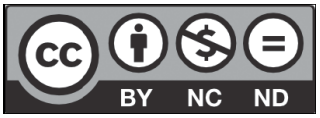
03 June 2014

Solving the E-Waste Problem (Step) White Paper

One Global Definition of E-waste

solving the e-waste problem

ISSN: 2071-3576 (Online)
ISSN: 1999-7965 (In-Print)



Disclaimer

Step White Paper Series

The Purpose of a Step White Paper is to state and explain Step's position on e-waste related issues, to make scientific-based recommendations and to provide guidance to relevant stakeholders and decision makers. Because all Step members endorse the conclusions made, all White Papers reflect a common Step standpoint.

Nevertheless, this White Paper is not an official document developed or endorsed by the Secretariat of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal or the International Telecommunication Union (ITU).

Acknowledgements

We take pleasure in thanking those who have actively contributed to the development of this Step White Paper.

- Adrian, Stephanie (US EPA)
- Choi, Sunghee (UNU)
- Gossart, Cedric (Télécom École de Management)
- Kuehr, Ruediger (UNU)
- Mars, Carol (The Sustainability Consortium)
- McCann, Duncan (WEEE Help)
- Perry, Jonathan (Dell)
- Phippen, Wendy (Philips)
- Pollet, Kris (Cisco)
- Reyes, Laura (Datec Technology)
- Seager, Daniel (Hewlett Packard)
- Shefveland, Mary (Cisco)
- Vandendaelen, Alexis (Umicore)
- Vött, Ulrike (Nokia)
- Wellum, Rebecca (Dell)

Table of Content

List of Tables and Figures

Acronyms

EEE	Electrical and Electronic Equipment
EU	European Union
MSW	Municipal Solid Waste
UNU	United Nations University
US	United States of America
WEEE	Waste Electrical and Electronic Equipment

1 Introduction

The definition of e-waste is essential to Step as an organization as well as its activities and its contributions to the worldwide solution of the e-waste problem. There is global inconsistency in the understanding and application of the term "e-waste" in both legislation and everyday use. This has resulted in many definitions contained within e-waste regulations, policies and guidelines. The intent of this paper is to provide a non-legal definition of the term and clarity about how the term should be used.

E-waste is one of the fastest growing waste streams globally. The UNU ADDRESS project documents that e-waste volume placed on the market since 1990 has grown from 19.5 million tonnes to 57.4 million tonnes in 2010 and is set to more than triple to approximately 75 million tonnes by 2015[1].

E-waste contains hazardous substances that, if treated inappropriately at end-of-life, can damage human health and the environment. It also contains complex valuable materials, such as precious metals which need to be treated properly to effectively recover them with minimal environmental impact.

2 Clarity on EEE

To provide a foundation to support the definition of e-waste, it is necessary to first define electrical and electronic equipment (EEE). The Step definition of EEE is:

"Any household or business item with circuitry or electrical components with power or battery supply.[2]"

This definition of EEE is independent to the definition used to determine the product scope of any e-waste or producer responsibility legislation.

The Step definition of EEE includes both household and business items. Some e-waste legislation differentiate the two as being separate streams and impose differing obligations on producers of household and business products. It is important to note that falling within the accepted definition of EEE is not the same as falling within the scope of a particular national or local e-waste policy.

Within specific e-waste legislation, the scope includes or excludes certain types of EEE. The European Union's WEEE Directive, 2012/19/EU[3], classifies all electrical and electronic items as potentially being in scope, with some specific exceptions such as filament bulbs and large scale fixed installations. In the United States, there is no federal e-waste law; therefore, there is no nationwide legal definition of e-waste scope. There are, however, state laws where the inclusion or exclusion of products varies from state to state. In general, references to "e-waste" in the United States refer to mobile phones, IT equipment and televisions, while other electrical and electronic appliances are mostly regulated as municipal solid[4].

3 Definition of E-waste

The term "e-waste" itself is self-explanatory, in the sense that it is an abbreviation of "electronic waste". A key part of the definition is the word "waste" and what it logically implies – that the item has no further use and is rejected as useless or excess to the owner in its current condition.

The definition of e-waste that has been agreed by Step is:

"E-Waste is a term used to cover items of all types of electrical and electronic equipment (EEE) and its parts that have

[1] J Huisman, Eco-efficiency evaluation of WEEE take-back systems, Waste Electrical and Electronic Equipment (WEEE) Handbook, 93-119, 2012

[2] The Step Initiative, www.step-initiative.org

[3] Directive 2012/19/EU of the European Union and of the council of date on 4 July 2012 published in issue L197 of the Official Journal on 24 July 2012: view file: last accessed on 21 February 2014

[4] http://www.electronicstakeback.com/home/, The Electronics Takeback Coalition, Scope of Products in E-Waste Laws, view file: last accessed on 21 February 2014

been discarded by the owner as waste without the intention of re-use."

It is important to note that the definition includes all types of EEE, as there is no room for regional variance or preference in a global definition; the fact that the item in question meets the definition "*with circuitry or electrical components with power or battery supply*" qualifies it for inclusion. The inclusion of "parts" within the definition refers to parts that have been removed from EEE by disassembly and are electrical or electronic in nature.

The use of the term "discarded" is also central to this definition, meaning to throw away[5] or get rid of as useless[6]. The term implies that the item in question is considered excess or waste by the owner. It is the critical point at which the potential nature of the item changes from a useful product to that of waste.

4 Perceptions of E-waste by the Owner

An area of inconsistency noted by owners or asset controllers (hereafter referred to collectively as "owners") of EEE is the point at which the product becomes waste. This is where the decision of the owner defines if the item in question is e-waste, or if it can be directly re-used by someone else for the same purpose for which the product was originally designed. In the latter, the equipment is not considered waste. The act of determining fully functional product as e-waste by the owner appears to be widespread, which potentially impacts the opportunity for reuse by blurring the suitability of the item for reuse.

This area of inconsistency highlights the inappropriate use of the term "discard", as well as the act of discarding. The word "discard" is defined in the Merriam-Webster dictionary as "to throw (something) away because it is useless or unwanted", and in the Collins English Dictionary as "to get rid of as useless or undesirable".

It is in line with the waste hierarchy (reduce, reuse, recycle) and also environmentally preferable that functional EEE items are not discarded as waste, but rather given an opportunity for reuse either directly by the owner, who may choose to donate or sell the item, or by a specialist organization that may donate or sell the item following a functional test, data wipe, evaluation process or repair.

The act of discarding EEE as e-waste occurs when the owner decides the item is no longer useful to them (due to failure, technical capability, cosmetic condition, age, replacement, organizational policy, depreciation, etc.). The owner usually discards the item to be collected for preparation for reuse (a process involving functionality testing, refurbishment, data wipe or repair) or recycling depending on the condition of the item. The EEE does not need to be non-functional for it to be designated as e-waste by the owner, as it is the owner's opinion or choice to discard as e-waste if they so decide. It is the responsibility of the receiving party to determine how best to maximize the value of the item that they have received. The motivation for directly discarding items for recycling rather than for preparation for reuse may be due to lack of functionality, age, cosmetic condition or business policy and would be broken down into component materials for recycling into raw material. However, large amounts of EEE are still disposed of in household bins going directly to disposal, skipping over the possibility for any reuse or recycling.

There are situations where an owner (often business) has agreed to return an EEE item to a manufacturer, under a service, leasing or trade-in contract, for example. In these and similar situations, this return is not an act of discarding, and, as such, the item is not considered or treated as e-waste.

[5] Discard, Merriam-Webster, www.meriam-webster.com/dictionary/discard: last accessed on 21 February 2014

[6] Discard, Collins, www.collinsdictionary.com/dictionary/english/discard: last accessed on 21 February 2014

Table 1 below shows the impact of discarding between the item either remaining EEE or becoming e-waste and how other processes are dependent on that determination.

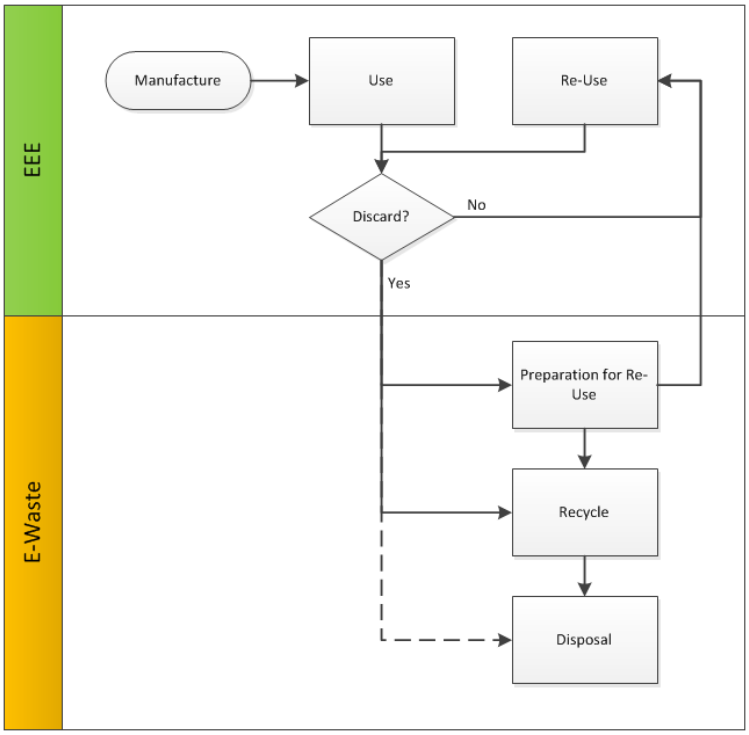


Figure 1 EEE to E-Waste with Reuse flow

Table 1 Definition of terms used in Figure 1

Manufacture	The phase of the EEE product lifecycle where it is manufactured.
Use	The phase of the product lifecycle where it is used for the first time.
Discard	The decsion by the owner to discard or not discard the product. Discarding indicates it becomes e-waste, whereas not discarding and routing to reuse indicates it is not waste.
Reuse[7]	"Reuse of electrical and electronic equipment or its components is to continue the use of it (for the same purpose for which it was conceived) beyond the point at which its specifications fail to meet the requirements of the current owner and the owner has ceased use of the product". Products could be donated or traded before or in this phase.
Preparation for Reuse[8]	Preparation for reuse comprises any operation performed to bring used EEE or its components into a condition to meet the requirements of a next potential owner.
Recycle	The phase of the product lifecycle where due to lack of functionality, cosmetic condition or age the product is broken down into component materials and recycled into raw material for use in the manufacture of new EEE or other products.
Disposal	Material that cannot be recycled into raw material for use in manufacture of new EEE or other products would need to be disposed of using other methods, such as energy recovery or landfill. Items that are disposed of in household bins may move directly to this phase avoiding any opportunity of reuse or recycling.

[7] Step Initiative, One Global Understanding of Re-Use – Common Definitions (White Paper), 6, 2009
[8] Step Initiative, One Global Understanding of Re-Use – Common Definitions (White Paper), 6, 2009

5 Conclusion

The definition of the term “e-waste” is simply all types of EEE that have been discarded. However, the potential use of the term has been made more complex because the point at which EEE becomes waste is often viewed subjectively. This paper has explored the subjectivity and defined the point at which EEE becomes e-waste: when it is discarded as waste by the owner without the intention of reuse.

6 Bibliography

Huisman, 2012	J Huisman, Eco-efficiency evaluation of WEEE take-back systems, Waste Electrical and Electronic Equipment (WEEE) Handbook, 93-119, 2012
The Step Initiative	www.step-initiative.org
2012/19/EU	Directive 2012/19/EU of the European Union and of the council of date on 4 July 2012 published in issue L197 of the Official Journal on 24 July 2012: view file: last accessed on 21 February 2014
electronicstakeback.com	The Electronics Takeback Coalition, Scope of Products in E-Waste Laws, view file: last accessed on 21 February 2014
Discard	Merriam-Webster, www.meriam-webster.com/dictionary/discard : last accessed on 21 February 2014
Discard	Collins, www.collinsdictionary.com/dictionary/english/discard : last accessed on 21 February 2014
Re-Use	Step Initiative, One Global Understanding of Re-Use – Common Definitions (White Paper), 6, 2009
Preparation for Re-Use	Step Initiative, One Global Understanding of Re-Use – Common Definitions (White Paper), 7, 2009

Members and Associate Members of the Step Initiative are:

(June 2014)

Full Members:

- Arrow Electronics
- Austrian Society for Systems Engineering and Automation (SAT)
- Basel Convention Coordinating Centre for Asia & the Pacific (BCRC China)
- Basel Convention Coordinating Centre for Training and Technology Transfer for the African Region (BCCC-Africa), University of Ibadan
- Basel Convention Regional Centre for Central America and Mexico (BCRC-CAM)
- BIO Intelligence Service S.A.S.
- Blueprint ERE Pte Ltd
- Center for Environment and Development for the Arab Region and Europe (CEDARE)
- Chiho-Tiande (HK) Limited
- Cisco Systems, Inc.
- Compliance and Risks
- Dataserv Group Holdings Ltd.
- Datec Technologies Ltd
- Delft University of Technology (TU Delft)
- DELL Inc.
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
- Dismantling and Recycling Centre Vienna (D.R.Z)
- Durabilit
- Empa – Swiss Federal Laboratories for Materials Science and Technology
- Ericsson
- FECACLUBS-UNESCO
- Fraunhofer Institute for Reliability and Microintegration (FHG-IZM)
- Griffith University
- Hewlett Packard (HP)
- Institute for Applied Ecology (Öko-Institut e.V.)
- International Telecommunication Union (ITU)
- KERP research
- Kevoy Community Development Institute (KCDI)
- Massachusetts Institute of Technology (MIT) – Materials Systems Laboratory
- Memorial University
- MicroPro Computers
- Microsoft
- Ministry of the Environment Japan, Office Waste Disposal Management, Department of Waste Management and Recycling
- National Center for Electronics Recycling (NCER)
- Philips Consumer Lifestyle Sustainability Center
- Plataforma de Residuos Eléctricos y Electrónicos para Latinoamérica y el Caribe (Latin American WEEE Platform) (RELAC Platform)
- Renewable Recyclers
- Reverse Logistics Group Americas (RLGA)
- Secretariat of the Basel Convention (SBC)
- Secretariat of the Pacific Regional Environment Program (SPREP)
- Sims Recycling Solutions

- Swiss State Secretariat of Economic Affairs (SECO)
- Technische Universität Berlin, Institut für Technischen Umweltschutz, Fachgebiet Abfallwirtschaft (Chair of Solid Waste Management)
- Technische Universität Braunschweig,Institute of Machine Tools and Production Technology
- Thai Electrical and Electronic Institute (EEI)
- The Sustainability Consortium
- UMICORE Precious Metal Refining
- United Nations Environment Programme/Division of Technology, Industry and Economics (UNEP/DTIE)
- United Nations Industrial Development Organization (UNIDO)
- United Nations University (UNU)
- United States Environmental Protection Agency (US-EPA)
- University of Limerick
- University of Northampton (UoN), The Centre for Sustainable Wastes Management
- University of Southern Denmark, Department of Chemical Engineering, Biotechnology and Environmental Technology
- WEEE Help
- WorldLOOP

Associate Members:

- ENDA Europe
- Global e-Sustainability Initiative (GeSI)
- Vertmonde Cia. Ltd.

Step White and Green Paper Series

Number	Step Task Force	Title	Date
Green Paper #8	TF 1 "Policy"	Differentiating EEE products and wastes	14 January 2014
Green Paper #7	TF 3 "ReUse"	E-waste Country Study Ethiopia	10 April 2013
Green Paper #6	TF 1 "Policy"	E-waste in China: A Country Report	05 April 2013
Green Paper #5	TF 1 "Policy"	Transboundary Movements of Discarded Electrical and Electronic Equipment	25 March 2013
Green Paper #4	TF 4 "ReCycle"	Recommendations on Standards for Collection, Storage, Transport and Treatment of E-waste	22 June 2012
Green Paper #3	TF 1 "Policy"	International policy response towards potential supply and demand distortions of scarce metals	01 February 2012
Green Paper #2	TF 2 "ReDesign"	Worldwide Impacts of Substance Restrictions of ICT Equipment	30 November 2011
Green Paper #1	TF 1 "Policy"	E-waste Indicators	15 September 2011

Number	Step Task Force	Title	Date
White Paper #5	TF 2 "Policy"	One Global Definition of E-waste	03 June 2014
White Paper #4	TF 4 "ReCycle"	Recommendations for Standards Development for Collection, Storage, Transport and Treatment of E-waste	02 June 2014
White Paper #3	TF 1 "Policy"	On the Revision of EU's WEEE Directive - COM(2008)810 final	1 October 2009, revised 22 March 2010
White Paper #2	TF 3 "ReUse"	One Global Understanding of Re-use – Common Definitions	5 March 2009
White Paper #1	TF 1 "Policy"	E-waste Take-back System Design and Policy Approaches	28 January 2009

All Step publications are online available at http://www.step-initiative.org/publications/.

About the Step Initiative:

"Step envisions to be agents and stewards of change, uniquely leading global thinking, knowledge, awareness and innovation in the management and development of environmentally, economically and ethically-sound e-waste resource recovery, re-use and prevention."

Step is an international initiative comprised of manufacturers, recyclers, academics, governments and other organizations committed to solving the world's waste electrical and electronic - e-waste - problem. By providing a forum for discussion among stakeholders, Step is actively sharing information, seeking answers and implementing solutions.

Our prime objectives are:

- Research and Piloting
  - By conducting and sharing scientific research, Step is helping to shape effective policy-making
- Strategy and goad setting
  - A key strategic goal is to empower pro-activity in the marketplace through expanded membership and to secure a robust funding base to support activity
- Training and Development
  - Step's global overview of e-waste issues makes it the obvious provider of training on e-waste issues
- Communication and branding
  - One of Step's priorities is to ensure that members, prospective members and legislators are all made aware of the nature and scale of the problem, its development opportunities and how Step is contributing to solving the e-waste problem.

The Step initiative came about when several UN organizations, who were increasingly aware of the growing global e-waste problem, saw the need for a neutral, international body to seek real, practical answers that would be supported by manufacturers, recyclers and legislators alike.

Step's core principles:

1. Step views the e-waste issue holistically, focusing on its social, environmental and economic impact – locally, regionally, globally.
2. Step follows the lifecycle of equipment and its component materials from sourcing natural resources, through distribution and usage, to disposal.
3. Step's research and pilot projects are "steps to e-waste solutions".
4. Step vigorously condemns the illegal activities that exacerbate e-waste issues, such as the illegal shipments, recycling practices and disposal methods that are hazardous to people and the environment.
5. Step encourages and supports best-practice reuse and recycling worldwide.

Contact:
Step Initiative
c/o United Nations University
Institute for the Advanced Study of Sustainability (UNU-IAS)
Operating Unit SCYCLE
Platz der Vereinten Nationen 1
53113 Bonn, Germany
Phone: +49-228-815-0271
Fax: +49-228-815-0299
info@step-initiative.org
www.step-initiative.org
www.ias.unu.edu

UNITED NATIONS UNIVERSITY