E-Waste Management Plan

Bangladesh Weather and Climate Services Regional Project

BWCSRP

Bangladesh Meteorological Department (BMD)
Bangladesh Water Development Board (BWDB)
Department of Agricultural Extension (DAE)

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1. Introduction of E-Waste: E-waste is among the most complex type of wastes. It contains toxic as well as scarce and valuable materials, and its amounts are growing worldwide. No or improper treatment of electrical and electronic equipment (EEE) at end-of-life (EoL) results in pollution and resource loses. Additionally, illegal exports of e-waste from industrialized countries to emerging market and developing countries cause severe health and environmental effects. Legislation related to e-waste provides a certain framework, but does not sufficiently enforce appropriate collection, transport, treatment, and disposal of e-waste and components, fractions and materials thereof, and it cannot stop or at least curtail these illegal exports. Guidelines are hence necessary to improve the quality of EoL operations along the EoL chain of e-waste.

E-waste is one of the most complex wastes to treat. It contains almost all elements of the periodic table of elements. Some of them are well known as pollutants like lead, cadmium or mercury, others as valuable and scarce resources like gold, silver, copper and palladium. Adequate treatment at the end-of-life (EoL) of electrical and electronic equipment (EEE) is therefore crucial to avoid pollution on the one hand, and to save valuable and scarce resources on the other hand. Adequate treatment of e-waste needs knowhow to achieve high recycling rates from this highly complex waste at low environmental impact and at reasonable cost. This needs the optimization and cooperation of all actors in the EoL chain of EEE from collection down to reuse, recycling and disposal. Things are working somehow, but there are serious problems along the EoL chain. These processes and operations may be applied in order to achieve the minimum recovery and recycling targets,

The Community programmer of policy and action in relation to the environment and sustainable development (Fifth Environmental Action Programmed) stated that the achievement of sustainable development calls for significant changes in current patterns of development, production, consumption and behavior and advocates, inter alia, the reduction of wasteful consumption of natural resources and the prevention of pollution. It mentioned waste electrical and electronic equipment (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.

It may be difficult to achieve and to prove an environmentally sound treatment of e-waste. Finally, regardless of any illegal exports of e-waste from industrialized countries, the amounts of domestic e-waste are growing in emerging market and developing countries. These countries are facing problems to adequately organize and conduct the collection and sound handling and treatment of this e-waste. Besides necessary transfer of knowledge and of technology, it might become necessary to transport and treat e-waste, components or fractions thereof from developing and emerging market countries to industrialized countries for treatment and ship back materials or fractions thereof to the countries of origin. Such exchanges, as long as possible and in line with international regulations, cannot be tolerated if the proper handling and treatment of e-waste, components and fractions thereof cannot be guaranteed. These guidelines must be a base to audit and prove compliance of all operators in the EoL chain in order to achieve a trustworthy and high level operational EoL network for e-waste. Objectives Any standard or guideline related to e-waste should cover the whole end-of-life.

Several public policy advocates apply the term "e-waste "broadly to all surplus electronics. This paper critically discusses the present status of management of e-waste of Bangladesh

and necessary steps to be taken in considering e-waste management regulations to make a sustainable-waste management system.

With the rapid development of communication and information technologies for the last few decades, the production of electrical instruments has increased. At the same time fast improvement of present technologies and intense marketing are engendering uncontrolled and unnecessary replacement of electrical instrument. Every year, 20 to 50 million tons of electrical and electronic equipment waste ("e-waste") are generated world-wide, which are sure to bring serious risks to human health and the environment, if not properly treated. E-waste usually contains hazardous materials such as lead, mercury, and hexavalent chromium which is highly hazardous for the environment. Electronics have been cited as a leading source of mercury in municipal waste. There is a general lack of awareness by Radar, Solar panel, Battery, Charger, Regulator, Water level gauge, Cables, Automatic rain gauge and computer users and the public in general about the toxins contained in Information and Communication Technology (ICT) components, and the associated risks of contamination of air, water and soil caused by land filling and incineration of technology equipment at the end of its life. Since Bangladesh is also in the stream of rapid technological advancement, it is seldom to take necessary steps to avoid the future jeopardized situation because of e-waste. This paper represents a case study of the present e-waste conditions and different steps undertaken by Bangladesh government to take care the upcoming problem. The study also shows the informal recycling of e-waste in Bangladesh which has both good and bad effect on environment due to illiteracy in this field. At the same time, it is alarming that no

inventory has been made to assess the extent of E- waste problem in Bangladesh by govt and the laws are totally immature to face the problem. E-Waste Management Strategies with a number of steps including government, nongovernment and public responsibilities is suggested in this paper to take care the problem efficiently and effectively.

2. Objectives of e-waste management plan of BWCSRP.

The objectives of our 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.

3. Current e-waste of the country practices

In the late 1980s, a tightening of environmental regulations in industrialized countries led to a dramatic rise in the cost of hazardous waste disposal. Searching for cheaper ways to get rid of the-wastes, "toxic traders" began shipping hazardous waste to developing countries and to Eastern Europe. When this activity was revealed, international outrage led to the drafting and adoption.

During its first Decade (1989-1999), the Convention was principally devoted to setting up a framework for controlling the "transboundary" movements of hazardous wastes, that is, the movement of hazardous wastes across international frontiers. It also developed the criteria for "environmentally sound management".

The Control of Transboundary Movements of Hazardous' Wastes and their Disposal is the most comprehensive global environmental agreement on hazardous and other wastes. The aim of convention is to protect human health and the environment against the adverse effects resulting from the generation, management, transboundary movements and disposal of hazardous and other wastes.

4. Current status of the e-waste generation by the project activities.

The People's Republic of Bangladesh is a signatory; and also has accessed to the Basel convention in April 01,1993. The positions of Bangladesh in Hazardous wastes under Basel Convention are follows:

- In the Bangladesh Environment Conservation Act, 1997, hazardous waste has been defined.

- Bangladesh has banned import of all sorts of waste in the Import Policy Order.

- In 1996, Bangladesh has prepared the 'Regulatory Framework on Import-of Hazardous and Toxic materials' through a project funded by ADB.

- Bangladesh organized training programmers on 'Toxic Chemicals and Hazardous Waste' and 'Risk Assessment and Management.

- A draft position paper on use of toxic chemicals and disposal of toxic and hazardous wastes in Bangladesh has also been prepared, which is under process of finalization by national expert team.

- Bangladesh has drafted a National Chemical Profile.

- The Ministry of Environment and Forest has published a manual and other material for the management of Medical Waste.

- The Ministry of Environment and Forest (MOEF) has also developed draft Medical Waste Management Handling Rules, which is going to be approved.

- Apart from this the Ministry developed a model titled "Medical Waste Management through Public Private Partnership Model", under which MOEF provided a training to the Medical Waste Management and Segregation to the medical professionals (Doctor, Nurse, Cleaner, Ward boy) of the public, private and clinics in both Dhaka and Rajshahi City.

5. E-waste policy and regulation

The Government of Bangladesh has approved the Hazardous Waste (e-waste) Management Rules, 2021 under the Bangladesh Environment Conservation Act, 1995 and it is expected to be published in government gazette soon. The old, end of life electronic appliances and devices including computers, laptops, tabs, mobile phones, batteries, television sets, refrigerators, photo copiers. fax machines, air conditioners, washing machine, electronic printers, calculators, chargers, audio-video equipment, various household and kitchen appliances, communication equipment including microwave telecommunication devices etc., generally form electrical and electronic waste (e-waste). The e-waste management rules will help the Department of Environment to bring in all the extended producers of electrical and electronic waste manufacturers nationally under an adequate management system. The rules help determine responsibilities of different categories of waste manufacturers, assemblers, hoarders and recycling companies for their storage and disposal activities. The said rules will enable the Department of Environment to register the e-waste producers, manufacturer, large importer, dismantler, recycler, trader or shopkeeper, hoarder, transporter, repairer, collection center, auctioneer and exporter and thus monitor their activities under the rules. The new rules will be applicable for the categories of electrical and electronic products related wastes like: household appliance, electronic monitoring and control equipment, medical equipment, various automatic machines and IT and telecommunication equipment. The e-waste

management rules will prohibit import of old or used electrical and electronic products except for some exception (for the purposes of research use in the educational institutes having no objection certificate (NOC) from the Department of Environment (DoE).

- Department of Environment hopes that the rules will help reduction and recycling of electrical and electronic wastes in the country. During registration the Department of Environment will approve plans for the amount of e-waste to be collected for dismantling and reusing as extended responsibilities by each of the producer/manufacturer for a period of time.

As the living standards of the people improve and country moves towards rapid urbanization, people's dependence on electrical and electronic goods have been increasing. The electrical and electronic product manufacturers, assembling factories have been producing and bringing a wide range of their products in the market. A lot of electronic and electrical appliances have been imported in the country as well. Unfortunately, not all of the imported or locally manufactured electrical and electronic goods are durable. As a result, electrical and electronic waste generation volume has been increasing in the country. Moreover, with the rapid technology changes people throw away daily a huge amount of electrical and electronic products as waste. A study report of DoE on 8 types of electrical and electronic products of the everyday use in 2018 has revealed that around 4 hundred thousand tons of electrical and electronic wastes are generated in Bangladesh annually. A BUET study report anticipates that the e-waste volumes (limited items) in the country will increase to 4,62 million tons in 2035. If the list is extended for the electronic wastes the annual volume will be significantly high. The published reports suggest that the e-waste generation in Bangladesh has been increasing annually at a rate of 20 per cent. Experts consider that the hazardous substances and chemicals contained in the e-wastes like lead, mercury, chromium, various chemicals and plastic additives may cause threat to human health if people get exposed to them during collection and crude recycling process. The collection of used electrical and electronic products and their partial reuse help limit the volume of wastes. However, a significant part of the e-waste including various hazardous waste are thrown away as solid waste in our environment causing contamination of soil and water bodies. Only approximately 10 per cent of the generated e-wastes are collected and recycled in the country so far.

On the other hand, proper recycling of the e-waste can help extract valuable metal like copper, steel, aluminum, zinc, lead and other precious and non-metal substances from the e-waste. A local company Azizu Recycling and E-waste Ltd. has been collecting e-wastes both from institutional (BTRC, Grameenphone, DELL, Green Line etc.) sources and from the waste collection vendors for last couple of years and recycle them. Approximately 1,000-1,200 tons of e-waste are being recycled annually at the Azizu plant at Fatullah, Naryanganj. Collected e-waste are initially segregated and separated manually or semi-mechanically in the factory. Large aluminum, copper, steel, rubber and plastic segments are separated and sold to various industries as raw materials for their production. On the other hand, small pieces of metals and dust of mixed metals (produced by specialized crusher and separator) from the

electronic microchips and printed circuits boards in the factory are either melted to separate copper or exported (as mixed metal dust) to overseas market as raw materials of precious metal. From the waste metallic cable (usually aluminum cable coated with copper), copper is separated by electrolysis processes in the same factory. So far, Azizu recycling and e-waste Ltd. cannot separate sophisticated precious metal (gold, silver palladium and rear earth minerals etc.) in the factory. But it has the intention to expand the factory and mobilise advanced technology to separate precious metals from the e-waste.

The Hazardous (e-waste) Management Rules, 2021 will compel at least large e-waste producers to systematically store and recycle their wastes. Thus new entrepreneurs may be encouraged to enter into the e-waste recycling business and advance the recycle, reuse and reduce e-waste. Institutional e-waste recycling and re-using business may help mobilize better technology to extract most of the valuable parts of the waste.

For DoE the challenge will remain to list all the electrical and electronic waste producers and their activities. Unless industrial clusters are created to bring all the e-waste generating companies and service providing industries/enterprises in the specific sites, challenges for DoE will be enormous for establishing effective monitoring and implementation of the rules.

The Policy shall address all issues ranging from production and trade to final disposal, including technology transfers for the recycling of electronic waste. Clear regulatory instruments, adequate to control both legal and illegal exports and imports of e-wastes and ensuring their environmentally sound management should be in place. There is also a need to address the loop holes in the prevailing legal frame work to ensure that e - wastes from developed countries are not reaching the country for disposal. The Port and the Custom authorities need to monitor these aspects. The regulations should prohibit the disposal of e-wastes in municipal landfills and encourage owners and generators of e-wastes to properly recycle the-wastes. Manufactures of products must be made financially, physically and legally responsible for their products. Policies and regulations that cover Design for Environment (DfE) and better management of restricted substances may be implemented through measures such as

- specific product take-back obligations for industry

- financial responsibility for actions and schemes

- greater attention to the role of new product design

- material and/or substance bans including stringent restrictions on certain substances

- greater scrutiny of cross-border movements of Electrical and Electronic Products and e-waste

- Increasing public awareness by labeling products as 'environmental hazard'

The key questions about the effectiveness of legislation would include:

- What is to be covered by the term electronic waste?

- Who pays for disposal?

- Is producer responsibility the answer?

- What would be the benefits of voluntary commitments?

- How can sufficient recovery of material be achieved to guarantee recycling firms a reliable and adequate flow of secondary material?

A complete national level inventory, covering all the cities and all the sectors must be initiated.

A public-private participatory forum (E-waste Agency) of decision making and problem resolution in E- waste management must be developed. This could be a Working Group comprising Regulatory Agencies, NGOs, Industry Associations, experts etc. to keep pace with the temporal and spatial changes in structure and content of E-waste. This Working Group can be the feedback providing mechanism to the Government that will periodically review the existing rules, plans and strategies for E-waste management. Mandatory labeling of all computer monitors, television sets and other household/industrial electronic devices may be implemented for declaration of hazardous material contents with a view to identifying environmental hazards and ensuring proper material management and E-waste disposal.

The efforts to improve the situation through regulations, though an important step; are usually only modestly effective because of the lack of enforcement. While there has been some progress made in this direction with the support of agencies, enforcement of regulations is often weak due to lack of resources and underdeveloped legal systems. Penalties for noncompliance and targets for collection or recycling are often used to ensure compliance.

Legal & Regulatory Regime (Present scenario)

- No regulations specifically dealing with E- waste in Bangladesh
- Medical Waste Management Rules, 2008 addresses the-waste management issues for the medical sector including E-waste.
- Government already prepared draft National 3R (Reduce, Reuse & Recycle) Strategy and in that draft e-waste issues were addressed.
- 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.
- We prepared draft solid waste management rules which is now in consultation stage and still time to include E-waste management issues in that rule,
- Import of any kind of waste requires Government permission.

E-waste recycling

Many discarded machines contain usable parts which could be salvaged and combined with other used equipment to create a working unit. It is labor intensive to remove, inspect and test components and then reassemble them into complete working machines. Institutional infrastructures, including e-waste collection, transportation, treatment, storage, recovery and disposal, need to be established, at national and/or regional levels for the environmentally sound management of e-wastes. These facilities should be approved by the regulatory authorities and if required provided with appropriate incentives. Establishment of e-waste collection, exchange and recycling centers should be encouraged in partnership with governments, NGOs and manufacturers.

Environmentally sound recycling of e-waste requires sophisticated technology and processes, which are not only very expensive, but also need specific skills and training for the operation. Proper recycling of complex materials requires the expertise to recognize or determine the presence of hazardous or potentially hazardous constituents as well as desirable constituents (i.e. those with recoverable value), and then be able to apply the company's capabilities and process systems to properly recycle both of these streams. Appropriate air pollution control devices for the fugitive and point source emissions are required. Guidelines are to be developed for environmentally sound recycling of e-wastes. If the Private Sector will come forward to invest in the e-waste projects once they are sure of the returns.

6. BMD, BWDB and DAE should take the following initiatives:

Necessary steps should be taken by Bangladesh Meteorological Department (BMD), Bangladesh Water Development Board (BWDB) Department of Agricultural Extension (DAE)
(i) Should set up regulatory agencies in each district, which are vested with the responsibility of coordinating and consolidating the regulatory functions of the various government authorities regarding hazardous substances.

(ii) Should be responsible for providing an adequate system of laws, controls and administrative procedures for hazardous waste management (Niu and Li 2007). Existing laws concerning e-waste disposal be reviewed and revamped. A comprehensive law that provides e-waste regulation and management and proper disposal of hazardous wastes is required. Such a law should empower the agency to control, supervise and regulate the relevant activities of government departments. Under this law, the agency concerned should:

- Collect basic information on the materials from manufacturers, processors and importers and to maintain an inventory of these materials. The information should include toxicity and potential harmful effects.
- Identify potentially harmful substances and require the industry to test them for adverse health and environmental effects.
- Control risks from manufacture, processing, distribution, use and disposal of electronic wastes.
- Encourage beneficial reuse of "e-Waste" and encouraging business activities that use-waste". Set up programs so as to promote recycling among citizens and businesses. ' '
- Educate e-waste generators on reuse/recycling options

(iii) Must encourage research into the development and standard of hazardous waste management, environmental monitoring and the regulation of hazardous waste-disposal.

(iv) Should enforce strict regulations against dumping e-waste in the country by outsiders. Where the laws are flouted, stringent penalties must be imposed. In particular, custodial sentences should be preferred to paltry fines, which these outsiders/ foreign nationals can pay.

(v) Should enforce strict regulations and heavy fines levied on industries, which do not practice-waste prevention and recovery in the production facilities.

(vi) Polluter pays principle and extended producer responsibility should be adopted.

(vii) Should encourage and support NGOs and other organizations to involve actively in solving the nation's e-waste problems.

(viii) Uncontrolled dumping is an unsatisfactory method for disposal of hazardous waste and should be phased out.

(viii) Should explore opportunities to partner with manufacturers and retailers to provide recycling services.

7. BMD, BWDB and DAE should take the Capacity building, training and awareness programmers for e-waste Enhancement Work

The future of "e-waste management depends not only on the effectiveness of local government, the operator of recycling services, but also on the attitude of citizens, and on the

key role of manufactures and bulk consumers to shape and develop community participation. Lack of civic sense and awareness among city residents will be a major hurdle to keep e-waste out of municipal waste stream. Collaborative campaigns are required to sensitize the users and consumers should pay for recycling of electronic goods. Consumers are to be informed of their role in the system through a labelling requirement for items, Consumers to be educated to buy only necessary products that utilize some of the emerging technologies (i.e. lead-free, halogen-free, recycled plastics and from manufacturers or retailers that will `take-back' their product) to be identified through eco-labeling.

Awareness raising programs and activities on issues related to the environmentally sound management (ESM), health and safety aspects of e-wastes in order to encourage better management practices should be implemented for different target groups. Technical guidelines for the ESM of e-wastes should be developed as soon as possible.

8. Responsibilities of the BMD, BWDB and DAE

- E-wastes should never be disposed with garbage and other household wastes. This should be segregated at the site and sold or donated to various organizations.

- Waste prevention is perhaps more preferred to any other waste management option including recycling. Donating electronics for reuse extends the lives of valuable products and keeps them out of the-waste management system for a longer time. But care should be taken while donating such items i.e. the items should be in working condition.

- Reuse, in addition to being an environmentally preferable alternative, also benefits society. By donating used electronics, schools, non-profit organizations, and lower-income families can afford to use equipment that they otherwise could not afford.

- While buying electronic products opt for those that:
  - are made with fewer toxic constituents
  - use recycled content
  - are energy efficient
  - are designed for easy upgrading or disassembly
  - utilize minimal packaging
  - offer leasing or take back options
  - Have been certified by regulatory authorities. Customers should opt for upgrading their computers or other electronic items to the latest versions rather than buying new equipments.

- NGOs should adopt a participatory approach in management of e-wastes.

9. Conclusion:

There exists an urgent need for a detailed assessment of the current and future scenario including quantification, characteristics, existing disposal practices, environmental impacts etc. Institutional infrastructures, including e-waste collection, transportation, treatment, storage, recovery and disposal, need to be established, at national and/or regional levels for the environmentally sound management of e-wastes. Establishment of e-waste collection, exchange and recycling centers should be encouraged in partnership with private entrepreneurs and manufacturers. `

Model facilities employing environmentally sound technologies and methods for recycling and recovery are to be established. Criteria are to be developed for recovery and disposal of E-wastes. Policy level interventions should include development of e-waste regulation, control of import and export of e-wastes and facilitation in development of infrastructure. An effective take-back program providing incentives for producers to design products that are less wasteful, contain fewer toxic components, and are easier to disassemble, reuse, and recycle may help in reducing the-wastes. It should set targets for collection and reuse/recycling, impose reporting requirements and include enforcement mechanisms and deposit/refund schemes to encourage consumers to return electronic devices for collection and reuse/recycling. End-of life management should be made a priority in the design of new electronic products.

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