic waste
- ✓ An integrated e-waste recycling facility should opt for the Best Available Technologies (BAT) and provide the state of art facility complying with all the environmental laws in terms of emissions, effluents, noise, waste treatment and disposal amongst others
- ✓ Ensure that dismantling is done in an environmentally safe manner.
- ✓ Provide recycling processes to be approved and authorized by MOEST or other concerned Entity of GoN

- ✓ Ensure that revenue generated through sales of the materials recovered will support the administrative, plant and machinery and other overheads
- ✓ Make the records of the recycling process /materials to the MOEST or concerned authority.
- ✓ Make ensure that the residue generated thereof is disposed of in a hazardous waste treatment facility
- ✓ File annual returns to the MOEST as the case may be on or before a deadline following the financial fiscal year specified by the GoN

5.7.7 Roles of Refurbishers

The refurbisher extends the functional life of equipment and feeds it into the second-hand market. Refurbishers need to:

- ✓ Ensure unusable material should go to a licensed disposer
- ✓ Ensure waste plucked out of the equipment will go to the recycler
- ✓ Provide incentives to the consumer to donate used devices

5.7.8 Roles of Transporters

Transporters need to:

- ✓ Ensure e-waste is properly stored
- ✓ Ensure vehicles transporting e-waste obtain a waste transport license from MEST.
- ✓ Ensure e-waste is disposed in licensed dumping sites

5.8 Procedure for Seeking Authorization and registration for e-waste Handling

- 1) Every producer of EEE listed in Annex-3 and 4, collection centre, dismantler, and recycler of e-waste shall obtain necessary authorization from the Concerned Authority of GoN/MOEST as the case may be.
- 2) Every producer of EEE listed in Annex-3 and 4, collection centre, dismantler, and recycler of e-waste shall make an application, within a period of six months starting from the date of commencement of these Directives to the concerned Authority of GoN/MOEST for grant authorization.
- 3) On receipt of the complete application in all respects for the authorization, the concerned Authority of the GoN/MOEST 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 the period of 90 days an authorization 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 Concerned Authority of GoN/MOEST 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 a format as specified by the MOEST, and prepare and submit the MOEST, an annual return on or before the deadline specified by the MOEST following the fiscal year to which that return relates.
- 6) An application for the renewable of an authorization shall be made before 90 days of its expiry and the MOEST 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 Regulation made under the conditions specified in the authorization

- 7) Every producer of EEE, collection centre, dismantler, and recycler of e-waste shall take all steps, wherever required, to comply with conditions specified in the authorization.
- 8) The MoEST shall maintain record/database containing particulars of conditions imposed under these directives for environmentally sound management.

5.9 Power to suspend or cancel an Authorization

1) The MOEST 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 directives for such period as it considers necessary in the public interest.

2) Upon suspension or cancellation of the Authorization, the MOEST 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

5.10 Procedure for Registration with MOEST

- 1) Every dismantler or recycler of e-waste shall make an application within 6 months starting from the date of commencement of these directives in the format specified by the MOEST accompanied with the related documents for the grant or renewable of registration.
- 2) The MOEST , on being satisfied that the application is complete in all respects and that the applicant is utilizing environmentally sound technologies and possesses 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 MOEST shall make decision on the application for registration within a period of 90 days from the date of receipt of such application complete in all respects.
- 4) The registration granted under these directives shall be valid initially for 2 years and thereafter for a period of maximum five years on subsequent renewals from the date of issue, unless the operation is discontinued by the unit or registration suspended or cancelled by the MOEST.
- 5) The MOEST may after giving reasonable opportunity of being heard to the applicant, by order, refuse to grant or renew.
- 6) The MOEST may cancel or suspend a registration granted under these directives, if it has reasons to believe that the registered recyclers has failed to comply with any of the conditions of registration, or provisions of Act or rules made there under, after giving an opportunity to the recycler to be heard and after recording the reasons therefore.
- 7) The dismantlers or recycler shall maintain record of the e-waste purchased and processed and shall file annual return of its activities to the MOEST each and every year within the deadline specified by the MOEST.
- 8) The MOEST may issue norms and standards in connection with the performance for recycling process from time to time.

5.11 Procedures for Storage of E-waste

- 1) Every producer, collection center, dismantler, or recycler may store the e-waste for a period not exceeding 6 months and shall maintain record of collection, sale, transfer, storage and segregation of wastes.

- 2) Whatever is mentioned in clause (1) the MOEST may extend the said period up to 1 year in special cases which may include specific storage for development of a process for its recycling or reuse.

5.12 The associated Features of Storage Areas

The associated Features of Storage Areas should have the following features:

- ✓ The location can be within the facility (on site) or outside the facility (off site).
- ✓ It should be well covered to store waste until it is recycled or treated.
- ✓ The covering should be weatherproof to minimize the contamination of clean surface and rain waters. It will also facilitate the reuse of whole appliances and components intended for recycling and to assist in the containment of hazardous materials and fluids.
- ✓ The type of weatherproof covering required will depend on the types and quantities of waste and the storage and treatment activities undertaken.
- ✓ E-waste items should be separated and kept in appropriate well marked containers.
- ✓ The storage area should have impermeable surfaces and a sealed drainage system. This will ensure that no liquid will run off the pavement and all liquids entering the system are collected in a sealed sump.
- ✓ Spillage collection facilities should be provided. They should include the impermeable pavement and sealed drainage system as the primary means of containment.
- ✓ An appropriate storage site should be provided for disassembled spare parts (e.g. motors and compressors) that contain oil or other types of fluids. They should be stored in containers that are secured that will not allow oil and other fluids to escape with an impermeable surface and a sealed drainage system.

- ✓ Components and residues arising from the treatment of e-waste should be contained for disposal or recovery. If they contain hazardous substances they should be stored on impermeable surfaces and in appropriate containers or bays with weatherproof covering.
- ✓ Containers should be clearly labeled to identify their contents and must be secure from liquids and rainwater seepage.
- ✓ Components should be segregated having regard to their eventual destinations and the compatibility of the component types.
- ✓ Batteries should be handled and stored with a clear knowledge of their potential fire risk.

5.13 Production of these of Hazardous substances in the manufacture of EEE

5.13.1 Reduction in the use of hazardous materials in the manufacture of EEE

- 1) Every producer of EEE listed in Annex-3 and 4 shall ensure that, new EEE does not contain Lead, Mercury, Cadmium, Hexavalent Chromium, Polybrominated biphenyls or Polybrominateddiphenyl ethers provided that a maximum concentration value of 0.1% by weight in homogeneous materials for lead, mercury, hexavalent Chromium, Polybrominated biphenyls or Polybrominateddiphenyl ethers and of 0.01% by weight in homogeneous materials for cadmium shall be permitted.
- 2) The detailed information on the constituents of the EEE shall be provided in the product information booklet in the event of such reduction in the hazardous materials.
- 3) Imports or placement in the market for new EEE shall be permitted only for those which are compliant with the clause 1.

- 4) Manufacture and supply of EEE used for security/defense and other strategic applications shall be excluded from the provisions of clause 1.
- 5) Such reduction in the use of hazardous substances in manufactured or imported EEE shall be achieved within a period of 2 yrs from the date of commencement of these directives.

5.13.2 Accident Reporting and follow up

The producer, transporter, dismantler, or recycler shall immediately report to the MOEST if any accident occurs in associated with the processing or transportation of e-waste.

5.13.3 Prescription of additional Norms and Standards

The MOEST may prescribe the additional procedures/standards relating to the collection, storage, transportation, segregation, refurbishment, dismantling, recycling and disposal of e-waste. The associated stakeholders are liable to comply such additional norms and standards relating with the e-waste

5.13.4 Functions and Duties of the MOEST

The MOEST has the following functions and duties in relation with the e-waste handling and management:

- ✓ Coordination with the related agencies/ministries/Local Authority in relation with the handling and management of e-waste
- ✓ Grant and renewal of authorization

- ✓ Registration of Recyclers of e-waste
- ✓ Monitoring and Enforcement of compliance of authorization and registration conditions
- ✓ Action against violations of rules
- ✓ Preparation of Guidelines for environmentally sound management of e-waste
- ✓ Conduct assessment of e-waste generation and processing
- ✓ Determine standards and specifications for processing and recycling e-waste
- ✓ Documentation, compilation of data on e-waste
- ✓ Conduct training and awareness program
- ✓ Incentives and certification for green design/products
- ✓ Any other e-waste related appropriate function

5.13.5 Environmental Impact Assessment (EIA)/Initial Environmental Examination (IEE) for Waste Management

It is necessary to carry out EIA or IEE as applicable for e-waste management by the concerned stakeholders as below:

I. e-Waste management activities to the undertake the objective of providing services to a population of more than Ten Thousand.

II. Following activities relating to waste emitted from houses and residential areas: -

(a) Filling of land with more than One Thousand tons of e-waste per year.

(b) Selecting, picking, disposing and recycling wastes through chemical, mechanical or biological techniques' in an area spread over more than Two hectares.

(c) Burying of e-waste emitted from an urban area with a population of at least Ten Thousand.

III. Following construction activities relating to hazardous waste of the following nature in any scale:-

- (a) Construction of e-waste plant.
- (b) Construction of e-waste recovery plant.
- (c) Constructing of a site for filling accumulating or burying e-waste.
- (d) Construction of a site to store the e-waste.
- (e) Construction of a e-waste treatment facility.

IV. Following activities relating to lethal waste:-

- (a) Emission and management of any radio- active Substance with a half age exceeding Twenty Five years.
- (b) Emission and management of any lethal chemical with Thirty lethal dose.
- (c) Any activating relating to one hectors or more of land and energy for the purpose of incinerating or recycling any lethal Substance

5.13.6 Penalties

The penalties applicable to infringements of the national provisions shall be defined well and the all necessary measures to ensure the lawful implementations shall be taken into account. Effective, proportionate and dissuasive penalty provisions are to be imposed on natural and legal persons responsible for waste management, where they infringe the provisions of these rules.

Annexes

Annex-1

Questionnaires on Assessment of E-Waste Management in Nepal

Electronic items or products being heavily used to facilitate and enhance the quality of life of the people by increasing comfort and productivity are being exponentially grown both in terms of in production and usage. E-waste is a generic term encompassing various forms of electronic and electrical equipment (EEE) which are old, end-of-life electronic appliances and which have ceased to be of any value to their owners. It is needed to consider e-waste since e-waste is hazardous in nature. Improper disposal of e-waste can result in environmental and health damage. E-waste can also be valuable as it contains valuable reusable materials through recycling/treatment. The e-waste is increasing at a very fat rate. Nepal Telecommunication intends to study on the e-waste statistics and formulate national regulatory framework for effective and efficient e-waste management. In this connection NTA seeks your valuable feedback on the following questionnaires:

A. Introduction

1. Company Name:
2. Type of Service Provider:
3. Focal Point of Contact (Name, email, Tel):
4. Telecom technologies being deployed:
5. Type of Equipment being used (e.g GSM, CDMA, 3G, WiFi, Router, Microwave, Optical fiber, battery, Mobile Phone, VSAT):

B. Involvement in Electrical/Electronic Waste Generation

6. How long have you been involved in telecom business?

2- 5 yrs 6 - 10 yrs 11 - 15 yrs 16 - 20yrs above 20yrs

7. Please quantify to what extent/how much telecom/ICT equipment you are importing annually? Please provide the data for last 5 years if applicable.

8. How much e-waste you are generating in your organization each year. Please provide the statistics.

9. Are you aware of any government regulation on e-waste management?

10. Do you have rules guiding your e-waste management activities in your organization?

Yes No

If yes, i) Are the rules in compliance with government regulation for waste management? Yes No Others (please specify).....

ii) How effectively are the rules enforced? Strongly Fairly Not enforced

11. What type of Telecom/ICT equipment/component do you import?

12. Indicate the volume of import per year for each product/component

Country of Import? European Union USA China India others (please specify)

Mode of Importation: Container Trucks Buses

Route of Importation: Sea port Airport Land Border

13. Do you import any second- hand product/component(s)?

Yes No

If yes, which product(s)/component(s)?

From which country? European Union USA others (please specify).....

14. Do you regard the unrepairable and unserviceable items as waste? Yes
No

If yes, how do you manage the waste/unserviceable items?

Storing in open field

Dump in designated places/refuse dump

Sell to recycler/ by tender

Dump in any available place(s)

Dump in River

Burning/incineration

Manufacturers

Others (please specify) e.g. Donation/export

C. Environmental Concerns

15. Are you concerned about your environment?

Not concerned

Barely concerned

Concerned

Very concerned

16. Do you know that some components of electronic devices contain toxic/hazardous materials?

Yes

No

If yes, are you aware that these toxic/hazardous materials require special treatment for environmentally sound disposal? Yes No

17. Does the disposal/treatment method in use for electronic waste have any impact on the environment?

D. Modalities and Responsibilities

18. What type of institutional control mechanism will be suitable for effective implementation/regulation of e-waste in Nepal? Please elaborate indicating the concerned Authority/Agency.

19. How do you think on formal practices to be taken into account relating to Transportation, collection, sorting, accident reporting, recycling and any other issues related to e-Waste management in Nepal?

20. How do you think the role and responsibilities of the producers/manufactures of electronic equipments for management of e-waste?

21. How do you think on charging certain amount on each electronic/telecom/ICT product associated to import from the manufactures and deposit of the amount in E-waste Management Fund (applicable for e-waste management activities e.g. collection or recycle or treatment)

22. How do you think the role and responsibilities of telecom operators for e-waste management in Nepal?

23. How do you think the role and responsibilities of consumers for e-waste management in Nepal?

24. Please any other view relating to the e-waste management in Nepal.

Environment Protection Council

वातावरण संरक्षण सम्बन्धी विषयमा नेपाल सरकारलाई नीतिगत मार्ग दर्शन र राय सल्लाह दिन तथा विभिन्न निकायहरु बीच समन्वय समेत गर्नको लागि वातावरण संरक्षण ऐन, २०५३ को दफा १४ बमोजिम वातावरण संरक्षण परिषदको गठन भएको छ । यस परिषदको संरचना निम्नानुसारको छ:

- क. प्रधानमन्त्री, अध्यक्ष
- ख. माननीय मन्त्री विज्ञान, प्रविधि तथा वातावरण मन्त्रालय, उपाध्यक्ष
- ग. माननीय मन्त्री अर्थ मन्त्रालय, सदस्य
- घ. माननीय मन्त्री परराष्ट्र मन्त्रालय, सदस्य
- ङ. माननीय मन्त्री गृह मन्त्रालय, सदस्य
- च. माननीय मन्त्री उर्जा मन्त्रालय, सदस्य
- छ. माननीय मन्त्री संधीय मामिला तथा स्थानिय विकास मन्त्रालय, सदस्य
- ज. माननीय मन्त्री स्वास्थ्य तथा जनसंख्या मन्त्रालय, सदस्य
- झ. माननीय मन्त्री उद्योग मन्त्रालय, सदस्य
- ञ. माननीय मन्त्री वन तथा भू-संरक्षण मन्त्रालय, सदस्य
- ट. माननीय मन्त्री भूमीसुधार तथा व्यवस्था मन्त्रालय, सदस्य
- ठ. उपाध्यक्ष, राष्ट्रिय योजना आयोग, सदस्य
- ड. सभापति, संसदिय समिति (वातावरण हेर्ने) व्यवस्थापिका संसद, सदस्य
- ढ. मुख्य सचिव, प्रधानमन्त्री तथा मन्त्रिपरिषदको कार्यालय, सदस्य
- ण. वातावरणको क्षेत्रमा उल्लेखनीय योगदान पुर्याएका व्यक्तिहरुमध्ये कम्तीमा दुई जना महिला सहित नेपाल सरकारबाट मनोनीत सात जना, सदस्य
- त. संविधान सभामा प्रतिनिधित्व गर्ने राजनितिक दलहरुबाट एक एक जना प्रतिनिधि, सदस्य
- थ. सचिव, विज्ञान, प्रविधि तथा वातावरण मन्त्रालय, सदस्य सचिव

माथि प्रकरण (ण) मा उल्लेखित सदस्यहरुको पदावधि बढीमा दुई वर्षको रहेको छ ।

वातावरण संरक्षण परिषदको बैठक वर्षमा कम्तीमा एक पटक बस्ने व्यवस्था रहेको छ । यस परिषदको बैठकमा वातावरणसंग सम्बन्धित नीतिगत विषयहरु छलफलको लागि पेश गर्ने व्यवस्था रहेको छ ।

S. N.	Description	057/58		058/59		059/60		060/61		061/62		062/63		Total	
		Qty	Amt (000)	Qty	Amt (000)	Qty	Amt (000)	Qty	Amt (000)	Qty	Amt (000)	Qty	Amt(000)	Qty	Amt (000)
1	AC Parts	0	0	6740	35541	2318	956	8826	35197	51262	18619	6325	104846	75471	195159
2	Adapter	0	0	0	0	0	0	1409299	5151	22125024	14176	323271	81273	23857594	100600
3	Air Conditioner	5737	89852	44896	113479	52957	115767	7262	112589	11054	73788	45214	349644	167120	855119
4	Air cooler											3631	9434	3631	9434
5	Alarm parts											365	310	365	310
6	Amplifier											65662	34680	65662	34680
7	Arial and reflector											91114	951463	91114	951463
8	Binocular											189	109109	189	109109
9	Calculator	1455654	58237	1521912	61667	1269276	66871	1617058	75110	3279861	109519	887715	39397	10031476	410801
10	Camera and projector parts											1052	198	1052	198
11	Camera film											551	11897	551	11897
12	Camera photo											3322406	55335	3322406	55335
13	Camera tube, photo converter											20362	7007	20362	7007
14	Coffee maker											4789	2699	4789	2699
15	Computer	37073	508072	26526	599353	20777	344922	46566	442506	25238	386564	216713	2066805	372893	4348222
16	Computer Accessories	7533276	2277159	1219875	846225	851538	735117	1325175	588407	3284255	440723	29496	273914	14243615	5161545
17	Computer Monitor	0	0	22546	141231	3035	16065	73310	165832	46828	136982			145719	460110
18	Electric alarm											18867	40474	18867	40474
19	Electric bulb, board, Accessories	8571337	191937	15437376	138508	27525505	182900	8074565	140198	13655080	308330			73263863	961873
20	Electric capacitor											101727	15080	101727	15080
21	Electric circuit											8718	22374	8718	22374
22	Electric circuit board											214	50357	214	50357
23	Electric conductor											208019	29741	208019	29741
24	Electric resistor											182686	1471	182686	1471
25	Electric semiconductor											40884	42593	40884	42593
26	Electric transformer											64926	31286	64926	31286
27	Electric tube light											2533958	45642	2533958	45642
28	Electric tube light and bulb parts											6405	672	6405	672
29	Emergency Light	0	0	0	0	0	0	61952	9619	0	0			61952	9619
30	Fan	23059	10518	394745	54518	212016	30169	23992	6306	189926	93766			843738	195277
31	Fax Machine	441043	325381	39454	32174	75535	1412760	11604	12889	5360	21823	2526	15833	575522	1820860
32	Film processor and developer											366	41075	366	41075
33	Floppy disk											14364	2325	14364	2325
34	Hard disk											383993	34929	383993	34929
35	Headphone											357386	4923	357386	4923
36	Inverter											7095	30368	7095	30368
37	Iron (cloth press)											121834	18059	121834	18059
38	Machinery quality test tools											233544	54147	233544	54147
39	Metal detector siren											1623	1538	1623	1538
40	Microphone											9666	33293	9666	33293
41	Microwave											163882	135592	163882	135592
42	Pager, Mobile, Wireless Phone	52399	21074	2785	6871	952	15827	0	0	26208	90961	28661	211858	111005	346591
43	Photo develop machine											95	1380	95	1380
44	Photo voltage module											7560	459750	7560	459750
45	Photo wash machine											43377	17523	43377	17523
46	Photocopy Machine	1862	96724	9263	91533	6066	79676	2402	82638	2597	79798	28858	240091	51048	670460
47	Photocopy Machine Parts	2392	11708	14627	25618	34028	25255	70464	26461	38215	11659			159726	100701
48	Printed circuit											214637	2838	214637	2838

Annex -3: Imports of Electronic Products

Annex 4

Statistical data of electronic commodities FY 2064/65 to 2066/67

S. N.	Description	057/58		058/59		059/60		060/61		061/62		062/63		Total	
		Qty	Amt (000)	Qty	Amt (000)	Qty	Amt (000)	Qty	Amt (000)	Qty	Amt (000)	Qty	Amt(000)	Qty	Amt (000)
49	Printer	59136	103864	139450	197912	75412	99910	12854	68031	52003	127005			338855	596722
50	Projector	100	2988	1772	33031	732	21430	2483	87087	1549	20336	1174	94086	7810	258958
51	Projector Parts	36	9	0	0	1110	961	1255	4009	200	2093			2601	7072
52	Radio											1088146	337340	1088146	337340
53	Radio parts											901186	34819	901186	34819
54	Radio, cassette player											21054	4114	21054	4114
55	Radio, cassette player											658197	89840	658197	89840
56	Radio, cassette, video parts											72111	15741	72111	15741
57	Refrigerator	32176	307101	32251	296548	41335	315052	30597	261005	17292	143881	4941	531404	158592	1854991
58	Refrigerator Parts	0	0	19800	1052	107391	4082	31472	2397	35324	8352	1666	430	195653	16313
59	Remote control											64912	112360	64912	112360
60	Satellite receiver											5865	3088	5865	3088
61	Speaker	61833	13146	96162	28199	388504	46050	289655	22793	768060	126893	823895	33902	2428109	270983
62	Stabilizer	299821	10257	56113	16052	108846	6481	15039	10712	27899	7681	464586	11114	972304	62297
63	Stabilizer Parts	0	0	675696	4470	1174344	3824	121411	3686	353415	5459			2324866	17439
64	Survey Equipment	13699	19819	37971	29713	15510	20878	17194	17566	0	0			84374	87976
65	Tape recorder											129081	9505	129081	9505
66	Telephone camera											2023	12974	2023	12974
67	Telephone Equipment	16754340	655618	477690	403119	15745333	491434	1500973	973995	1301300	2004106	444639	594799	36224275	5123071
68	Telephone parts											356092	1455971	356092	1455971
69	Telephone Set	287285	88051	321558	201840	335920	101607	409910	136712	1047654	213176	251145	3249605	2653472	3990991
70	Toaster machine											3319	2755	3319	2755
71	Transformer	4789437	268833	728872	123720	647726	141266	27421	69190	52602	414478			6246058	1017487
72	Transformer Parts	423276	4571	750894	2629	522493	8024	0	0	12237917	60192	245908	181223	14180488	256639
73	Transmeter	0	0	0	0	0	0	183	836	959	163361			1142	164197
74	TV	65316	317056	65134	319486	71798	487685	109194	419344	145577	571524	245908	181223	702927	2296318
75	TV, Radio Parts	1143839	472756	1339262	379722	4302153	558426	1405565	467949	1130021	455561	323607	152395	9644447	2486809
76	UPS	206433	31030	354911	74687	173293	54700	179392	99372	281818	198355	79338	155167	1275185	613311
77	Vacuum Cleaner	8768	22712	12077	27862	15270	30136	7273	12726	22569	29031	24652	43502	90609	165969
78	VCD, Cassette Player, Radio	1913518	454922	2676774	987705	2030253	370882	6975869	316353	2697242	659589	101755	206257	16395411	2995708
79	Video Camera	0	0	10314	25240	2	60	3165	17640	8585	29296	7774	54486	29840	126722
80	Video project											6266	2180	6266	2180
81	VSAT Equipment	0	0	0	0	110	25004	2	458	0	0			112	25462
82	Walkie-talkie											16413	1615483	16413	1615483
83	Walkman											19596	2314	19596	2314
84	Washing Machine	1946	23771	1947	18934	4016	40652	825	8357	6901	40584			15635	132298
85	Washing Machine Parts	0	0	0	0	0	0	5792	16212	1068	739			3338691	48900
86	Watch	4795370	239095	4090039	150741	1355421	169588	135065313	184429	4787972	158454	15115967	135409	165210082	1037716
87	Watch Parts	7816911	121997	9218861	168048	15041724	67411	7600825	37683	18395194	121161	3331831	31949	61405346	548249
88	Wireless phone CDMA											4144	32615	4144	32615
89	X-ray Machine											646025	175529	646025	175529
	Total		3461156		2022696		2905527		1593804		1604290		4579360		16166833

Source: Compiled from Data of Department of customs

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Questionnaire

Nepal Telecommunications Authority (NTA) would like to request all the concerned stakeholders, including individuals to provide feedback/comments on this Consultation Document on Regulatory Framework for E-wastes management in Nepal.

1. This consultation document identifies different aspects of E-waste management. Provide your feedback on the proposed
 - Strategies for handling the e-waste
 - Classification of e-waste products
 - Stakeholders' responsibilities
 - Licensing for e-waste Managing entities
 - Regulation for different aspects of e-waste management
 - Reduction of hazardous materials in the manufacture of EEE
2. State your comments and/or suggestions on the proposed Roles and Responsibilities of Manufacturers, Collectors, Consumers/Bulk Consumers, Dismantlers, Recyclers, Refurbishers, Transporters, & MOPE, in relation to e-waste management in Nepal.
3. This document identifies procedure for e-waste handling actions in relation to registration and authorization. Do you agree on the proposed registration & Authorization procedure? Elaborate your answer
4. This document identifies specific requirement in relation to production, collection, recycling, dismantling, transportation, and storage in connection with the e-waste management in Nepal? Do you agree on the proposed requirements/specification? Elaborate your response.
5. Provide any other feedback and comments on the proposed Regulatory Framework for E-waste Management in Nepal.