

# E-waste Management and Resource Recovery in Vietnam



Nguyen Trung Thang and Duong Thi Phuong Anh

**Abstract** E-waste has become an emerging issue in Vietnam due to the rapid increase of generated volume and its harmful effects. It has been estimated that there are 61,000–113,000 tons of e-waste generated in 2010, mainly from households. Resource recovery of e-waste has brought high profits of valuable metals; however, recycling practices are mainly dismantling for refurbishment or recovery of valuable parts, which is implemented by informal sector in craft villages and caused negative impacts on the environment and human health. E-waste has been treated as hazardous waste and is included in the starting extended producers' responsibility (EPR) system; however, there are still many challenges for a successful implementation. Recommendations have been provided for a better management of e-waste in Vietnam.

**Keywords** E-waste · Recycling · Resource recovery · E-waste management

## 1 Introduction

Like in many developing countries, e-waste has become an emerging issue in Vietnam due to the rapid growth of generated volume of waste from electronic and electric products. The reasons are the increase in population, economic growth, increasing middle-income class, and also fast development of technologies in the last two decades. E-waste has been considered as a resource in Vietnam and almost all e-waste are recycled; however, recycling and treatment are still far from sustainable.

---

N. T. Thang (✉) · D. T. P. Anh  
Institute of Strategy and Policy on Natural Resources and Environment (ISPONRE), 479  
Hoang Quoc Viet Str., Cau Giay, Hanoi, Vietnam  
e-mail: ntthang@isponre.gov.vn

© Springer Nature Singapore Pte Ltd. 2019  
S. K. Ghosh (ed.), *Waste Management and Resource Efficiency*,  
[https://doi.org/10.1007/978-981-10-7290-1\\_67](https://doi.org/10.1007/978-981-10-7290-1_67)

805

## 2 E-waste Generation in Vietnam

E-waste comes from four main sources: households, offices, industry, and imported from abroad as used equipments. A survey by JICA and URENCO in 2007 showed the increase of all types of e-waste, of which mobile phone has the highest rate of growth, almost six times from 2002 to 2006 (Table 1) [5].

H. T. Hai et al. in their research have estimated the amount of e-waste from household as electronic home appliances in Vietnam from 1.8 million units (approximately 61,100 tonnes) to 3.8 million units (113,500 tons) in 2010, and e-waste amount from industry was much smaller than from household [1]. According to the State of Environment Report 2011, Vietnam has 52 electronic and electric producers, which produce printed circuit boards, cathode ray tubes, and assembly electronic devices such as TV, refrigerators, air conditioners, and washing machines, generating wastes such as broken pieces, packages [3]. With regard to e-waste generated from office and import, there have not been any data reported so far.

In general, the amount of e-waste is increasing due to the development of the electronic industry as well as increasing demand for new electronic devices. Prices of electronic products continue to decrease, also designs change constantly making them become more suited to many different people including low-income people, and making the life of electronic devices increasingly shortened. In projection, URENCO has estimated that there will be about 10.6 million pieces of electronic and electric good in 2020 (including 4.85 million TVs, 2.27 million refrigerators, 2.6 million washing machines, and 873 thousand air conditioners) [5]. Similarly, N. D. Quang et al. has also estimated 12.1 million pieces (including 6.5 million TVs, 3.4 million refrigerators, 1.9 million washing machines and 284 thousand air conditioners) in 2020 [4].

Composition of e-waste is very diverse and may contain more than 1,000 different substances. It consists of ferrous and non-ferrous metals, plastics, glass, wood and plywood, printed circuit boards, concrete and ceramics, rubber and other items. Potential for resource recovery from e-waste is high because iron and steel constitute about 50% of the e-waste, followed by 21% of plastic, 13% of non-ferrous metals, and others [5].

**Table 1** Electronic wastes in Vietnam in 2002–2006 (unit: tons/year)

Year	TV	PC	Mobile phone	Refrigerator	Air conditioner	Washing machine
2002	190.445	62.771	80.912	112.402	17.778	184.140
2003	222.977	77.845	86.467	140.916	24.706	214.271
2004	261.542	90.447	103.414	162.262	29.853	249.094
2005	308.076	110.123	472.707	194.570	39.157	287.910
2006	364.684	131.536	505.268	230.856	49.782	327.649

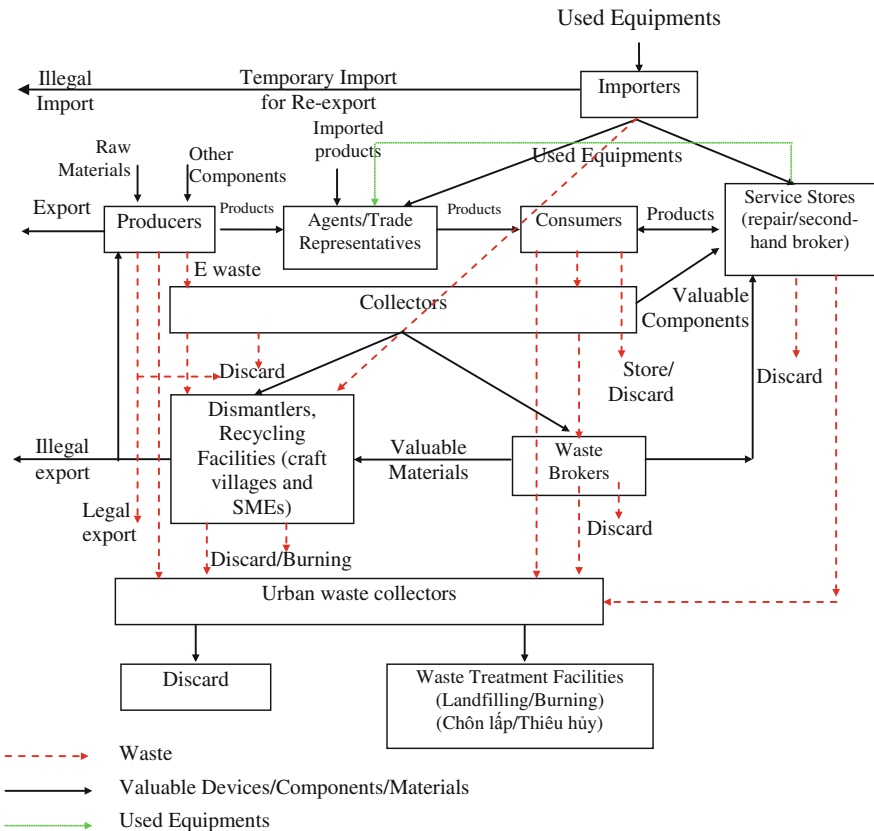
Source URENCO, JICA, 2007

### 3 E-waste Separation, Collection, and Recycling

It has been observed that e-waste has not been controlled in Vietnam; there is no any official e-waste collection and treatment system so far. Most of the e-waste is collected by waste brokers, then transferred to dismantling/refurbishing workshops, which focus mainly on dismantling or refurbishing discarded appliances rather than recycling them (Fig. 1) [2]. E-waste recycling system has been fragmented, uses backward technology, and mainly recovers some metals (Cu, Fe, Al) and plastics [1].

In Vietnam, e-waste has not been sorted at source, but usually sold to and separated by private collectors into several categories: (i) devices that can be reused; (ii) devices that can be dismantled and refurbished; and (iii) devices that can be recycled. Devices or their parts/components that cannot be sold will be discarded with municipal wastes.

The private collectors collect the discarded products from users and other sources, check, and classify them into above categories. Then collectors sell



**Fig. 1** Flow of household electronic equipments and e-waste in Vietnam. *Source* Institute of Environment Science and Technology, 2013 [3]

category (i) and (ii) for the maintenance/refurbishing shops and sell category (iii) for the dismantling facilities. This is a private collection system which is very dynamic and successful. The system has extracted almost valuable parts and materials from e-waste collected directly from the final users and the landfill. Valuable parts are sold to private maintenance system and will be used to repair other damaged appliances to become new goods with poor quality for sale to low-income households. Most valuable materials are manually recycled in the craft villages and the recycling facilities. In these facilities, only some common materials such as iron, copper, aluminum, and plastic can be recycled with outdated technology, rudimentary equipment, and causing serious environmental pollution [3].

## 4 Current Legislations Related to E-waste Management

E-waste has been considered as hazardous waste in Vietnam but not yet managed by a special policy as in other countries. Vietnam has ratified the Basel Convention on March 13, 1995. The *Law on Environment Protection 2014* (LEP 2014) has provisions on retrieval, treatment of discarded products along with regulations on hazardous waste management. Article 87 under LEP 2014 regulated that owners of production, business, service facilities must retrieve and treat discarded products, while consumers have responsibility for bringing the discarded products to the specified disposal point.

*Decree 38/2015/ND-CP dated April 24, 2015, on waste management and scraps* stipulates detailed regulations of hazardous waste management, and the *Circular 36/2015/TT-BTNMT dated June 30, 2015, of Ministry of Natural Resources and Environment* has regulated that discarded electronic equipments and parts belong to the list of hazardous waste.

However, the most important document is the *Decision 16/2015/QĐ-TTg dated January 22, 2015, on retrieval, treatment of discarded products*, which is the EPR system in Vietnam. The decision provides a list of discarded products that must be taken back and treated by producers and importers. In this list, discarded electrical and electronic appliances, such as computers (desktop, laptop); computer screens; CPU (microprocessor of the computer); printers; fax machines; scanners; camera; mobiles; tablets; DVD players; VCD; CD and tape reader types, other disks; photocopiers; televisions; fridges; air conditioners; washing machines, must be applied from July 1, 2016. Manufacturers can directly take back and recycle products by themselves or they can authorize the waste transport, treatment companies to do this. For easier implementation, collection, storage, and transportation of electronic and electrical discarded products do not need to be licensed for hazardous waste management functions but they must meet national technical regulations of collecting, storing, transporting discarded products.

## 5 Challenges for E-waste Management

After the Decision 16/2015/QD-TTg had been issued, a number of businesses have developed plans to implement the take-back system for discarded products. For example, Dien Quang Lamp Production Company has actively developed a network for take back of compact, fluorescent bulbs based on its distribution system, with an initial focus on major cities such as Hanoi and Ho Chi Minh City. Other information technology companies including Apple, Canon, HP, and Sony also together developed a pilot program on retrieval systems of electrical and electronic waste in Vietnam. However, it is observed that until now, the EPR system is still not operated as required. For the time being, the Ministry of Natural Resources and Environment is developing the guiding document of implementing the Decision No. 16/2015/QD-TTg, which is expected to be issued at the end of 2016.

There are number of challenges and issues for implementation of e-waste management in Vietnam. *Firstly, there is a lack of special legislation of e-waste management.* The EPR regulation has been adopted, however, a guidance circular still needs to be issued for this policy implementation. There are lacks of standards and technical specifications of recycled products and safe recycling technologies to be applied. *Secondly, the recycling capacity is still very weak.* Recycling in Vietnam has been implemented by informal sector not only for e-waste but for all material recovery. Formalization of the informal recycling facilities is one of the urgent tasks that need to be implemented. E-waste contains high number of toxic metals such as lead, mercury, cadimi, arsenic and so formal recycling with safe technologies is very important. *Thirdly, awareness and sense of responsibility of consumers, producers, retailers are still very low* not only on EPR implementation but also on environmental protection in general. *Finally, monitoring and reporting mechanism have not been set up* and so is difficult to promote implementation nationwide.

## 6 Conclusions/Recommendations

Vietnam is a developing country that still faces many issues in environmental protection. E-waste management has not been effectively implemented; the waste is not managed by a formal system; treatment/recycling is still implemented by informal sector, causing pollution, and health impacts.

To improve e-waste management, several recommendations of appropriate solutions have been proposed as follows:

*Firstly, to raise awareness of people* about the harm caused by improper waste management, enhancing separation of solid waste at source, increasing the reuse of waste including e-waste. Raising awareness of authorities the about importance of public participation in solid waste management work, ensuring authorities are qualified enough in coordinating the activities, planning, implementation, and to

mobilize the participation of all parties. Raising awareness and responsibility of manufacturers, particularly in taking back and treatment of discarded products as well as in environment protection in general.

*Secondly, to complete policy and legislation on e-waste management* including the policy on EPR, specifically to promulgate the circular guiding implementation of the Decision 16/2015/QĐ-TTg. Develop also the monitoring and reporting system for EPR implementation as well as the standards of recycled products and materials.

*Thirdly, step by step to establish a formal recycling industry for e-waste* through constructing modern recycling facilities and infrastructure for collecting discarded products. Private recycling facilities should be enhanced, which can be contractor of producers/importers.

*Finally, to promote R&D, international cooperation and transfer of technology on e-waste recycling* to improve the recovery of valuable materials, reducing environmental pollution and enhancing the recycling industry development in the country.

## References

1. Hai, H. T., Hung, H. V., Quang, N. D. (2015). *An overview of electronic waste recycling in Viet Nam*. Springer Japan.
2. Institute of Environment Science and Technology, Ha Noi University of Technology, Report on Study of electronic-electric waste management system and proposal of sustainable retrieval model for expired electronic equipments, 2013.
3. MONRE, National State of Environment Report 2011—Solid Waste.
4. Nguyen, D. Q., Yamasue, E., Okumura, H., & Ishihara Keiichi, N. (2009). Use and disposal of large home electronic appliances in Viet Nam. *Journal of Material Cycles and Waste Management*, 11(4), 358–366.
5. Urban Environmental Company Limited (URENCO). (2007). Report on the development of E-waste inventory in Viet Nam.