step

solving the e-waste problem

ANNUAL REPORT

2015 | 2016

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PREFACE

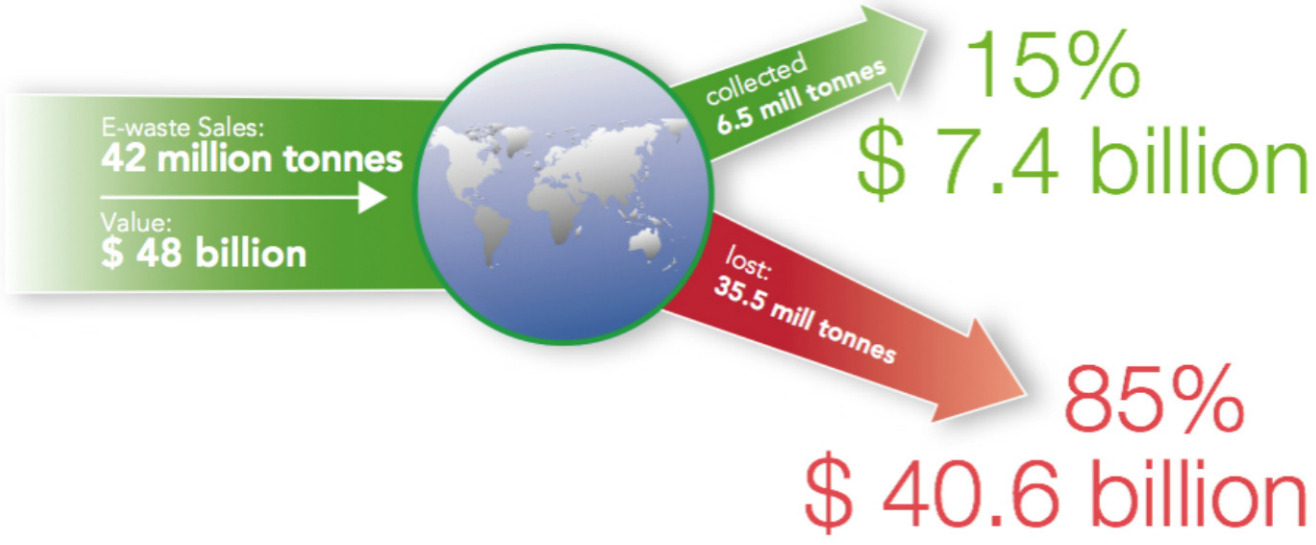
Metals and materials provide the foundation of the global economy. Our Internet connections rely on silicon glass in fiber optic cables. Buildings depend on a ready supply of concrete and wood. Hard disk drives, wind turbines and electric vehicles need rare earth metals for maximum performance. Materials are also finite, and their distribution on Earth is not uniform. Many materials, such as the rare earth metals, are critically scarce. What's more, the extraction and refining of materials into components and products is extremely energy intensive, and these processes are often monopolized by a handful of countries.

As population and welfare increase, demand for products and services also generally increases, though a decoupling of these two trends has been observed in a few countries.

What has emerged is that a linear economy does not facilitate a sustainable use of materials. Worse, this model can result in adverse environmental impacts, including damage to ecosystems and potent greenhouse emissions. One alternative is a circular economy. Circular economies promote the harvesting of secondary components and materials in our urban mines from discarded products and scrap. The economic opportunities and environmental benefits of a circular economy are staggering.

In the European Union, 60 per cent of discarded materials currently enter a landfill or an incinerator. This illustrates a significant loss of value as well as a missed opportunity to recover materials with minimal environmental impact compared to mining. In fact, a circular economy in the European Union

VALUE OF THE E-WASTE FLOW



would lead to a 48 per cent reduction in carbon emissions by 2030 and an 83 per cent reduction by 2050, compared to 2012 levels. Furthermore, European Union dependence on primary material imports would decrease by 32 per cent in 2030 and by 53 per cent by 2050. For these reasons, attractive circular economy strategies have permeated energy, resource and environmental policy discussions in the European Union and worldwide.

As appetite has continued to increase for electronics, their wastes could play a substantial role in a circular economy. According to UNU, 42 million tonnes of e-waste with a value of EUR 48 billion left the global economy in 2014, but only 15 per cent – or 6.5 million tonnes – was formally collected and treated. This signifies a considerable material and value loss, but it also offers a wake-up call to all electronics stakeholders participants, ranging from policymakers and consumers to original equipment manufacturers and recyclers.

In 2015, the Step network continued collaborating on projects in order to deliver e-waste solutions that will contribute to the circular economy knowledge base. For example, Step members are participating in a Person in the Port project to quantify and characterize imports of e-waste in the Port of Lagos. Results will expose leakages in the end-of-life (EOL) e-waste value chain and enable policymakers to design strategies to stymie illegal exports. A cooperation with the Ethiopian government and the United Nations Industrial Development Organization (UNIDO) continued in the final project phase in 2015 with draft e-waste legislation and the establishment of a demanufacturing facility that will recover and recycle e-waste. Step members also finalized the Business Plan Calculation Tool, one component of the Step Toolkit. Recyclers will be able to use the Calculation Tool in combination with the forthcoming Dismantling Guide to determine how to safely and economically dismantle e-waste and how their business can remain profitable. Finally, the Step E-waste World Map and quantification activities illustrated the size and inherent opportunity of the global e-waste stream by quantifying global sales, stocks and flows by country.

We hope you will enjoy exploring our Step objectives and learning about Step activities in 2015. We also look forward to receiving your feedback or interest in joining the Step network.

Regards,
Chair Step Steering Committee
Step Executive Secretary

Per Döfnäs,
Ericsson
& Chair Step Steering
Committee

Ruediger Kuehr,
United Nations University
& Executive Secretary
Step Initiative

WHO IS **STEP**?

DIVERSE MEMBERS | **LIFE CYCLE APPROACH** | **ROBUST RESULTS**

The Solving the e-waste problem (Step) Initiative emerged in 2004 as an independent, multi-stakeholder platform for designing strategies that address all dimensions of electronics in an increasingly digitized world. The Step mission is to apply an integrated, science-rooted approach to create salient solutions to global e-waste challenges along the entire electronics life cycle.

Step focuses its projects and activities on five life cycle areas, which are carried out by its diverse member network. Project results support two broad domains: (1) reduce adverse environmental and human impacts resulting from improper e-waste management and (2) implement the waste hierarchy by reducing the generation of e-waste, promoting reuse and supporting material recovery.

In this rspect, Step steers international e-waste dialogue by championing the Initiative's inherent, independent attributes:

- **Multi-stakeholder network:** The diversity of the Step Initiative enables a truly comprehensive collaboration that incorporates global perspectives and expertise from industry, government, recyclers, civil society & NGOs, research & academia and international organizations.
- **Life cycle orientation:** The electronics life cycle is reflected in the five life cycle areas: Policy and Legislation, Redesign, Reuse, Recycle and Capacity Building.
- **Robust outputs:** The scientific rigor of Step research and capacity building projects fosters cogent results that inform sound and unbiased policymaking, resilient management systems and dynamic business models.

STEP **SUCCESS** BY THE NUMBERS

Number of members, disaggregated into member type:

51 members

Governmental Organizations: **4**
NGOs: **8**
International Organizations: **10**
Research and Academia: **14**
Recyclers: **6**
Industry/Business: **9**

Number of research and capacity building projects:

Currently running: **13**
Completed projects: **51**

Area	Completed projects	Ongoing projects
Policy	10	2
Redesign	7	0
Reuse	12	1
Recycle	11	5
Capacity Building	8	5
Other	3	0
TOTAL	**51**	**13**

Number of publications:

Total completed: **31**
Total in progress: **3**

Type	Completed publications	Ongoing publications
White Papers	6	3
Green Papers	12	0
Other	13	0
TOTAL	**31**	**3**

Number of E-waste Academies: across Europe, Latin America, Africa and Asia **9**

Media: Press coverage from **1000+** news outlets, translated into **30+** languages, reaching **85+** countries

Number of government cooperations: USA, Germany, Switzerland, Japan (4 countries, 3 continents)

Global analysis of e-waste generated and legislation:
The Step E-waste World Map contains the following data
E-waste generated of **183 countries**
E-waste legislation/standards of **65 countries**

STEP **STRUCTURE**

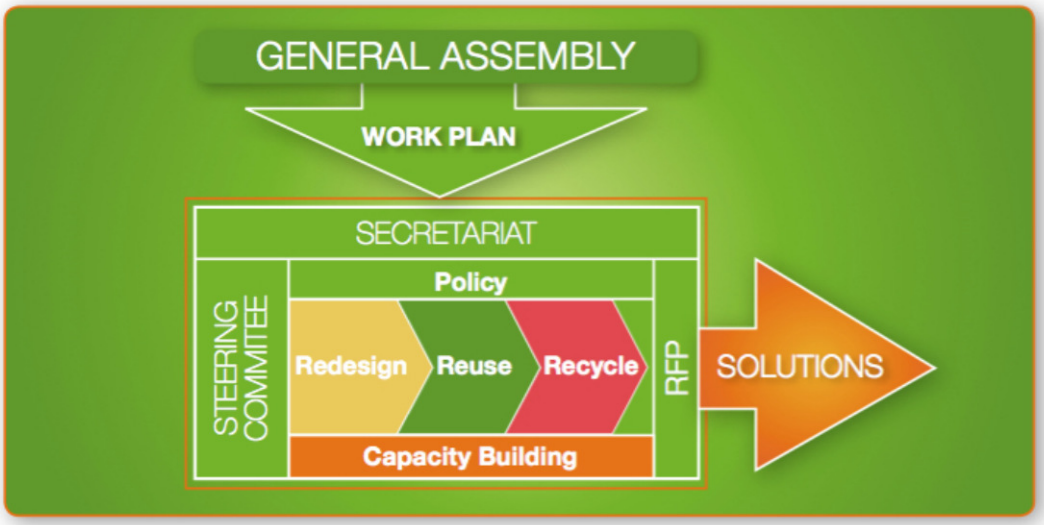
Officially launched at the UN Secretariat in 2007, the Step Initiative is now guided by the Sustainable Development Goals (SDGs) of the UN, and it is hosted by the global think tank and scientific training body of the UN System, the United Nations University (UNU).

Embedded in the UNU Sustainable Cycles Programme hosted by the Vice Rectorate in Europe, the Step Secretariat is located at the UN Campus in Bonn, Germany. The Step Secretariat coordinates and administers the Step Initiative and ensures a steady and succinct information flow among Step members. The Step vision is realized through Step projects which are managed by individual Step members and fall under one of the five life cycle areas:

1. **POLICY**
2. **REDESIGN**
3. **REUSE**
4. **RECYCLE**
5. **CAPACITY BUILDING**

Five Step knowledge hubs have been established throughout the world, where Step Regional Focal Points (RFPs) link members and e-waste activities in corresponding regions. They also spotlight Step achievements and increase Step visibility worldwide.

The chief Step decision-making body is the General Assembly, comprising all Step members. The General Assembly meets at least once per year in order to discuss the previous year's project activities and outputs, vote on new members and establish the Step work plan for the coming year.



THE STEERING COMMITTEE:

Stephanie Adrian, United States Environmental Protection Agency

Jonathan Perry, Dell

Per Döfnäs, Ericsson

Jinhui Li, Basel Convention Coordinating Centre for Asia and the Pacific and Tsinghua University, China

Jason Linnell, National Center for Electronics Recycling

Duncan McCann, WEEE Help

Rolf Widmer, Swiss Federal Laboratories for Materials Testing and Research

Ex-officio: Ruediger Kuehr, United Nations University

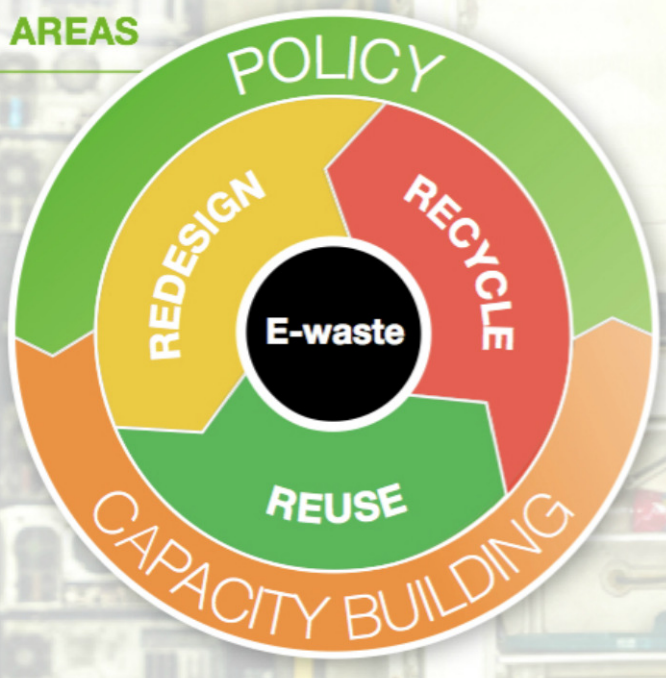
AREAS **INTRODUCTION**

The e-waste challenge is complex. The production, consumption and disposal of electronics encompasses extensive supply chains and a variety of participants. Sound, salient e-waste solutions that reduce adverse impacts and support a circular economy require a coordinated, systems-oriented governance structure where all relevant participants are engaged.

Step comprehensively confronts the e-waste dilemma from all angles. The Initiative efficaciously identifies pressing e-waste hot spots in each of its life cycle areas: ● Policy, ● Redesign, ● Reuse, ● Recycle, ● Capacity Building.

Policy and Capacity Building represent cross-cutting areas. Their projects maintain iterative relationships with activities under Redesign, Reuse and Recycle, establish vital feedback and improvement loops and produce robust Step results.

THE STEP **AREAS**



CURRENT AREA HOT SPOTS

Policy:

- Transboundary movements of used electronics
- Policy principles for sound WEEE legislation in developing countries

Redesign:

- Design for EOL strategies – disassembly, recycling, environments

Reuse:

- Export dilemma: sham reuse vs. functioning used EEE

Recycle:

- Managing and financing CRT waste flows
- Circular economy: the need to quantify and model critical material flows
- Smart, profitable and responsible business models at the recycler and system levels

Capacity Building:

- Training of e-waste practitioners in developing countries
- Integrating the informal sector in developing countries

Photo: E-waste © Benjamin Hale

AREA: **POLICY**

Global electronics legislative efforts have accelerated over the years as a result of increasing welfare and a growing appetite for electronics. As more and more people obtain access to electronics – such as laptops and sophisticated medical devices – they also become plugged into a collective global pulse and improve their qualities of life.

Electronics require a range of materials and energy for their functionality – both at production and during their use. Electronics also become waste. To cope with an increased "electronics metabolism", legislative frameworks lay down blueprints to minimize electronics hazards and maximize inherent opportunities. According to the Step E-waste World Map, 63 countries now have either preliminary or finalized e-waste legislation in place, while some countries have requested Step expertise to assist in policy design.

Due to increasing requests from developing countries, Step responded in 2015/2016 by pooling together the diverse knowledge of its member network to establish customizable e-waste policy pillars, which are especially useful for developing countries. Step is also evaluating the sensitive transboundary movement debate to gauge and measure perception on this pivotal issue.

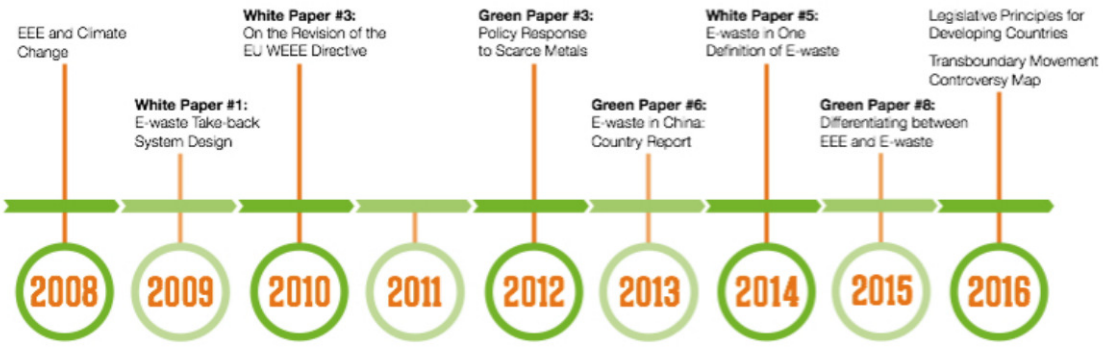
HAZARDS:

- Improper EOL management of toxic appliances and components
- Illegal e-waste dumping in developing countries
- Lack of ownership and responsibility

OPPORTUNITIES:

- Employment openings
- Recovery of (scarce/valuable) materials and embodied energy
- Extended lifespans and reuse of electronics
- Remanufacturing

STEP **POLICY RESULTS**



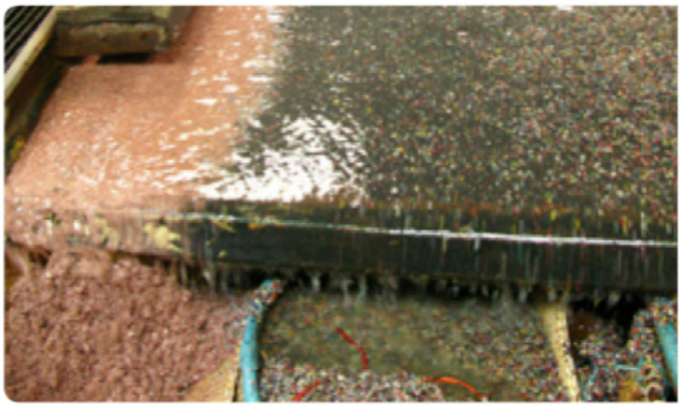
POLICY PROJECTS

LEGISLATIVE PRINCIPLES: E-WASTE POLICY IN THE DEVELOPING WORLD

Objective: *Establish a repository of standardized policy principles building on lessons from both the developed world and the developing world*

In the past, Step has developed tailored recommendations on draft e-waste legislation, most notably informing the governments of Ghana and Nigeria. The Initiative also reached out to the European Union during the WEEE Directive Recast. Emerging from the increasing country consultations and requests from national governments exposed an urgent need for an accessible vault of vetted regulatory principles vital to the development of sound e-waste legislation. The policy principles created in this project group will support governments in the developing world as they form e-waste policy. The Step policy principles will build on the challenges and experiences of both the developed world and the developing world.

- ✓ Methodology established
- → Policy principles currently being finalized
- → Final results to be published in a Step White Paper in 2016



Copper wire recycling © Feng Wang

TRANSBOUNDARY MOVEMENTS: A CONTROVERSY MAPPING APPROACH

Objective: *Foster a less-polarized international e-waste debate and a better-informed public perception of the e-waste dilemma using controversy mapping*

The sensitive transboundary movement (TBM) dialogue is polarizing. Is the developed world exporting responsibility and dumping e-waste under the guise of reuse, or are functioning used electronics destined for reuse facilitating access to the Internet, mobile banking and communication networks in the developing world? Different participants and experts along the value chain possess contradictory positions on the issue. The need for better understanding of the issues as well as the actors involved in transboundary disputes was identified. This project is therefore using controversy mapping to map and link the issues and actors involved in TBM disputes.

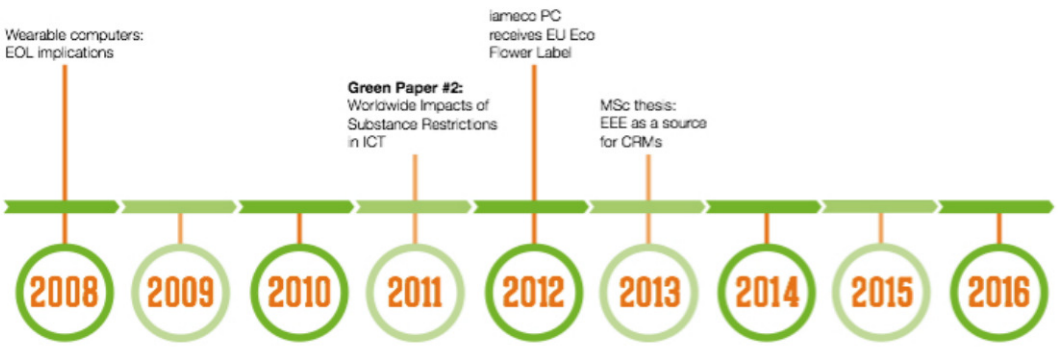
- ✓ Inventory of key statements and actors completed
- ✓ Research protocol established by Memorial University
- → Mapping and characterization exercise ongoing
- → Finalized TBM Controversy Map and Step Green Paper in 2016

AREA: **REDESIGN**

Design decisions can influence the environmental impacts of electronics along the entire value chain. Products containing hazardous materials in their design, such as mercury-containing fluorescent bulbs or brominated-flame-retardant plastics, must be handled and treated appropriately at EOL.

The concepts of dematerialization and eco-efficiency are design strategies that condone the "do more with less" philosophy and decouple resource use and environmental impacts with growth. This is evident in the miniaturization shift in gadgets observed in PCs which have become smaller and lighter compared to models from 30 years ago. Finally, the ease with which e-waste can be dismantled and recycled can be influenced by upstream design choices and has been addressed by techniques, such as design for recycling (D4R). For example, discouraging glue in electronics design has made dismantling practices easier and quicker.

STEP **REDESIGN RESULTS**



AREA: **REUSE**

The Step definition of reuse builds on the foundation of the waste hierarchy and refers to the extension of life of a product and its subsequent reuse. Reuse of electronics and/or components has been subsequently identified as both (1) the avoidance of waste generation and (2) the curbing of material and energy requirements necessary for manufacturing a new product, which are replaced by the reused product.

By reusing discarded but functioning electronics, the developing world can connect to the global digital pulse and take advantage of a range of services, such as distance learning, online banking and social media. However these reused products will reach their second EOL, and often, the developing countries benefiting from their reuse lack legislation and capacity to manage the e-waste flow. The practice of illegally exporting non-functioning e-waste to developing countries under the guise of reuse (i.e., sham reuse) adds more complexity to the reuse discussion and has polarized various actors around the issue.

For this reason, Step has mobilized its "Reuse Coalition" to further explore the transboundary movement frontier against a neutral foundation. Step teamed up with the US Environmental Protection Agency (EPA) in 2015 and carried out fieldwork in the Port of Lagos. In this project, the team sampled shipments and ascertained quantifiable and statistical insights into the size of e-waste moving from the developed world to Nigeria. This work will be followed up in 2016 through a collaboration with the German government. In 2016, Step will also cluster transboundary movement perspectives to actors using controversy mapping.

STEP **REUSE RESULTS**

REUSE PROJECTS

PERSON IN THE PORT: TRACKING FLOWS OF E-WASTE

Objective: *Quantify and characterize the flows of e-waste in the port of Lagos*

Ports are vital transit arteries through which thousands of containers pass daily bringing goods – including electronics – into the homes of consumers. Ports pump goods through the global economy, and they can also function as hubs where illegal goods pass, such as the shipment of e-waste from the developed world to developing countries. E-waste shipments can go undetected simply due to the volume of containers and lacking enforcement resources. In partnership with – and funded by – the US EPA, Step developed and implemented the Person in the Port (PIP) project in Lagos, Nigeria. This project aimed to characterize the imports of e-waste including the quantity, type, origin, quality and functionality. Step worked closely with Nigerian authorities to gain access to the port and shipment containers. The German Federal Ministry for Economic Cooperation and Development is funding a 2016 follow-up Person in the Port project to build on and complement the 2015 results. Data generated will shed light on the quantities of illegal e-waste and exporter-importer networks, and it will enable authorities to design more robust strategies going forward.

- ✓ Inception meeting with Nigerian Customs Authority, Nigerian Port Authority and Nigeria Ministry for Environment held
- ✓ Data collection over 10 months completed
- → Project group assessing the data results
- → Person in the Port II with the German government to begin in 2016

© Klaus Willke: Views of the Nigeria project

IMPACT OF WASTE LEGISLATION ON TRANSBOUNDARY MOVEMENTS OF ELECTRONICS DESTINED FOR REUSE

Objective: *Offer recommendations to optimize legislation regarding the transboundary movement of e-waste and further strengthen refurbishment and reuse efforts*

Media attention and academic reports have illuminated the increase in illegal shipments of e-waste to developing countries as well as their adverse environmental impacts. The reality is more complex than this simple narrative which has thus far largely neglected the role and significance of reuse. A Step project group set out to investigate current transboundary legislation and measure their effectiveness; measure benefits of reuse and refurbishment; carry out reuse case studies; and formulate solutions that will strengthen current transboundary policy and promote reuse and refurbishment. Results demonstrated that there is a substantial e-waste trade in the developed and developing world. This contradicts the message purported by environmental NGOs. The study also identified how confusion between waste and non-waste can discourage refurbishment and reuse in the absence of a global standard for reuse.

- ✓ Green Paper published in January 2016

E-WASTE MANAGEMENT IN ETHIOPIA

Objective: *Establish an e-waste management system in Ethiopia to ensure proper EOL handling as the national ICT sector grows*

The information and communications technology (ICT) and electronics sectors are growing in Ethiopia, and the products they create will one day become waste. In response, Step has collaborated with UNIDO and UNU in a Global Environment Facility-funded pilot project to engage Ethiopian stakeholders and facilitate the development of a responsible e-waste management system in the country. The Project Advisory Group has been helping the government to draft legislation and design the system. One chief output is the upgrade of an e-waste dismantling plant (DMF) as formal entry point for future waste flows. A final report on the DMF was completed which offers proposals and recommendations on the following: (1) financing mechanisms, (2) connection of the DMF to national and international downstream markets, (3) increasing collection volumes and (4) pilot projects on e-waste collection from households.

- ✓ GEF funding acquired
- ✓ Advisory Group established
- ✓ Equipment for the e-waste dismantling centre (DMF) installed
- → Final training of DMF workers to take place
- → E-waste framework legislation in the last phase before final adoption
- → Complementary directives to support impending e-waste legislation to be worked out

AREA: **RECYCLE**

As the global appetite for electronics soars, the urban mine also proportionately swells with growing future e-waste streams. In 2014, the amount of e-waste produced totaled 41.8 million tonnes, and this figure was expected to increase to 43.8 million tonnes in 2015. However, e-waste is not only an ends; it can be harvested to provide materials and a source of energy to create new products. In 2014, the e-waste flow contained 300 tonnes of gold, which amounted to EUR 10.4 billion. Once all materials were considered, the value of e-waste generated in 2014 totaled EUR 48 billion, according to UNU.

There is also a dark side to e-waste. Toxins can be released to the environment if handled and treated improperly. For example, in the same 2014 e-waste stream, there were also 2.2 million tonnes of hazardous lead-glass, the predominate source of which was old cathode ray tube (CRT) monitors. Also present were 4,400 tonnes of ozone-depleting substances, which often originate from cooling and freezing appliances that predate the Montreal Protocol regulation.

As the e-waste metabolism speeds up, e-waste pillars have to be in place in national collection and treatment systems in order to recover valuable material and properly treat hazardous fractions.

In 2015, Step responded to this "call for action" by carrying out country case studies of e-waste systems to offer 12 principles that should be addressed when developing an e-waste management system. Step has also recognized the urgency for CRT lead-glass solutions and will inventory and assess all existing treatment options. Final results will be available in a white paper and a quick-fact sheet, and they will be discussed in webinars in 2016.

CRT TV Recycling in China © Feng Wang

RECYCLE PROJECTS

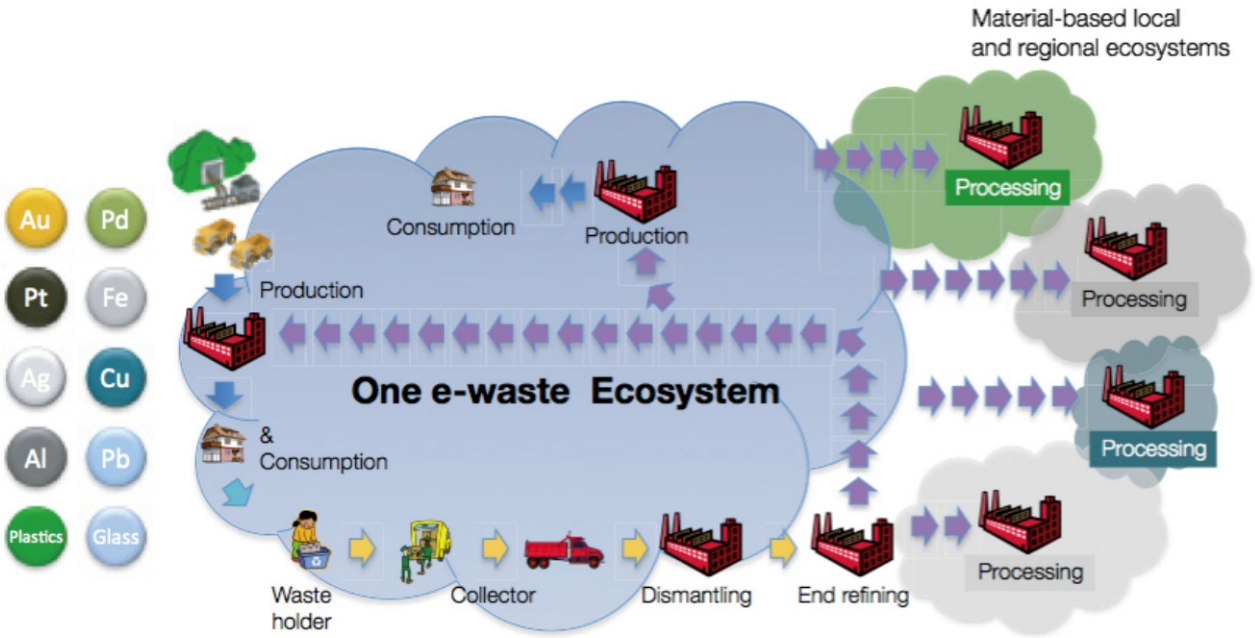
COLLECTION AND RECYCLING SCHEMES IN DEVELOPING COUNTRIES

Objective: *Develop 10 guiding principles to support the development of e-waste management in developing countries*

As welfare increases in the developing world, appetite for electronic gadgets increases in parallel. As a result, many developing countries aim to design e-waste legislation, but they often use the "developed-world model" as a reference point. Because boundary conditions (e.g., socioeconomic dimensions, market maturity and recycling infrastructures) differ among countries, a "copy and paste policy" does not work. Step identified the need for broad, customizable guiding principles to be considered in e-waste policy development. E-waste regulation and management systems were evaluated across 13 case study countries. Common "policy and system" patterns emerged, which were ultimately clustered to form the foundations of the 10 guiding principles.

- ✓ Project group established
- ✓ 13 country case study assessments carried out on e-waste systems
- ✓ SWOT analysis and clustering of common e-waste system successes completed
- ✓ 10 Guiding Principles published in a White Paper in 2016

STEP **RECYCLE** RESULTS



THE CRT CHALLENGE

Objective: *Develop strategies to responsibly manage the disposal of CRT screens*

CRT glass contains 1 to 1.5 kg of lead per screen. Lead is highly toxic but also increasingly scarce. Although CRT screens have been replaced by lighter, less bulky flat screens, CRT screens are currently being stockpiled until a financed disposal solution is developed. One legitimate fear is that developing countries will become the ultimate CRT sinks. In response, Step aims to develop a CRT Solutions Toolbox in a two-step approach:

1. Inventory of EOL and recycling options for CRT glass and
2. Evaluation of all options using environmental, economic and technical indicators.

Results will address all stakeholder groups, including recyclers, policymakers and producers. Moreover, case studies will be explored to contextualize solutions to national, regional and global scenarios. Finally, the project will explore the global supply-demand dynamics of lead and the potential of secondary lead recovered from CRTs reducing scarcity from primary sources.

CRT tubes for recycling © Benjamin Hale

- ✓ Workshop held to synthesize expert opinion and knowledge on CRT options
- → CRT solutions to be published in a White Paper in 2016
- → CRT solutions to be submitted as a conference paper in 2016
- → CRT Fact-Sheet to be developed to offer a condensed executive summary
- → Follow-up CRT activities to be discussed in a Step Stakeholder Dialogues webinar

AREA: **CAPACITY BUILDING**

Decision makers are tasked with sifting through mountains of often conflicting and complex research in order to design sound environmental, resource and public health policy. Because the electronics sector is still relatively nascent and continuously evolving, there is a need for (1) consistent monitoring of the latest research and (2) translation and interpretation of these findings. At the same time, there is also an urgent need for all participants in the e-waste value chain to become plugged into the e-waste knowledge base, from designers to recyclers to consumers.

On a global level, Step ensures the knowledgebase of policymakers, scientists, recyclers and consumers is enriched. This enables these stakeholders to develop comprehensive legislation, create resilient business models and make informed decisions when discarding scrap. Step builds on its diverse network to convert e-waste results from Step projects into training material, which has supported the development of the UNU E-waste Academy for policymakers and recyclers (EWAM) and for researchers (EWAS).

Over the past year, Step developed a toolkit that contains different training material for recyclers and other downstream e-waste participants. As part of the toolkit, Step developed an open-source piece of business modelling software that enables recyclers to evaluate the economic viability of their business plans after inputting their own revenue and costs. Additionally, using its quantification framework, Step continued to model and characterize the size of electronic sales, stocks and associated wastes which is publicly available in the Step E-waste World Map.

STEP **CAPACITY BUILDING** RESULTS

CAPACITY BUILDING PROJECTS

E-WASTE TRAINING MATERIALS: STEP TOOL-KIT

Objective: *Support e-waste practitioners in the sound management of e-waste by offering a comprehensive, interactive set of training tools*

Because a comprehensive and easy how-to guide is missing for e-waste practitioners, Step synthesized the patchwork of existing training sources into clusters.

- ✓ Business Plan Calculation Tool: Interactive tool in Excel that calculates output and financial performance of manual dismantling for different input quantities and compositions considering national framework conditions. The open-source tool can be requested here.
- ✓ Dismantling guide: Provides an overview and description of technologies and equiment required for superficial, medium or detailed manual dismantling of e-waste fractions. To be published in 2016.
- → Downstream guide: Instructions detailing how and where to direct e-waste output fractions from recyclers to materials recovery facilities and final disposal destinations. To be published in 2016.

ADDRESS PROJECT: QUANTIFYING AND MAPPING E-WASTE FLOWS

Objective: *Quantify the size of the e-waste challenge, model e-waste arising and establish an e-waste policy inventory in order to design and implement appropriate e-waste solutions*

Electronic penetration rates, e-waste generated and political landscapes are not uniform throughout the world. Some countries consume large amounts of electronics but have e-waste legislation in place. Other countries are also significant consumers but lack e-waste policy. Still others – mostly developing countries – consume little and consequently do not have an e-waste system in place.

Step recognized the need to understand the size and characteristics of the e-waste urban mine and has developed a fact-finding initiative underpinned by the three-pillar ADDRESS methodology.

Pillar 1: Quantification and characterization of sales of electronics, e-waste generated and arising at the country level using the UNU classification system, UNU Keys
Pillar 2: Establishment of a repository of e-waste legislation at the country level to supplement quantification of volumestion of results per country in the interactive, open-source Step World Map
Pillar 3: Communication of results per country in the interactive, open-source Step World Map

- ✓ Detailed quantification studies (Pillar 1) have been carried out in 7 countries
- ✓ Step has created a repository of e-waste legislation per country that can be accessed via the Step E-Waste World Map (Pillar 2 and 3)
- → Updates of existing quantification country studies and new assessments are ongoing

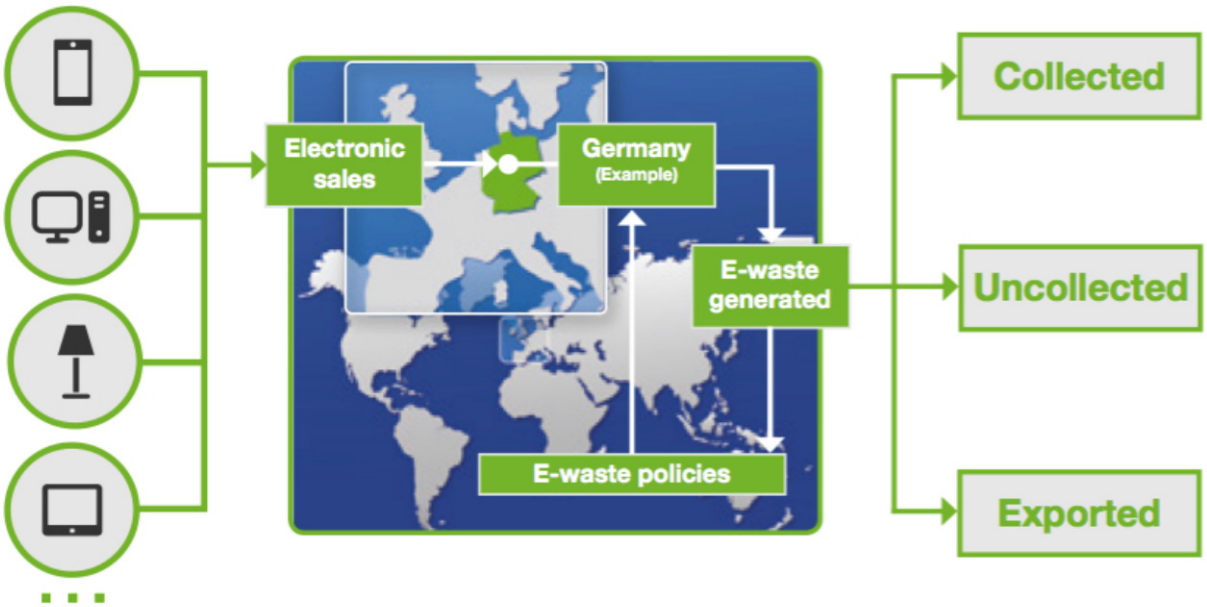
E-WASTE WORLD MAP

How big is the e-waste problem? What measures are countries taking to ensure proper management across the electronics life cycle? Though these are rather straight-forward questions, policymakers and researchers have struggled with viable answers to them due to complex, non-harmonized classification systems, data gaps and inconsistencies. As a result, they are unable to accurately model electronic sales and disposal.

Step solved this problem with the first-ever Step E-waste World Map – the only centralized repository of comprehensive e-waste data. The Step E-waste World Map is an interactive interface where users can obtain the following information per country at the click of a mouse:

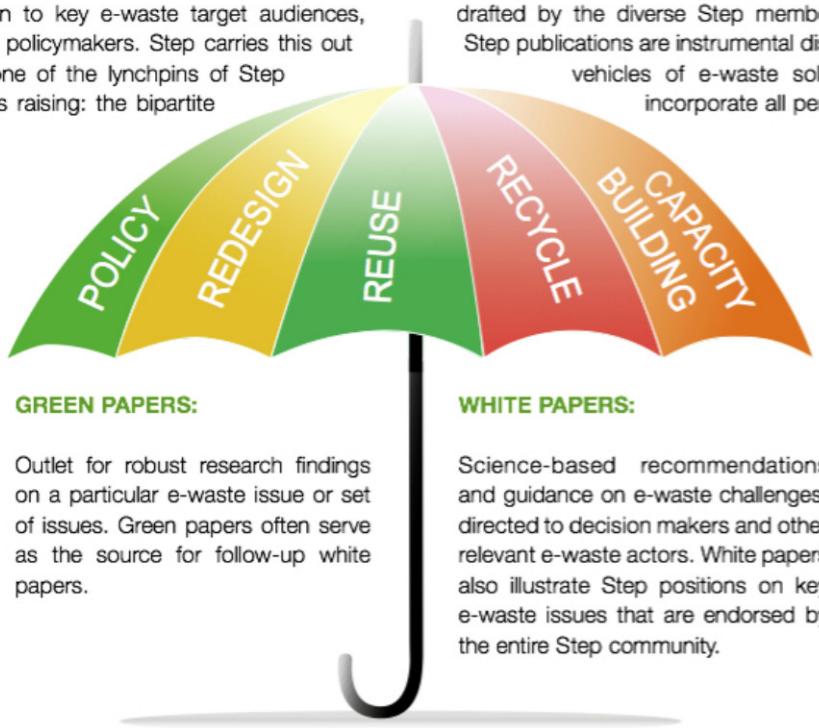
- ✓ Electronics sales known for 183 countries
- ✓ E-waste generated known for 183 countries
- ✓ Legislation addressing the sound management of e-waste and status of implementation identified in 65 countries

Results are comparable, as the same methodology was used across all countries. With an overview of the "electronics metabolism", policymakers can make better-informed decisions on collection targets, recovery rates and financing tools.



PUBLICATIONS

One of the primary objectives of the Step Initiative is to ensure a steady flow of data-supported information to key e-waste target audiences, especially policymakers. Step carries this out through one of the lynchpins of Step awareness raising: the bipartite publication umbrella, comprising white papers and green papers. Because Step publications are drafted by the diverse Step member network, Step publications are instrumental dissemination vehicles of e-waste solutions that incorporate all perspectives.



GREEN PAPERS:

Outlet for robust research findings on a particular e-waste issue or set of issues. Green papers often serve as the source for follow-up white papers.

WHITE PAPERS:

Science-based recommendations and guidance on e-waste challenges, directed to decision makers and other relevant e-waste actors. White papers also illustrate Step positions on key e-waste issues that are endorsed by the entire Step community.

THE FOLLOWING STEP WHITE AND GREEN PAPERS WERE **PUBLISHED IN 2015/2016:**

Green Paper #9

Green Paper #10

THE FOLLOWING TABLE CONTAINS ALL STEP WHITE AND GREEN PAPERS **PUBLISHED SINCE 2007**.

#	WHITE PAPER	#	GREEN PAPER
1	E-waste Take-back System Design and Policy Approaches	1	E-waste Indicators
2	One Global Understanding of Re-Use – Common Definitions	2	Worldwide Impacts of Substance Restrictions of ICT Equipment
3	On the Revision of EU's WEEE Directive - COM (2008) 810 final	3	IInternational Policy Response Towards Potential Supply and Demand Distortions of Scarce Metals
4	Recommendations for Standards Development for Collection, Storage, Transport and Treatment of E-waste	4	Recommendations on Standards for Collection, Storage, Transport and Treatment of E-Waste. Principles, Requirements and Conformity Assessment
5	One Global Definition of E-waste	5	Transboundary Movements of Discarded Electrical and Electronic Equipment
6	WEEE systems and legislation	6	E-waste in China: A Country Report
		7	E-waste Country Study Ethiopia
		8	Differentiating EEE products and Wastes
		9	E-waste Prevention, Take-back System Design and Policy Approaches
		10	Reuse Potential
		11	TBM of EEE destined for Reuse
		12	Business Plan Calculation Tool for Manual Dismantling Facilities

Green Paper #11

Green Paper #12

White Paper #6

BUDGET AND FINANCES

Funding of the Step Secretariat and the operational budget comes solely from the annual contributions of Step members and projects acquired directly through the Step Secretariat. The seamless functioning of Step is dependent on its members and their unified vision around e-waste.

Step members also contribute value to the Initiative through in-kind contributions, as all Step projects are managed and carried out by Step members. Step knowledge and research results are also incorporated into larger project contexts, such as the Global Environment Facility (GEF) e-waste project in Ethiopia.

The total value of the Step Initiative for 2015, based on annual contributions and project value, amounted to EUR 1.7 million.

Total Value
Step Initiative 2015:
1.7 mill €

E-waste mangement © Benjamin Hale

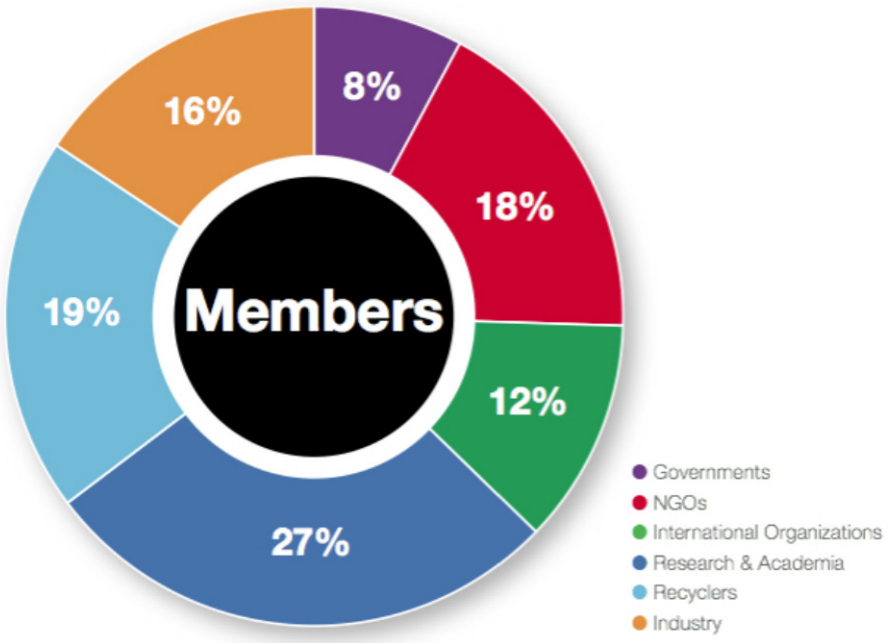
MEMBERSHIP

The scientific rigor and robustness of Step activities is made possible by the diverse, multi-stakeholder Step member network. In total, 50+ Step members from six continents spanning six different stakeholder groups have been collaborating on and actively contributing to e-waste solutions since 2007.

Being an active contributor in the UNU-hosted Step network has many benefits. Step members (1) steer the international e-waste agenda within an UN initiative, (2) define Step priorities and (3) cooperate in projects and publications falling under Policy, Redesign, Reuse, Recycle, and Capacity Building areas.

Due to the member diversity and geographical richness inherent in the Step network, all Step activities and results are objective, rooted in science and incorporate the perspectives and experiences of all stakeholder groups. Consequently, Step results and solutions carry particular policy significance in national, regional and international e-waste discussions.

THE DIFFERENT **TYPES OF STEP MEMBERS**



MEMBERS – STEP **AROUND THE WORLD**

Status 15. September 2016

THE REGIONAL FOCAL POINTS (RFP):

1. Datec Technologies Ltd., Laura Reyes (18.2)
2. Centre for Environment and Development for the Arab Region and Europe (CEDARE), Hossam Allam (46)
3. Basel Convention Coordinating Centre for Asia and the Pacific, Jinhui Li (47)
4. Griffith University, Sunil Herat (54)

MEMBERS

- Austrian Society for Systems Engineering and Automation (SAT) (29)
- Basel Convention Coordinating Centre for Asia and the Pacific (BCRC China) (47)
- Basel Convention Coordinating Centre for Training and Technology Transfer For the African Region (BCCC-Africa), University of Ibadan (45)
- BIO Intelligence Service S.A.S. (21)
- Centre for Environment and Development for the Arab Region and Europe (CEDARE) (46)
- Compliance and Risks (16)
- Dataserv Group Holdings Ltd. (20)
- Datec Technolgies Ltd. (18)
- Delft University of Technology (33)
- Dell (7)
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (37)
- Dismantling and Recycling Centre Vienna (D.R.Z) (48)
- EAGD Istanbul (63)
- Ericsson (42)
- E-waste de Guatemala (62)
- Fecaclub UNESCO (59)
- Empa - Swiss Federal Laboratories for Materials Science and Technology (28)
- Fraunhofer Institute for Reliability and Microintegration (FHG/IZM) (41)
- GeSI Global e-Sustainability Initiative (GeSI) (31)
- Griffith University (54)
- Hewlett Packard (HP) (4)
- Institute for Applied Ecology (Öko-Institut) (36)
- ITU (56)
- Massachusetts Institute of Technology (MIT) – Materials Systems Laboratory (12)
- Memorial University (13)
- MicroPro (17)
- Ministry of the Environment Japan, Office Waste Disposal Management, Department of Waste Management and Recycling (14)

- National Center for Electronics Recycling (NCER) (10)
- Microsoft (43)
- Philips Consumer Lifestyle Sustainability Center (34)
- Plataforma RELAC (39)
- Reverse Logistics Group Americas (RLGA) (3)
- Secretariat of the Basel Convention (25)
- Sims Recycling Solutions (35)
- Secretariat of the Pacific Regional Environment Programme (SPREP) (1)
- Sustainable Electronics Recycling International (SERI) (2)
- Shanghai Collaborative Innovation Centre for WEEE Recycling (64)
- State Secretariat of Economic Affairs (SECO), (27)
- Technische Universität Braunschweig, Institute of Machine Tools and Production Technology (40)
- Technische Universität Berlin, Institut für Technischen Umweltschutz, Fachgebiet Abfallwirtschaft (Chair of Solid Waste Management) (60)
- United Nations Environment Programme / Division of Technology, Industry and Economics (UNEP/DTIE) (24)
- United Nations Industrial Development Organisation (UNIDO) (52)
- United Nations University (UNU) (51)
- United States Environmental Protection Agency (EPA) (11)
- University of Southern Denmark, Department of Chemical Engineering, Biotechnology and Environmental Technology (22)
- University of Limerick (15)
- University of Northampton (UoN), The Centre for Sustainable Wastes Management (19)
- Vel Tech, Technical University (61)
- Vertemonde cia. Ltd., Quito (8)
- WEEE Help (26)
- WorldLoop (44)

- Governments
- NGOs
- International Organizations
- Research & Academia
- Recyclers
- Industry

Becoming part of the Step Coalition on responsible e-waste management is simple. After new members are voted in at the Step General Assembly, new Step members will be able to contribute to the development of the annual Step work plan and collaborate in or even lead Step e-waste projects. Step members also benefit from full member access to all Step reports, the Step archive, project datasets and the extended Step community. Above all, Step members become part of an e-waste steward network dedicated to shattering e-waste barriers.

In return, all Step members pay an annual contribution based on member size and type that supports the Secretariat and Step seed-funding projects. Additionally, an E-waste Compact is signed by all members, which describes the common vision and shared e-waste objectives as well as establishes the foundation of cooperation between Step and its members.

You can explore more about becoming a Step member here.

MEMBER TYPE	ANNUAL CONTRIBUTION
Large-size company	EUR 12,000
Medium-size company	EUR 6,000
Small-size company	EUR 1,200
All other members	EUR 1,200

Cover photo: CRT tubes for recycling © Benjamin Hale
Page 14 illustration, page 16 pictograms: fotolia.com

solving the e-waste problem

THE STEP INITIATIVE

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