StEP
SOLVING THE E-WASTE PROBLEM

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Per Doefnaes –
Chair Steering Committee,
StEP Initiative

Ruediger Kuehr –
Executive Secretary, StEP Initiative

The year 2008 was a particularly good one for StEP, which has started harvesting results since its formal launch in March 2007.

A high point was signing the Memorandum of Understanding with the Secretariat of the Basel Convention in September 2008. This agreement sets the foundations for effective collaboration between StEP and the Basel Convention in research, capacity development, outreach and policy issues.

Also in 2008 the United Nations Industrial Development Organization (UNIDO) formally joined StEP. It became the fourth UN organization to participate in this initiative, after the United Nations University (UNU), the United Nations Environment Programme (UNEP) and the United Nations Conference on Trade and Development (UNCTAD).

In May 2008 StEP organized its annual General Assembly, kindly hosted by Ericsson in Stockholm, Sweden. During this meeting we identified a growing need to publicly announce findings of our work, to increase participation of representatives from developing and transition countries and NGOs in StEP, and to secure funding of our initiative. And we agreed on approaches to meet these ongoing challenges; for example, encouraging Associated Membership, which will offer enhanced capacity to undertake project work.

During the General Assembly, StEP also assigned the Center for Environment and Development for the Arab Region and Europe (CEDARE) as the StEP Regional Focal Point for the Middle East and Northern Africa. CEDARE became the second Regional Focal Point after the Massachusetts Institute for Technology (MIT) became the Regional Focal Point for Northern America in 2007. Discussions are underway to establish more Regional Focal Points worldwide in order to satisfactorily reflect the regional experiences, interests and needs in our global initiative.

Within 2008 StEP was contracted externally to carry out two specific research projects – one supported by UNEP entitled *"Recycling – from E-waste to Resources"* and the other one supported by the Swiss State Secretariat of Economics (SECO) and the Swiss Federal Laboratories for Materials Testing and Research (EMPA) on evidence of the need for an appropriate international policy response towards the supply and demand of geochemically scarce elements. StEP's high level of technological and scientific expertise offers an invaluable resource on a global platform, which we hope will be called upon by other organizations in the future.

As you will see from this report, StEP has become a recognized hub for expertise in meeting the challenges caused by the production, usage and disposal of electrical and electronic equipment. Hence, it is with great pleasure that we release the first annual review of the work of the StEP initiative.

Stockholm/Bonn, April 2009

The *"Solving the E-waste Problem (StEP) Initiative"* was established to start up and foster partnerships between companies, governmental and non-governmental organizations and academic institutions on meeting the challenges that result from the production, usage and disposal of electrical and electronic equipment. As a public-private partnership initiative founded by various UN organizations, StEP is uniquely positioned to contribute to the formulation of basic principles, policies and strategies, and the development of technologies and projects for action.

Since 2004, when the idea to develop StEP was first discussed by a handful of scientists and experts, and its formal launch in March 2007, the Initiative has grown and matured into a de-centralized network that now comprises 50 members from around the world. Stakeholders have recognized the need to colla-borate internationally in the current global context where social, political and economic challenges – whether occurring at home or in other regions – impact as never before. All StEP members are committed to join forces in project work and align their strategies to five core principles (detailed over-leaf) in order to establish solutions to the E-waste Problem that are evidence-based, holistic and practical.

StEP continues to evolve. This annual report is neither exhaustive nor indicative of the overall breadth or depth of StEP's work and projects. Rather, it presents selec-ted highlights of the initiative's work and achievements. Five priority areas are identified, reflected in StEP's five Task Forces: Policy, ReDesign, ReUse, ReCycle and Capacity Building.

This report also describes the networking activities (strategic partnerships and linkages) through which StEP complements and leverages its work, and discloses the human and financial resources that support StEP. Further informa-tion about StEP including detailed information about projects can be found on StEP's website (http://www. step-initiative.org) and in the publicly accessible parts of StEP's file depository (http://files.step-initiative.org).

HP has joined StEP to help countries work through the many legal, scientific and practical issues involved in managing e-waste, treatment standards, and innovative design to maximize re-use and recycling.

Klaus Hieronymi, Environmental Business Manager, Hewlett-Packard Europe, Middle East and Africa

Ericsson recognizes StEP's valuable contribution to addressing climate change and sustainability issues within the industry and strongly supports their initiatives on recycling, re-use and policy development.

Elaine Weidman Grunewald, Vice President, Sustainability and Corporate Responsibility, Ericsson

What is e-waste?

E-waste is a term used to cover almost all types of electrical and electronic equipment that has entered or could enter the waste stream. It is also known as WEEE (an acronym standing for waste electrical and electronic equipment). Examples of e-waste include TVs, computers, mobile phones, white goods (fridges, washing machines, dryers etc.), home entertainment and stereo systems, some toys, toasters, kettles – in other words almost any household or business item with circuitry or electrical components with power or battery supply.

Vision & Key Objectives

"StEP envisions a future in which societies have reduced to a sustainable level the e-waste-related burden on the ecosystem that results from the design, production, use and disposal of electrical and electronic equipment. These societies make prudent use of lifetime extension strategies in which products and components – and the resources contained in them – become raw materials for new products."

Principles

StEP's core principles:

1. StEP's work is founded on scientific assessments and incorporates a comprehensive view of the social, environmental and economic aspects of e-waste.
2. StEP conducts research on the entire life-cycle of electronic and electrical equipment and their corresponding global supply, process and material flows.
3. StEP's research and pilot-projects are meant to contribute to the solution of e-waste problems.
4. StEP condemns all illegal activities related to e-waste including illegal shipments and reuse/ recycling practices that are harmful to the environment and human health.
5. StEP seeks to foster safe and eco/energy-efficient re-use and recycling practices around the globe in a socially responsible manner.

We strongly support the StEP Initiative as a way to foster co-operation among stakeholders, develop needed infrastructure at a global scale, and optimize interfaces between manual, mechanical and metallurgical recovery processes.

Hugo Morel, Executive Vice President of Umicore Precious Metals Services

To achieve the aforementioned vision, StEP undertakes the following activities:

(I) It functions as a **network** of actors who share experiences and best practices.

This network offers a neutral, unbiased and independent arena for discussion and information exchange.

(II) It carries out **research and development projects**.

These projects help to support the objectives of the five StEP Task Forces through the optimization of the life-cycle of electric and electronic equipment by:

• Improving supply chains;
• Closing material loops;
• Reducing contamination;
• Fostering safe and eco/energy-efficient re-use and recycling practices around the globe in a socially responsible manner;
• Exercising concern about disparities such as the digital divide between industrializing and industrialized countries; and
• Increasing public, scientific and business knowledge about e-waste challenges and solutions.

(III) It **disseminates** experiences, best practices and recommendations.

StEP aims to be a key knowledge hub for holistic approaches that help to solve the aforementioned problems. It seeks to involve experts from various disciplines (natural sciences, social sciences and engineering etc.), bringing together stakeholder groups and encouraging the exchange of expertise, data and ideas.

Membership

StEP is generally open to all organizations who commit to proactive and constructive participation in addressing the objectives of StEP by signing StEP's Memorandum of Understanding (MoU). Only associations are not entitled to a full membership. More information on eligibility is available via the StEP Secretariat.

StEP members are expected to contribute monetarily and in kind to the existence and development of the initiative. Though initiated by various UN organizations, StEP gets no funds from the regular budget of the United Nations. The Initiative is funded entirely by annual contributions and entrance fees from its members plus the successful acquisition of project grants. New commercial members are charged EUR 10,000 as single entrance fee for becoming a StEP member. For non-commercial organizations, the fee is either EUR 2,000 or 1,000, depending on their size. Such entrances fees then waive the annual contribution for the first year of membership.

The annual membership contributions for 2008 are:

- Large-size companies:
  EUR 10,000 each
- Medium-size companies:
  EUR 5,000 each
- Small-size companies:
  EUR 1,000 each
  (including micro-enterprises)
- All other full members:
  EUR 1,000 each
- Associate members:
  EUR 500 each

As indicated above, StEP also offers the option of Associate Membership, thus encouraging the participation of small companies, research and educational institutes, associations and NGOs, including those from developing and transition countries, which either cannot afford full membership, are only interested in working on specific projects or are not entitled to become a full StEP member (e.g. associations). Associate Members can contribute to the objectives of StEP on a project basis, but are not allowed to vote in the General Assembly.

In exceptional cases the Steering Committee might decide on a case-to-case basis to waive the financial contributions and entrance fee for non-commercial, individual, governmental and inter-governmental members. In these cases, the member must clearly commit to offer certain in kind contributions that support the overall development of StEP.

The following stakeholder map displays StEP's membership as of December 2008:

Organization

Stakeholders involved in StEP will benefit through globally standardized, safe and environmentally-proven processes for disposal, reduction or re-use and recycling of e-scrap.

Konrad Osterwalder,
UN Under-Secretary-General and UNU Rector

The StEP Initiative has five principal organs: the General Assembly, the Task Forces, the Steering Committee, the Secretariat and the Regional Focal Points.

(I) General Assembly

The General Assembly is the main body of StEP. The General Assembly meets at least once a year to accept new members, elect the members of the Steering Committee, approve annual budgets and financial accounts, approve the Steering Committee's proposals for StEP policies, and set up main committees and issue groups. Each full member has one vote in the General Assembly.

(II) Task Forces

All StEP members actively participate in at least one of the five StEP Task Forces. The Task Forces are devoted to research, analysis and implementation of pilot-projects in line with StEP's objectives:

Task Force 1: **Policy and Legislation**, coordinated by Cédric Gossart, TELECOM & Management SudParis, and Ruediger Kuehr, United Nations University.
TF 1 Policy and Legislation analyses the status of existing legislative and policy approaches on electronic waste and, based on this, elaborates policy recommendations for future developments.

Task Force 2: **ReDesign**, coordinated by Charuek Hengrasmee, Electrical and Electronics Institute and Karsten Schischke, Fraunhofer Insitute for Reliability and Microintegration (IZM).
TF 2 ReDesign is dedicated to product design aspects in order to reduce negative impacts of the entire life cycle of electronic products.

Task Force 3: **ReUse**, coordinated by Christoph Herrmann & Tobias Luger, Technische Universität Braunschweig, Lutz-Guenther Scheidt, Austrian Society for Systems Engineering and Automation (until March 2009) and John Dickenson (AER Worldwide).
TF 3 ReUse focuses on professional re-use, refurbishement and recycling and the establishment of international requirements for re-use and transboundary movements of re-usable equipment.

Task Force 4: **ReCycle**, coordinated by Jaco Huisman, United Nations University/TU Delft and Mathias Schluep, Swiss Federal Laboratories for Materials Testing and Research (EMPA).
The overall aim of TF 4 ReCycle is to enhance global recycling infrastructures and technologies to realize a sustainable e-waste recycling.

Task Force 5: **Capacity Building**. The coordinators of this Task Force have yet to be confirmed.
TF 5 Capacity Building aims at increasing public, scientific and business awareness on the global e-waste problem and the dissemination of knowledge generated in the TFs.

In principle, each Task Force is coordinated by two StEP members, who contribute to advancing the overall aim of the StEP Initiative through project development, networking and fundraising. The coordinators play a key role in maintaining positive momentum, ensuring a holistic view and exploiting synergies.

(III) Steering Committee

The Steering Committee monitors the progress of the StEP Initiative. Steering Committee members are elected for two years, after which they can be re-elected to serve another term. The Committee has a permanent, voluntary Chair, the appointment being rotated amongst elected members at least every 1 July and 1 January.

The Steering Committee, elected on 13 May 2008, is composed of:

• Jean Cox-Kearns, Dell (Chair to 31 December 2008)
• Per Doefnaes, Ericsson (Chair since 01 January 2009)
• Christian Hagelueken, Umicore Precious Metals Refining
• Charuek Hengrasmee, Thai Electrical and Electronics Institute
• Guido Sonnemann, United Nations Environment Programme
• Rolf Widmer, Swiss Federal Laboratories of Material Testing and Research

Ex officio

• Ruediger Kuehr, Executive Secretary StEP Initiative, United Nations University

(IV) Secretariat

The Secretariat is responsible for the executive management, administration and daily operational work of the Initiative and assists StEP Projects in the respective Task Forces. Among other assignments the Secretariat manages the information flow within the network, but also serves as a communication hub for any information of relevance for StEP. The Secretariat is lead by the Executive Secretary who is the chief academic project and administrative officer and who has overall responsibility for efficient management of the Initiative and its

strategic development along certain directions which were agreed-upon by the members and Steering Committee.

The StEP Secretariat is hosted by the United Nations University (UNU).

(V) Regional Focal Points

The primary purpose of the StEP Focal Points is to act as a link between the StEP Secretariat and the members, activities and issues in their respective regions. They provide information to the Secretariat and StEP members on activities, issues, and members relevant to StEP in the region. In addition the StEP Regional Focal Points act as the primary point of contact for StEP members on StEP activities and events.

StEP Regional Focal Point for Northern America: Jeremy Gregory & Randy Kirchain, Materials Science and Engineering Systems at Massachussetts Institute of Technology (MIT)

StEP Regional Focal Point for the Middle East and Northern Africa: Hossam Allam, Center for Environment and Development for the Arab Region and Europe (CEDARE)

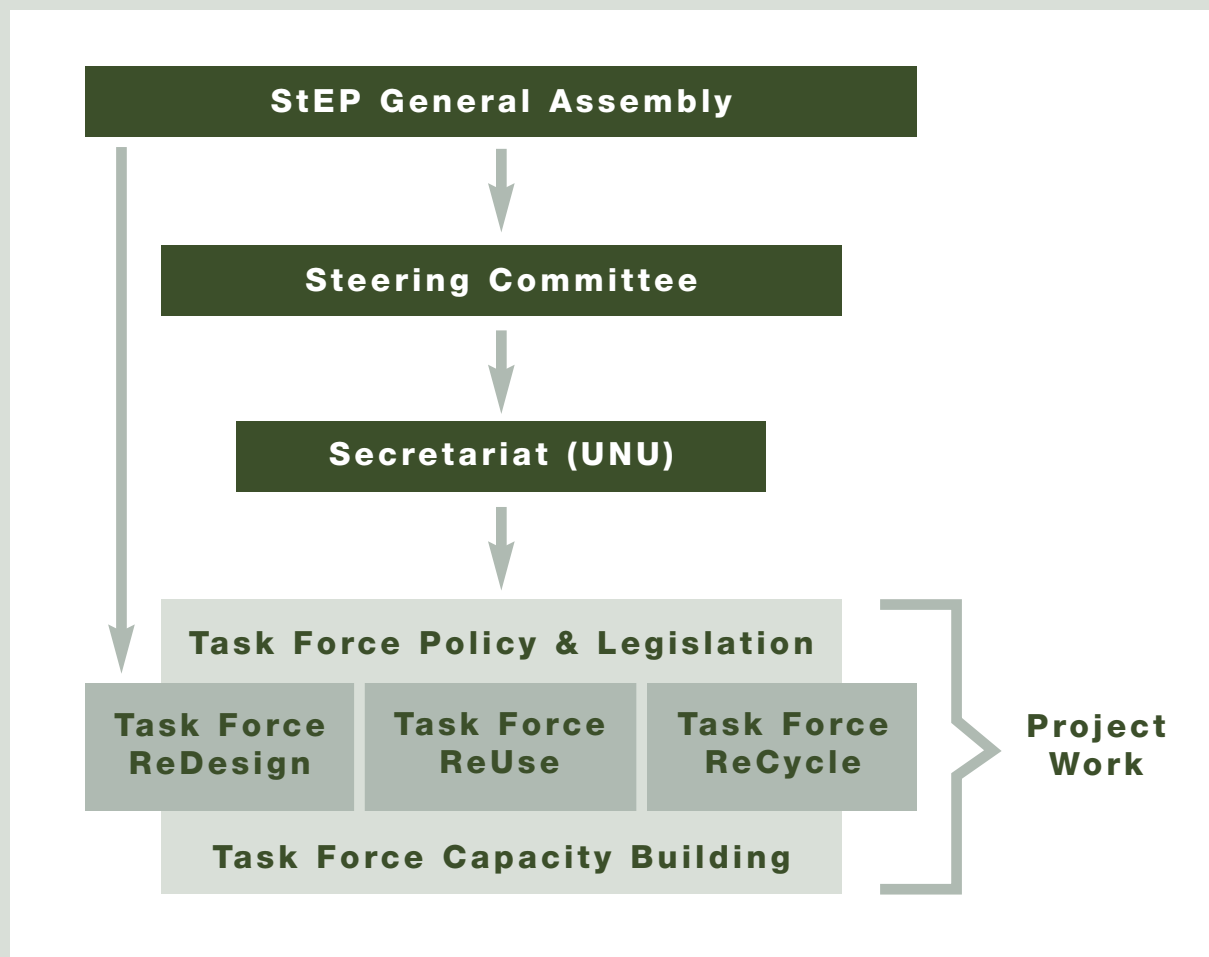*MIT's MSL is participating in StEP because we believe it is an effective mechanism for collaborating on important research topics with a broad range of stakeholders. StEP is structured in a manner to ensure that its research has impact.*

Joel P. Clark, Professor of Materials Science and Engineering and Engineering System, Founder and Director of the Materials Systems Laboratory, Massachusetts Institute of Technology

StEP Organizational Chart

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StEP General Assembly
        ↓
Steering Committee
        ↓
Secretariat (UNU)
        ↓
Task Force Policy & Legislation
Task Force        Task Force        Task Force              Project
ReDesign          ReUse             ReCycle                 Work
Task Force Capacity Building
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StEP's History

Researchers at UNU have been examining the interrelation between electronic devices, especially computers, and the environment for several years. Such research led to a book project, which was published under the title *"Computers and the Environment: Understanding and Managing their Impacts"* in late 2003. While working on the book, many more questions concerning this subject matter were identified. So the topic was expanded from computers to the whole field of electrical and electronic equipment – and eventually grew into the development of an international initiative: Solving the E-waste Problem (StEP). Important initiators of the StEP project were Klaus Hieronymi, Hewlett Packard, Ruediger Kuehr and Eric Williams, both at UNU, and Axel Schneider from promotion team wetzlar.

At Nokia, we are continuously looking for innovative and sustainable ways to improve and expand our recycling programmes. We joined StEP for the opportunity to share information and develop best practices with others that have the same vision.

Markus Terho, Director, Environmental Affairs, Nokia

StEP Task Forces Explore Sustainable Solutions to the E-waste Problem…

Task Force 1: Policy and Legislation

In recent years the management of end-of-life electronics has emerged on the world's agenda of environmental and development issues to tackle. Significant increases in the generation of waste electrical and electronic equipment (WEEE) have led many concerned countries to legislate and implement policies that deal with the reasons and the consequences of this develop-ment. Even though policymakers worldwide are increasingly respon-ding to rapidly growing e-waste streams, this response has taken shape by single-state action and proposals, leading to a patchwork of different policies in place or under development.

In contrast most newly industria-lizing and developing countries do not have legislation specifically dealing with e-waste, even though they receive increasing quantities of end-of-life equipment via im-ports. In addition to waste im-ports, the vulnerability of the re-cipient countries is aggravated by their own waste generation. Populous countries like China and India tend to have the fastest growing markets for electrical and electronic equipment and are already huge producers of e-waste themselves.

StEP's Policy and Legislation Task Force aims to report and analyse the status of existing policy approaches relevant to the pro-duction, usage and disposal of electrical and electronic equip-ment. Based on this research, it will support future developments in the field of e-waste policies and legis-lation from a holistic point of view.

Key objectives of this Task Force include improving harmonization of worldwide policy approaches, compliance and enforcement.

Task Force members have priori-tized their work in 2008 to look into optimizing e-waste policies, e-waste take-back and collection systems, policy responses to metal scarcity and institutional coopera-tion in the field of transboundary movements of waste.

Best E-Waste Policies

Recognizing the urgent need to develop recommendations for "Best E-waste Policies", StEP's Policy and Legislation Task Force has started a project to com-paratively evaluate different national policies and legislation on e-waste and from this to come up with recommendations for optimizing e-waste policies.

The development of "Best E-waste Policies" is seen as a long-term objective. There are numerous fundamental knowledge gaps that inhibit proper planning of alternative systems. New standards, regula-tions, incentives and approaches to enforcement need to be developed and implemented. E-waste is a poli-tically contentious issue, with com-plicated interfaces of the interests and perceptions of industrializing and industrialized countries, governments, manufacturers, re-cyclers and NGOs. There is thus a need for analysis and dialogue from a neutral standpoint in order to pave paths towards consensual solutions to the e-waste problem which manage environmental risk and enhance development. In a first step, a Task Force sub-group is comparatively analysing how stake-holders are managing e-waste.

Flection Inter-national joined StEP since this is the platform & knowledge-base for best practices, ideas and future developments concerning ICT recycling and re-use.

Joep van Loon, Managing Director, Flection International b.v.

E-waste issues now become global and require cooperation and support from all key stakeholders. I have the confidence that the StEP Initiative can serve as the neutral focal point to exchange experience and expertise to provide the appropriate solutions.

Charuek Hengrasmee, President, Thai Electrical and Electronics Institute

Take-Back Systems and Design Guidelines

While it is laudable that policy-makers across the world address e-waste issues, they often lack an in-depth knowledge and the practical experience required to create efficient systems to collect and process e-waste, also known as "take-back systems" for end-of-life electronics. The current systems in-place are nascent and many were developed concurrently without the benefit of learning from existing systems. This leaves policymakers and system architects in the unenviable position of creating systems that are essentially experimental in nature – they must use policy instruments that are new and have not been well-tested. A tangential result is that there is a patchwork of different implementations of e-waste take-back systems in many states and regions. There is a need for a consolidated source of information on WEEE take-back system design that summarizes design alternatives and highlights their strengths and weaknesses.

StEP has addressed this issue in a White Paper on Take Back Systems and Policy Approaches. The primary objective of this paper is to provide guidance to policy-makers and system architects on the policy tools, configuration alternatives, financing schemes and management alternatives that may be used to operate such systems. It provides a description of the generic structure of a take-back system, followed by details on the alternatives available to fulfil each component of the system and strengths and weaknesses of various alternatives. Key considerations in system design and examples of current system models are included at the conclusion of the document. The White Paper can be downloaded at http://www.step-initiative.org/publications/

"Resource Scarcity" – International Policy Responses

Global demand for naturally occurring scarce elements is rising to meet the needs of an increasing population and widespread economic development. Many of these needs relate to the economic well-being of society as a whole and are highly interconnected, such as infrastructure, food production and distribution, health, education and effective government. Without an adequate understanding of the way in which scarce elements are extracted and produced, and in what quantities, we may be jeopardizing the economic well-being of future generations in terms of their access to resources. Whilst technological advances and material substitution can account for some mitigation of this problem, the medium- to long-term supply of geochemically scarce elements, which is a necessary prerequisite for a widespread market diffusion of emerging technologies such as thin-film photovoltaics, cannot be secured without appropriate policies on an international scale.

With this in mind, StEP has reviewed existing policies and found that the international policy framework is inadequate to secure the medium- to long-term supply of these geochemically scarce elements. In its research study *"Resource Scarcity – Evidence of the need for an appropriate international policy response towards the supply and demand of geochemically scarce elements"* UNU, EMPA and ETH Zurich evaluate the problem and offer recommendations on a strategic response. Publication as a StEP White Paper is foreseen for 2009.

Why is e-waste growing?

E-waste is growing exponentially simply because the market for electronic products is also growing rapidly as many parts of the world cross the so called „digital divide". For example, between 2000 and 2005, the Organisation of Economic Co-operation and Development (OECD) notes a 22 per cent growth in Information Communication Technology (ICT) in China. China was the 6th largest ICT market in 2006, after the US, Japan, Germany, UK and France. This is astounding when one considers that just ten years ago, according to UN data, less than 1 per cent of China's population owned a computer.

Computers are only one part of the e-waste stream. In 2005 fridges and other cooling and freezing appliances, combined with large household appliances, accounted for 44 per cent of total e-waste in the EU, according to UNU's Study supporting the 2008 Review of the Waste Electrical and Electronic Equipment (WEEE) Directive. The production of household fridges in China is rising rapidly, at over 7 per cent in the first quarter of 2007.

Rapid product innovations and upgrades, especially in ICT and office equipment, combined with the migration from analogue to digital technologies and to flat-screen TVs and monitors, are fuelling the increase. Economies of scale have given way to lower prices for many electrical goods, which has increased global demand for many products that eventually end up as e-waste.

Transboundary Movements of Waste

When electrical and electronic equipment has reached it final end-of-life in (post-) industrialized nations, some of the equipment is exported to transition and developing countries either for re-use or illegal dumping. In recipient countries the recycling and separation of electronic waste is now a main source of income for a growing number of people. However, in most cases this is done with poor health and safety standards in place, exposing workers to extensive health dangers as well as leading to substantial environmental pollution. Moreover, recycling in this context usually focuses on a few valuable elements like gold and copper (with often poor recycling yields), while most other metals are discarded and inevitably lost.

In order to regulate, monitor and control transboundary movements of waste, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted in 1998. The Secretariat to the Basel Convention, which facilitates the Convention's activities on the environmentally sound manage-ment of electronic and electrical waste, and the StEP Initiative signed a Memorandum of Understanding (MoU) in September 2008. This agreement lays down a framework to enhance use of existing expertise and cooperate in the development of research, capacity development and outreach activities, as well as in making recommendations for policy development.

Moreover StEP contributed to the IMPEL TFS (European Union Network for the Implementation and Enforcement of Environmental Law Cluster Transfrontier Ship-ments of Waste), E-waste work-shop 20 & 21 Nov. 2008 in Faro, Portugal in order to establish a closer cooperation.

Challenges related to EEE product and material flows require more and more a global and multi-disciplinary collaboration. The PLM research group at TU Braunschweig joins StEP to tackle these challenges with global partners in joint research projects.

Christoph Herrmann, Head of the research group Product- and Life-Cycle Management, Technische Universität Braun-schweig

Electrical and Electronic Equipment and Climate Change

During the last couple of years, the climate change debate has taken a dramatic turn. The release of the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report and the Stern Review on *"The Economics of Climate Change"*, the movie *"An Inconvenient Truth"*, and the Nobel Peace Prize awarded to the IPCC and Al Gore have galvanized public opinion and created a new momentum to address what many world leaders describe as the most serious challenge ever faced by mankind.

In 2007 the United Nations University, and in particular a consortium under the StEP umbrella, outlined the positive contribution that electronics re-cycling can make in the prevention of greenhouse gas emissions. Each kg of electronic waste collected and treated according to different end-of-life scenarios has a different potential. The current collection rate of e-waste in Europe is annually, roughly speaking, 2.2 Mt out of 10.3 Mt potentially arising. If Member States were to collect and treat 5.3 Mt – the estimated collection rate achievable – this would reduce emissions by nearly 38 Mt of CO_2 equivalent per year.

Due to much higher metal grades compared to mining ore con-centrates, state-of-the art recycling requires significantly less energy and thus generates much less CO_2 than mining. StEP member Umicore calculated that the total metal output from treatment of 300,000 t of mainly secondary materials at their Hoboken refinery in 2007 caused only one-fifth of the CO_2 emissions that would have been generated if these metals would solely have come from mining operations. For typical e-scrap feed like circuit boards and cell phones, the CO_2 saving factor will even be significantly higher since the contained plastic fraction in the feed substitute energy for smelting etc. StEP member Umicore calculates an annual CO_2 emission of 23.4 Mt almost 1/1000 of the world's CO_2 production, for the metals needed to produce electrical and electronic equip-ment. There are other metals contained in e-scrap (like steel, Al, Ni, Pb, etc.) which also generate CO_2 in their primary production, but they are not included in the figure of 23.4.

Hence, StEP has started to further analyse the potentials of reducing greenhouse gas emissions through e-waste recycling, to develop sustainable business models and to establish truly closed cycles in the envisioned "recycling society".

The issues around electronics re-use are sensitive and complex. AER Worldwide joined StEP in order to work cross-sector in a global team to promote environmentally, socially and economically sound electronics re-use models.

*John Dickenson,
Vice-President Business
Development, AER Worldwide*

Task Force 2: ReDesign

Environmental design and life-cycle assessment are two concepts that support low materials intensity, low toxicity and high recyclability. The use of these concepts in the production of electrical and electronic equipment continues to grow significantly. StEP's ReDesign Task Force is dedicated to product design. It contributes to the StEP aim – Solving the E-waste Problem – by fostering design approaches which ensure that environmental impacts, including pollution and waste, are considered and mini-mized at all stages of a product's life, not just at the disposal stage.

E-waste legislation typically aims to improve product design with respect to re-usability and re-cycling. Furthermore, material bans, such as the European RoHS, are largely motivated by concerns regarding a potential release of toxic substances at the end-of-life of equipment. However, current legislation lacks appropriate economic incentives for manufac-turers to benefit from developing more sustainable designs. The first ecodesign legislation worldwide, the European Directive 2005/32/EC on the Eco-design of Energy-using Products (EuP Directive), intends to tackle "design for recycling" (DfR). There is a clear need for appropriate, effective and evidence-based DfR criteria, which can be implemented in a legislative policy framework.

In addition, product technologies are relevant to e-waste on various levels. Add-on technologies, such as radio-frequency identification (RFID), are implemented in products to support e-waste management and logistics. Although such technologies have been investigated extensively over recent years, they have yet to be implemented in the market for various reasons. Other technology trends in the electronics sector, e.g. electronics in textiles, also result in foreseeable challenges for e-waste management. Furthermore, the rapid uptake of some new technologies, such as flat panel displays, has seen the recycling industry struggling to keep pace.

Design for Re-use and Recycling – Case Studies

The work of the ReDesign Task Force is driven by the view that risks to public health and the environment from e-waste can be reduced by product redesign. Redesign optimizes the lifetime (use) of a product by implementing measures that improve repair, refurbishment, re-use, and re-cycling of the product or its components.

A compilation of DfR examples has been provided by the ReDesign Task Force as a DfR Case Studies Library. In addition to giving an overview on current approaches, the library currently offers 13 case studies in the field of design for recycling. An update with additio-nal examples might be a task for coming years.

StEP is for Delft University an inspiring forum to exchange ideas and knowledge. Even more important, it is a platform for action. StEP is the perfect way to put engineering into a societal perspective!

Ab Stevels, Professor, Design for Sustainability Lab, Delft University of Technology
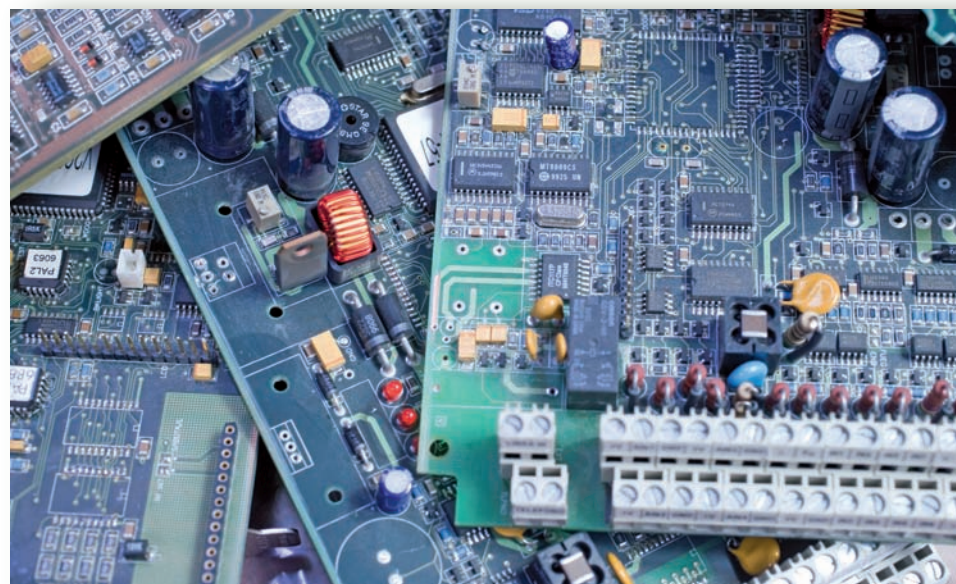
SECO initiated the Swiss program for global partnerships in e-waste recycling in the wake of first alarming news about dangerous e-waste recycling. StEP as a global platform for efficient knowledge exchange is supporting this country based programme.

Hans-Peter Egler, Head of Unit, Trade Promotion, Swiss State Secretariat for Economic Affairs (SECO)

Dell recognizes that the solution for E-Waste problems are bigger than just one company and has joined StEP to participate in a globally represented multi stakeholder group working on different aspects of the e-waste challenge.

Jean Cox-Kearns, Senior Dell EMEA Take Back Manager, Asset Recovery & Producer Responsibility Programmes

Closing the Loop – Electronics Design to Enhance Reuse/Recycling Value

End-of-life (EOL) management has traditionally been an externality for those who design and sell electronic products. Whilst making products that are more easily assembled is in the interest of manufacturers – and as such the products are likely to be more readily disassembled – design decisions solely to enhance the end-of-life value proposition have not been a high priority for manufacturers. Producer responsibility – where manufacturers take financial responsibility for the recycling of their products – could potentially internalize this design issue. However, this can be expensive, potentially requiring brand sorting. An environmental standard to which manufacturers pay serious attention could provide an effective incentive to improve design for end-of-life. And that is the intent and strength of the Electronic Product Environmental Assessment Tool (EPEAT), a system to help purchasers in the public and private sectors evaluate, compare and select desktop computers, notebooks and monitors based on their environmental attributes.

The Closing the Product Design – End-of-Life Loop project ("Closing the Loop") intends to generate recommendations to promote design for EOL, including EPEAT. It is being conducted by StEP member Wayne Rifer as a member of the Green Electronics Council (GEC) and the National Center for Electronics Recycling (NCER). This project explores the following questions:

1. What are the greatest challenges and obstacles facing electronics refurbishers and recyclers that are caused by the design of consumer electronic products?

2. How could the design of these products be changed to enhance the EOL value proposition?

3. What kind of information from manufacturers, and in what form, would expedite the most efficient management of electronics at EOL?

The final draft has been reviewed by StEP members and ideas for future research were included in the final version.

Zero Waste Strategies for Electronics

"Production without waste and harmful emissions – hardly any idea is more convincing and challenging." That was the introduction to a radio story by German Bayerischer Rundfunk in 1997 about enterprises without chimneys. Initial reactions called this a crazy idea or simply impossible. Nevertheless, this idea of Zero Emissions could become a new industrial standard and a new model for a sustainable society.

Under the umbrella of a larger Zero Emissions research project, a number of StEP's ReDesign Task Force members have started looking at the Zero Emissions Concept from a design perspective. Project activities include the development of science-based best practice design guidelines for recycling of flat panel display products, such as LCD monitors, laptops and LCD and plasma TVs, the development of a detailed product concept for a DfR Laptop including a feasibility study and the development of a prototype, and the elaboration of a Report on Innovative Technologies to facilitate Individual Producer Responsibility and product re-use.

Why is e-waste different from general municipal waste?

Electrical waste contains hazardous but also valuable and scarce materials. Up to 60 elements from the periodic table can be found in complex electronics. To use the home computer as an example – a normal cathode ray tube (CRT) computer monitor contains many substances that are valuable but also many that are toxic. One of these toxic substances is cadmium, which is used in rechargeable computer batteries and contacts and switches in older CRT monitors. Cadmium can bio-accumulate in the environment and is extremely toxic to humans, in particular affecting the kidneys and bones. It is also one of the six toxic substances that have been banned in the European Restriction on Hazardous Substances (RoHS) directive.

In addition to CRT monitors, plastics, including polyvinyl chloride (PVC), are used for printed circuit boards, connectors, covers and cables. When burnt or land-filled, PVCs release dioxins that affect human reproductive and immune systems. Mercury, which is used in lighting devices within the flat panel displays, can cause damage to the nervous system, kidneys and brain, and can be passed on through breast milk. Electrical goods contain a range of other toxic substances such as lead, beryllium, brominated flame retardants and polychlorinated biphenyls (PCBs) to name a few. Lead plays an important role in the overall metal production processes. Hence, attempts to design-out lead from electrical and electronic equipment do not necessarily mean that it is no longer used. Even the lead-free solder elements are co-produced with lead. This illustrates the importance of taking a holistic view when analysing the e-waste situation and working out possible solutions.

One must also consider the huge impact of using valuable metals in the manufacture of electronic products. A mobile phone, for example, can contain over 40 elements including base metals (such as copper and tin), special metals (such as cobalt, indium and antimony) and precious metals (such as silver, gold and palladium). Most of the metal content is copper (9 g), while the precious metal content is in the order of milligrams only: 250 mg silver, 24 mg gold and 9 mg palladium. Whilst these levels may appear low, with the leverage of 1.2 billion mobile phones sold globally in 2007 this leads to a significant metal demand. Similar calculations can be made for computers or other complex electronics. 80 per cent of the world indium demand is used for LCD glass; over 80 per cent of ruthenium is for hard disks and 50 per cent of the antimony is used for flame retardants.

Asian Electrical and Electronics Green Society Conference

To facilitate the dialogue on e-waste related issues between Asia and the EU, StEP member EEI is currently preparing an international conference on 07 – 09 October 2009 in Bangkok, Thailand. Product design, life cycle assessment, corporate social responsibility, and global sustainability at both public and private levels are among the priority topics discussed.

The conference will provide a forum to share ideas and experiences in this field where leading experts present their research activities and discuss new concepts and technologies for sustainable electronics.

The international conference will address the following themes:
• Information dissemination to the public and public relation towards the development of an Electrical and Electronic Green Society
• Exchange of knowledge and experiences in research at both local and international levels
• Building up cooperations and support in academics, research, and skills from various organizations, publicly and privately, within Thailand and from overseas

Griffith University recognizes that while dealing with e-waste as a local and regional issue, it is a global problem that needs a global solution and StEP is by far the most effective global initiative developed to solve the e-waste problem.

Sunil Herath, Senior Lecturer in Environmental Engineering, Griffith School of Engineering, Griffith University

A problem as broad, complex and important as e-waste cannot be tackled in isolation. The University of Limerick became involved with StEP because this multi-stakeholder approach offers the best opportunity to find sustainable solutions.

**Colin Fitzpatrick,
University of Limerick**

Task Force 3: ReUse

Our world is dominated by rapid technological change. As new technology is introduced to various markets, older technology is displaced, resulting in a stream of equipment in all stages of operation. The re-use of electrical and electronic equipment helps to reduce waste. There are many re-use strategies to prevent a product or component from entering the waste stream. One can sell the product to another user, donate the product to another user, restore the product if it is damaged prior to moving it to another user, or harvest components from it. Furthermore, for products that are material-intense in their production, re-use can enhance resource efficiency, reduce the usage of virgin materials and thus reduce deleterious effects from extraction of materials from the earth.

According to UNU calculations from 2001, the total fossil fuels used to make one desktop computer weigh over 240 kilo-grams, 10 times the weight of the computer itself. Also, substantial quantities of chemicals (22 kg), and water (1,500 kg) are used in computer manufacturing. So re-use diverts materials from disposal, provides social benefits in terms of job creation, conserves natural resources and reduces pollution.

To secure the benefits from re-use of electrical and electronic equipment one must overcome various difficulties linked with the following issues:

- An absence of established markets for re-used electronic products;
- A lack of efficient collection systems that guarantee constant supply of re-usable equipment;
- Long-term storage by consumers due to lacking aware-ness or a negative consumer perception of used products;
- Barriers such as legal liability, warranty issues and data protection;
- Product design not allowing easy disassembly or an absence of accepted quality standards for recovered products and components.

Aware of these challenges, StEP's ReUse Task Force aims to define globally consistent re-use practices and standards in order to change consumer behaviour (to get acceptance for re-use and early product take-back), to extend the usage of electrical and electronic products and components, and to reduce the flow of irresponsible re-use between donor and development countries.

Towards Common Definitions in Re-use

The term re-use (and its associated terminology) has several definitions in international legislations, norms and re-use practice, all embracing different contexts and not following a global standard for communication. The StEP Initiative dicovered early on that mixed definitions of key terms can become barriers for solutions and create confusion among academia, government, industry and, of course, consumers, thus hindering an efficient re-use market.

In its White Paper *"One Global Understanding of Re-Use – Common Definitions"* the ReUse Task Force lays down a common understanding of key terms related to re-use, their definitions and concepts. It does not discuss existing definitions in depth, but creates one "dictionary" of key definitions in order to establish a global standard for communication. The White Paper can be downloaded at http://www.step-initiative.org/publications/.

When much of WEEE generated in the world is still exported to developing countries despite the Basel Convention, StEP is a unique network to find new ideas and project partners to solve the e-waste problem in the world and in France.

Cédric Gossart, Associate Professor, TELECOM & Management SudParis

How much e-waste is there?

Because so much of the planet's e-waste is unaccounted for, it is difficult to know exactly how much e-waste there is. Moreover the types of e-waste included in government-initiated analyses and collection programmes is different across the world: the EU has 10 distinct product categories, whereas in North America it is typically limited to Information and Communication Technology (ICT) products and TVs, and in Japan to four product categories including TVs, air conditioners, refrigerators and washing machines. Nevertheless reasonable estimates are in the order of 40 million tons per annum, which is enough to fill a line of refuse collection vehicles (RCVs) stretching half way around the globe.

A recent review of European legislation on e-waste, known as the "Waste Electrical Electronic Equipment (WEEE)" Directive, highlights that in Europe alone Member States generated between 8.3 and 9.1 million tons of e-waste in 2005. In Australia, with an average of 22 electrical items per household, the Australian Bureau of Statistics has estimated that in the next two years, most of the 9 million computers, 5 million printers and 2 million scanners in Australian homes will be replaced. In the US, the Environmental Protection Agency (EPA) has reported that the US generated 1.9 to 2.2 million tons of e-waste in 2005, with only 12.5 per cent collected for recycling.

We strongly believe in the goals and activities of StEP to solve the global challenge of e-waste and to close the resource cycles. We contribute through our international network, projects and our more than 15 years of hands-on experiences.

Bernd Kopacek, Austrian Society for Systems Engineering and Automation (SAT)

Business Principles for Re-use

To enable product re-use, product returns from the market have to be managed, prepared and qualified for another use phase and marketed again to their target markets. All these activities involve multiple actors and complex product flows. The challenge for companies in this sector is to match available supply of used products to market demand. Furthermore, companies have to understand the influencing factors on return and sales markets for used electronics.

StEP's ReUse Task Force has thus launched a research thesis addressing this topic, supervised by the Technische Universität Braunschweig, Germany. The goal of this thesis is to develop a prediction model for product returns and secondary market sales. Validation with real market data should help researchers to understand re-use markets. And varying key parameters will allow them to build scenarios of future market developments and predict product flows. The results of this thesis will flow into a StEP White Paper on Business Principles for Re-use.

Framework Conditions for Re-use

The White Paper on Framework Conditions will discuss the following questions:
• What is the benefit of re-use?
• What is the current situation?
• What are barriers to re-use?
• How to overcome these?
Work on this White Paper has just started.

Forum for Re-use Research

Task Force members have seen the urgent need for an international platform to share ideas, questions and information, focusing specifically on re-use only. Thus StEP helped to organize a separate forum at the Electronics Goes Green 2008 conference, looking into professional re-use, refurbishment, remarketing and sustainable consumption of electronics. The forum was entitled the 1st World ReUse Forum and its highly interactive discussion sessions covered matters such as innovative business models in re-use markets, communication with stakeholders, re-use technology, tools and design, re-use and transboundary shipments, global re-use definitions. It is envisaged to establish a conference series, with the next World ReUse Forum taking place in Japan in 2010.

StEP is one of the world's most relevant initiatives paving the ground for a future with sustainable ICT. Empa as a materials science and technology institute of the ETH domain is proud to be part of this initiative.

Lorenz M. Hilty, Professor, Technology and Society Lab, Empa – Swiss Federal Laboratories for Materials Testing and Research

Task Force 4: ReCycle

Modern electronics can contain more than 60 different elements: many are valuable, some are hazardous and some are both. Despite all legislative efforts to establish a circular flow economy, today the majority of valuable resources are lost due to insufficient collection efforts, inappropriate recycling technologies, and above all due to large and often illegal exports streams of e-waste into regions without any or with inappropriate recycling infrastructures.

Increased take-back and innovative recycling technologies at the different steps of the recycling chain can generate genuinely sustainable products and services and can create new markets. What is more, next to the direct impacts of recycling on resource efficiency, sustainable recycling operations contribute to reducing greenhouse gas emissions. The ecological footprint of mining, especially regarding the precious and special metals used in electrical and electronic equipment, is very high due to the low concentration of these metals in the ores and often difficult mining conditions. Recovering these metals through environmentally-sound e-waste recycling needs only a fraction of energy compared to mining ores in nature.

StEP's ReCycling Task Force aims to connect with a multitude of stakeholders involved in realizing sustainable recycling systems for electrical and electronic equipment worldwide. The ReCycling Task Force strives to increase evidence-based decision-making and enable the independent role that scientific research should play in complex sustainability themes such as e-waste recycling.

The mission of DSF is to contribute to the creation of a fair, all-inclusive information society, by putting ICT at the service of human development. We are very proud to be part of the StEP initiative which enable us to share information with various partners and better handle the e-waste management issue in a multi-stakeholder perspective.

Cissé Kane,
Project Manager, Global
Digital Solidarity Fund (DSF)

Philips perceives StEP as an inter-national stakeholder platform that results in a better understanding of e-waste management for all parties involved and creates improvement opportunities for recycling systems worldwide.

Theo Schoenmakers,
Senior Director Sustainability,
Philips Consumer Lifestyle

Partnership and knowledge transfer are the two key issues for joining the StEP Initiative

There is a need to apply an environmentally and economically sound e-waste management system in the Middle East & North Africa in cooperation with the StEP members.

Hossam Allam, Regional Programme Manager, Centre for Environment and Development for the Arab Region & Europe (CEDARE)

The Best of Two Worlds

The Chinese e-waste recycling system is characterized by efficient manual pre-processing with relatively pure fractions and little material losses. However, primitive and hazardous processes are often found when it comes to the actual recovery of complex material, such as printed wiring boards. The existence of such primitive recycling techniques combined with the upcoming e-waste amounts in China underlines the need of urgent action in order to avoid tremendous environmental and social impacts.

StEP's ReCycling Task Force members have thus launched the Research Project *"The Best of Two Worlds"*. The Best of Two Worlds combines manual dismantling, traditionally prevalent in newly industrializing countries with low labour costs, with the best available technology for the further processing of complex materials. The aim is to optimize the interface between manual pre-processing and further treatment by assessing the optimal dismantling level.

The realization of modern, environmentally sound and large-scale disassembly processes and subsequent monitoring of the resulting material streams are key elements in enhancing the quality of treatment, economies of scale and supporting a gradual conversion of the uncontrolled informal sector into better controlled recycling operations. In this project, attention focuses on professional, transparent operations that comply with environmental, health and safety standards. By strengthening such operations it becomes possible to optimize resource chains and meet the rising demand for materials in a more eco-efficient way. At the same time a growth in employment and improving environmental, health and safety conditions can be realized.
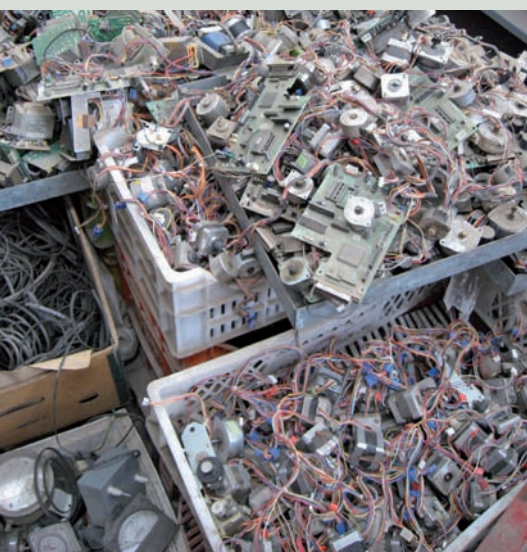
Why is so much e-waste unaccounted for?

The US EPA has estimated a 5 to 10 per cent increase in the generation of e-waste each year globally. Perhaps even more alarming is that only 5 per cent of this amount is being recovered. So what happens to the rest? In Europe the review of the WEEE Directive by the United Nations University found that 25 per cent of the total weight of the EU's e-waste in 2005 was unaccounted for. Astoundingly, that means there was no scientific data available to explain where over 6 million tons of e-waste is going each year. Why is so much e-waste unaccounted for? We don't really know for sure. Enough is known to suggest a few explanations, such as illegal trade to developing countries, like China and India, domestic 'informal' processing centres as well as the e-waste that remains in the sheds, attics and storage rooms of sentimental owners.

E-waste Management in Africa

Most African countries do not have the appropriate infrastructure in place yet to deal with the growing amount of waste from electronic (computers, mobile phones etc.) and electrical (e.g. washing machines, fridges) equipment. This waste primarily arises from an increased demand for such products, the import of new and used products as well as donations to schools and charities.

Many African countries have an active informal sector which harvests the valuable materials contained in WEEE. This activity occurs in backyard operations and provides an important source of income for local workers. Consequently, there is likely to be some resistance from this sector to the introduction of new automated systems. Any solution must therefore involve the informal sector, which provides jobs for the under-privileged; however, the processes used to treat e-waste need to be improved to increase worker safety and minimize environmental damage.

The ReCycling Task Force has addressed this issue in a project on E-waste Management in Africa. This project includes an assessment of e-waste management in Kenya, Morocco and Senegal and the implementation of a replicable pilot-project for the processing of e-waste in South Africa. By sharing knowledge between countries and from other continents, StEP can explore new usage and potential markets for the by-products of e-waste. This will clearly help to generate income for underserved people in the respective communities. The final reports can be accessed via http://www.step-initiative.org/publications/index.php.

StEP Recycling Guidance

Now that climate change and environmental degradation are high up on the political agenda, corporate "greenwash" threatens the real and honest efforts of all those taking steps to reduce resource consumption, greenhouse gas emissions, mitigate climate change and minimize environmental destruction.

Prepared by the ReCycling Task Force, StEP's Recycling Guidance paves the way for establishing an approach similar to Generally Accepted Accounting Principles – whereby flows are accounted for in a standard way throughout the treatment and downstream vendor chain. Such guidance aims to support the development of recommendations for global re-cycling and auditing standards and facilitate an international network of well-trained auditors from the Auditing Consultancies involved.

The NCER values the forum that StEP provides for international information exchange and problem solving, such as lessons learned from the implementation of other e-waste policies around the world as we move forward with new state systems in the US.

Jason Linnell, Executive Director, National Center for Electronics Recycling (NCER)

Supporting the StEP Initiative aligns with Microsoft's commitments to help bridge the Digital Divide and enhance the re-usability of personal computers and other devices to keep them out of the waste stream as long as possible. The e-waste problem is complex, and StEP fosters collaboration among stake-holders and emphasizes the value of scientific research. Together we are working toward a solution.

Kimberly Braun, Environmental Engineer, Microsoft Corporation – Entertainment and Devices Division

At our Chiho Tiande treatment centre, all e-waste ends up as a reservoir of valuable materials. The treatment of obsolete electronic appliances is reversed assembling. I believe in exchange of our expertise, with mutual benefits for all stakeholders.

Stephan van Ooyen, Chiho Tiande

The Environmental Fate and Effects of Hazardous Substances

With the increasing legal and illegal trade of waste electrical and electronic equipment worldwide comes an equally increasing concern that poor e-waste recycling techniques particularly in developing countries are generating more and more environmental pollution that affects both ecosystems and people living within or near the main recycling areas.

Until recently, it has been difficult to clearly link environmental pollution with e-waste recycling activities. However, an increasing number of studies published over the past few years clearly indicate a causal relation between pollution levels and emissions from informal e-waste recycling activities. Atmospheric pollution due to burning and dismantling activities seems to be the main cause for occupational and secondary exposure at the e-waste recycling sites. Other emissions from e-waste recycling such as leachates and toxic liquids, increase human exposure through affected natural resources such as soils, crops, drinking water, livestock and fish.

Summarizing these studies and creating a solid basis for further scientific discussion, Task Force members have initiated a review of the environmental fate and effects of hazardous substances released from electrical and electronic equipments during recycling. The review compiles information from published literature about the fate and environmental levels of lead, polybrominated diphenyl ethers, dioxins and furans in e-waste recycling areas of China and India, two of the countries most impacted by informal and inappropriate recycling practices, where there is a great need for resources and very low labour costs.

Such reviews highlight the need for environmental and occupational protection measures to introduce advanced processing methods, improve the workplace environment, and biomonitor the exposed populations. The paper is in the review process for publication by a journal.

Recycling – From E-Waste to Resources

Recycling reduces waste going to disposal, decreases consumption of natural resources and improves energy efficiency. Hence, it is a key process, which can be improved through innovative and more effective processes and technologies. That said, recycling processes and technologies have to be identified for a range of framework conditions and e-waste products, recognizing that the barriers for implementation, especially in developing countries, can be high.

Contracted by UNEP, a StEP consortium has undertaken a research study on *"Sustainable Innovation & Technology Transfer – From E-Waste to Resources"*, analysing the market potential of relevant technologies for the e-waste recycling sector in selected developing countries, applying the framework for UNEP technology transfer activities and identifying innovation hubs and centres of excellences in emerging economies relevant for e-waste recycling technologies. The study for UNEP was finalized in December 2008 and is planned for publication in 2009.

Task Force 5: Capacity Building

Generally speaking the challenges and opportunities e-waste poses to our society are still widely overlooked. StEP's Capacity Building Task Force aims to strengthen the foundations for sustainable and efficient management of electrical and electronic products through their entire life-cycle.

Task Force members initiate and maintain links between practitioners, thus gaining a comprehensive overview on existing approaches, tools and networks for capacity building and building a dialogue with relevant key actors in this field. Based on this expanding network, the Capacity Building Task Force strives to identify and develop viable approaches (content and methodology) adapted to different target countries/target groups, to test these approaches by implementing pilot-projects, and to embed these pilot-projects in sustainable structures (local adoption, follow-up, resources etc.). These approaches and experiences from pilot-projects should then also lead to the deduction of criteria and standards and the elaboration of guidelines and recommendations.

The Capacity Building Task Force has made slow progress in 2008, as it has lacked a Task Force coordinator during the course of the year, with United Nations University taking over interim coordination. Efforts focused on the realization of a summer school on e-waste management and the representation of StEP at various international conferences and events.

Summer School on E-waste Management

The vision for the summer schools is to develop the foremost forum available to young scientists involved in e-waste related research, where they can share their knowledge, interact with experts and develop collaborative partnerships that foster high quality cutting-edge scientific research on all areas related to e-waste – from policy to technology and from economics to social aspects. The e-waste summer schools are a pioneering concept in the research and education on e-waste management, looking at the e-waste issue in its entirety, rather than through the lens of a specific academic discipline.

The e-waste summer schools offer participants a diverse curriculum in an innovative framework supported by various teaching and learning methodologies including lectures, workshops, participant presentations, group projects and plenary discussions with an international interdisciplinary faculty and experienced facilitators. Divided into two, the first summer school will have a greater focus on prioritising and developing the research agenda through research projects; and the second summer school's emphasis will lie on the evaluation of the research results and the applicability of the lessons learnt.

The first summer school, supported by NVMP and Philips CL, is planned to take place in September 2009 in Eindhoven, the Netherlands.

We are always aware of the issue of e-waste disposal when dealing as an advertising agency with our international electronics customers. We are glad being an active part of StEP since its foundation and contributing to the success of this initiative.

Axel Schneider,
Executive Director,
promotion team wetzlar

Dataserv became involved in STEP because we feel as a company that there needs to be more direct involvement in the setting up of responsible practices for the disposal of e-waste in the developing world.

Neal Saunders, Group Managing Director, Dataserv

E-waste Management in Latin America and the Caribbean

In 2008 the StEP North American Regional Focal Point worked with Empa and RELAC (a regional platform on e-waste in Latin America and the Caribbean) in coordinating a workshop on the challenges and strategies for e-waste management in Latin America and the Caribbean (LAC). This was held at the REWAS 2008 Global Symposium on Recycling, Waste Treatment and Clean Technology in Cancun, Mexico, during October 2008. The primary objective of the workshop was to identify major challenges and strategies associated with the management of e-waste in LAC under the policy principle of Extended Producer Responsibility. This was accomplished by facilitating discussion among OEMs, recycling companies, PROs, government authorities, and academics. The discussion enabled the analysis of existing experiences and identification of suitable approaches to deal with challenges, including exploring the potential of regional solutions and the role of public-private partnerships.

The workshop included the following presentations which were meant to stimulate ideas for discussion:

- General overview on the e-waste situation in LAC, Uca Silva, Regional Platform on e-waste RELAC – SUR/IDRC, Santiago, Chile
- E-waste situation and trends in OECD countries, John Dickenson, AER Worldwide, StEP Initiative, Fremont, USA
- Legal framework and the role of governments, Dr. Leila Devia, BCRC South-America, Buenos Aires, Argentina
- EPR and private sector involvement, Ricardo Gonzalez Llera, IBM, New York, USA
- Regional example: México, Dr. Guillermo Román, Instituto Politécnico Nacional México, México D.C.
- Refurbishment and reuse for the civil society, Ángel Eduardo Camacho L., Computadores para Educar, Bogota, Colombia

Discussions were held following these presentations in two groups, one focusing on the government and civil society perspective and another looking at the issue from the industry perspective. Government representatives identified increased public awareness, improvement of communication among public actors, harmonization of legislation and technical norms, and capacity building as major needs and potentials for regional cooperation. The industry group formulated the need to have harmonized and auditable recycling and refurbishment standards. It also pointed out the requirement of intensifying global and regional knowledge exchange.

The meeting participants concluded that there was a desire among policy-makers in Latin America and the Caribbean to implement harmonized policies, but they needed guidance on creating and implementing such policies. It was agreed that the assembled group could act as the nucleus of a body that could provide such guidance. RELAC would take a leadership role in the creation and management of such a body and StEP could provide scientific and technical analysis to support decision-making. RELAC and StEP are currently developing proposals that will be used to generate resources to support these efforts.

Further details on the workshop may be found at: http://ewaste guide.info.

E-learning Course on E-waste Management

CEDARE and UNEP have cooperated in developing an e-learning course on e-waste management. The objective of this course is to build capacity of practitioners and decision makers to guide and support them to plan, design and implement e-waste management including policy, collection, transportation and treatment in a city/geographical area and country.

Study on E-Waste Management in the Arab Region

In cooperation with UNEP, CEDARE has implemented a study on e-waste management practices in the Arab countries. A survey was carried out covering all Arab States. In total over 300 questionnaires were sent out to NGOs, governmental organizations, and ICT companies. The received answers indicate that there is no formal e-waste sector in this region. Five international organizations, four companies and four NGOs are active in nine Arab countries. The practices are mostly assessment studies and basic data collections leading to the assumption that the implementation of e-waste projects is in its initial phase. The received answers showed that the private sector enterprises are active in Egypt and the United Arab Emirates (UAE) supporting the collection of used mobile phones and batteries and their refurbishment/recycling.

More than 25 potential partners were found for a collaboration in different fields like awareness campaigns, capacity building, technical assistance for recycling and refurbishment projects, donation of old end-of-life (EOL) equipment, or funding of future projects. The report is downloadable from http://www.step-initiative.org/publications.

StEP as it is an important vehicle for Datec to understand how the legislators, industry and academia see the reuse market, too much is wrongly perceived and therefore wrongly legislated; it allows developing good business protocols for our industry.

*Jeff Bormann,
Datec Technologies Ltd.*

The StEP Website

StEP's website has been designed to generate interest in the Initiative's work on the e-waste problem and act as a tool for external communication. Its basic sections are:

- Initiative – gives an overview of the main objectives and a brief look back at the history of StEP also linking to its organizational structure and relevant actors
- Task Forces – presents the work of the five Task Forces, their objectives and current tasks
- Actors – gives an overview of StEP's organizational structure with the key elements being the Steering Committee, Secretariat and five Task Forces involving its coordinators, members and

observers. It also states relevant actors and introduces all companies and institutions actively involved in StEP activities
- News
- Events
- Publications
- Projects – as one module of making StEP the e-waste knowledge platform, a first version of a project database on e-waste-related projects has been set up on StEP's website. This database comprises information on projects within and outside of StEP. Project information can be entered through an easy-to-use form.

For more information see
www.step-initiative.org

Governments need to develop effective regulatory regimes that empower the market to respond positively to the challenge of e-waste.
By partnering with the private sector and civil society, they can promote value chains that allow for a circular economy.

Guido Sonnemann,
Programme Officer for Innovation and Life Cycle Management, Sustainable Consumption and Production Branch, UNEP/DTIE

StEP File Gallery

Acknowledging the rising need for an up-to-date and easy to use document management system, StEP has established an online file management system, the so-called File Gallery. Its objectives are to:
• Provide an online-database of StEP documents

• Guarantee internal knowledge dissemination
• Limit unnecessary email flows
• Provide a tool for external communication allowing 'Anonymous Users' to access some elements of the File Gallery. Hence, non-StEP members interested in the work of the initiative can get an

insight, without having access to sensitive data though.

The file gallery can be found at http://files.step-initiative.org/

In addition, a StEP Member Newsletter is published on a regular basis via email.

E-waste – A Global Challenge

It is evident that e-waste is a global concern because of the nature of production and disposal of waste in a globalized world. And whilst it is difficult to know exactly how much e-waste there is, we do know that large amounts end up in places where processing occurs at a very rudimentary level. This raises concerns about resource efficiency and also the immediate concerns of the dangers to humans and the environment. There is a long and sometimes complicated chain of events in the e-waste problem, beginning from an idea that someone has for a new product and then its production, ending in its purchase and eventual disposal by the end user. By engaging with various stakeholders and relevant scientific wisdom within this chain of events, we are on the way to Solve the E-waste Problem (StEP).

The vision of Öko-Institut is a way of life that is environmentally and socially sustainable throughout the world. As a leading European research institute we expect that StEP will contribute to solve the global e-waste problem.

Matthias Buchert, Head of the Infrastructure and Enterprises Division, Öko-Institut e.V.

StEP Events

The following overview summarizes various international conferences and events which have been organized by the StEP Secretariat or where StEP has been present to raise visibility and present outcomes of the work so far.

23 January 2008
Meeting of StEP Task Force Policy, hosted by United Nations University in Bonn, Germany

24 January 2008
Meeting of StEP Task Force Re-use, hosted by United Nations University in Bonn, Germany

25 April 2008
Coordination Meeting between StEP and the Secretariat to the Basel Convention on synergizing efforts in the e-waste sector,

hosted by the German Ministry of Environment, Bonn, Germany

13-15 May 2008
StEP General Assembly 2008, hosted by Ericsson, Stockholm, Sweden
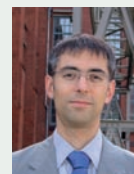
7-10 September 2008
1st World ReUse Forum in line with the Electronics Goes Green Conference, Berlin, Germany

6-10 October 2008
E-waste session at the Wastecon conference in Durban, South Africa

12-15 October 2008
E-Waste Workshop at REWAS 2008, the 2008 Global Symposium on Recycling, Waste Treatment and Clean Technology in Cancun, Mexico

FHG/IZM values the international outlook and broad coverage of recycling and re-use within StEP. Our work on electronics recycling and ecodesign in the past has repeatedly highlighted, that not only a national or EU wide cooperation, but a global one is required.

Nils F. Nissen, Head of Department Environmental Engineering, Fraunhofer-Institut fuer Zuverlaessigkeit und Mikrointegration (FHG/IZM)

Full Members

International Organizations

Center for Environment and Development for the Arab Region and Europe (CEDARE)

Global Digital Solidarity Fund (DSF)

United Nations Conference on Trade and Development (UNCTAD)

United Nations Environment Programme (UNEP)

United Nations Industrial Development Organization (UNIDO)

United Nations University (UNU)

Industry

AER Worldwide

Cisco Systems Ltd.

Dataserv Ltd.

Datec Technologies

Dell

Ericsson

Flection

GOAB mbH

Hewlett Packard (HP)

MicroPro

Microsoft

National Center for Electronics Recycling (NCER)

Nokia

Philips Consumer Lifestyle

promotion team wetzlar

Sims Recycling Solutions

Taizhou Chiho Tiande

Umicore Precious Metal Refining

Wellington Green

Governmental and Development Cooperation

German Technical Cooperation (GTZ)

Swiss State Secretariat of Economics (SECO)

United States Environmental Protection Agency (US-EPA)

Academia & Research

Austrian Society for Systems Engineering and Automation (SAT)

Chinese Academy of Sciences (CAS)

Delft University of Technology

GAIKER Foundation

Griffith University

Institute for Applied Ecology (Öko-Institut)

Federal Laboratory for Materials Testing and Research (EMPA)

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Initiated by various UN organizations, the Solving the E-waste Problem Initiative (StEP) works with representatives from industry, governments, international organizations, NGOs and the academia to initiate and facilitate approaches that promote the sustainable handling of e-waste. Organized in five Task Forces, feasible, just and environmentally safe solutions for the e-waste problem are developed through analysis, planning and pilot projects. For more information please visit www.step-initiative.org.

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