

**APT STATUS REPORT**

**ON**

**STANDARDIZATION ACTIVITIES   
FOR E-WASTE AND RARE METALS**

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**APT Status Report on Standardization Activities for E-waste and Rare Metals**

# 1. Scope

The scope of this report includes introduction of e-waste & rare metal related strategies, activities & management systems of international standardization organizations to Asia Pacific Telecommunication members. Additionally scope of this report is to presents some countries’ and regions’ success stories on adequate e-waste management that could be used as a guidance or best practice and may be adopted by countries working on developing adequate e-waste management systems, too.

The purpose of this supplement is to only present the different procedures and processes which countries have adopted to adequately manage their e-waste, and not to decide or select the best methods or practices.

# 2. Terms and Definitions

WEEE Waste electrical and electronic equipment

OGF Operation Green Fence

USD mn Millions of US Dollars

EoL With respect to a product supplied to customers, indicating the product is in the end of its useful life

EPR Extended Producer Responsibility

ITU International Telecommunication Union

ITU-T International Telecommunication Union Telecommunication Standardization Sector

ITU-D International Telecommunication Union Telecommunication Development Sector

WTSA-12 The World Telecommunication Standardization Assembly which is held in 2012

ICT Information and Communication Technologies

OEM Original Equipment Manufacturer

UN Intergovernmental organization to promote international co-operation

ISO International Organization for Standardization e-Stewards Electronics waste

recycling standard created by Basel Action Network (BAN)

BAN Non-governmental organization working to combat the export of toxic waste

ETBC Non-profit organization that promote responsible recycling and green design in the electronic industry

CEN The European Committee for Standardization

CENELEC The European Committee for Electrotechnical Standardization

LGE Multinational electronic company (LG electronics) in South Korea

NEC Japanese multinational provider of informational technology services and products

OECD Organization for Economic Co-operation and Development

UNU United Nations University

GeSI Global e-Sustainability Initiative

StEP International initiative for solving the E-waste problem

UNEP United Nations Environment Program

DfE Design of Environment

LPUR Law for the Promotion of Utilization of Resources\

DOE Department of Environment

EPA Environmental Protection Agency

DRS Deposit Refund System

SHEA Small Household Electrical Appliances

RRW Regulated Recycle Waste

# 3. The status and problems of e-waste and rare metals

International trends around the world indicate that Electrical and Electronic Equipment (WEEE) waste or e-waste is one of the fastest growing waste stream. Rapid economic growth in Asia and the increasing trans-boundary movement of secondary resources will increasingly require both 3R endeavors (reduce, reuse, recycle) in each country and appropriate control of international material cycles. To meet these needs, the prevention of environmental pollution and efficient utilization of resources will both be important.

Certain countries in the world have adopted a number of legislations and policies both in public as well as private sector in order to cater the problem occurring due to excessive e-waste production. The success stories of these countries can act as a stimulus for other countries to develop an adequate E-waste management system.

# 4. Related national policies, plans and management systems

In the wake of current scenario different developing and developed nations of Asia have paid a great stress on minimizing these waste,passed a number of legislations and held numerous conferences in order to devise certain strategies to lessen the amount of E-waste generated every year. Japan Home appliance Recycling Law in 1998 and the Law for the Promotion of Utilization of Resources (LPUR) encourages efforts among producers to decrease the waste, reuse the recycling materials and enhances the recyclability of EEE through the adoption of Design of Environment (DfE). Similarly Legislation made by Taiwan which is called the Waste Disposal Act under which Environmental Protection Agency (EPA) has integrated different management actors. Malaysia, has officially regulated EQSWR in 2005 which was enforced by Malaysian’s Department of Environment (DOE). Recently they have implemented the Cleansing Management Act in 2015 and this policy is being administered by Solid Waste Corporation.

# 5. Related national laws and regulations on e-waste and rare metal management

## 5.1 Bangladesh: E-waste management

Bangladesh adopted its National Environmental Policy in 1992, The Environmental Conservation Act in 1995 and Medical Waste Management Rules in 2008. Currently there are no regulations specifically dealing with e-waste. However, the Government of Bangladesh has given top priority to the preparation of ‘WEEE (Management and Handling) Rules’ in 2011. In addition, the Government has already prepared a National 3R (Reduce, Reuse and Recycle) Strategy incorporating some aspects of e-waste management. Furthermore, two Rules, the Hazardous Waste Management Rule (under preparation) and the draft Solid Waste Management Rule (under consultation) could also accommodate the issues related to e-waste. Currently, there is no inventory of e-waste in Bangladesh. It is estimated that every year Bangladesh produces about 2.8 million tonnes of e-waste out of which 2.5 million is contributed by the e-waste generated from ship breaking yards. As for EoL management of electrical and electronic equipment, reuse is a common practice in Bangladesh. Dismantling and recycling is also a growing business, mainly undertaken by the informal sector. Most of the e-waste in Bangladesh is dumped in open landfills, farming land and open water bodies causing severe health an environmental impacts**.**

Bangladesh adopted its first National Environmental Policy in 1992 highlighting and regulating all the activities that pollutes and destroy the environment. Following this Environmental court act was issued regarding the preservation of environment and e-waste management and recycling. Government of Bangladesh also drafted National 3R strategy and in that draft e-waste issues were addressed. In 2008 Bangladesh drafted medical waste management rules in order to manage the e-waste in medical sector.

The latest initiative is Electrical and Electronic Waste (Management and Handling) Rules, 2011 which has the following features: These rules apply to every producer(s), dealer(s), collection centre(s), refurbisher(s), dismantler(s), recycler(s), auctioneer(s) consumer(s) or bulk consumer(s) involved in the manufacture, sale, purchase and processing of electrical and electronic equipment or components. It defines Responsibilities of the producer, Responsibilities of dealers, Responsibilities of refurbisher, Responsibilities of collection centers, and Responsibilities of consumer or bulk consumer, Responsibilities of dismantler, Responsibilities of recycler / reprocessor

## 5.2 China: policing illegal traffic - Operation Green Fence (OGF)

China already banned imports of e-waste in 2000. The “Catalogue for Managing the Import of Wastes” included a list, regularly updated, of prohibited goods. China signed the Basel Convention and in 2012 the government announced actions to improve coordination between the customs and inspection departments. Finally, in 2007, the Ministry of Environmental Protection signed a cooperation agreement with the Environmental Protection Department of Hong Kong - the main entrance port for scrap to combat illegal movements of waste. However, due to inadequate enforcement and monitoring activities imports of e-waste did not diminish.

It was only in 2013 that the People’s Republic of China enforced the ban on imports of waste electric and electronic equipment through a major initiative: OGF. The ten-month operation aimed at preventing imports of bales with a percentage of contaminants higher than 1.5%.

The Chinese customs and China Certification and Inspection Group (CCIC) controlled documentations and suspicious behaviors. These include low prices for shipments, freight and insurance; firms that had already shipped hazardous wastes in the past through fraud and other malpractices; or companies that use different entrance points for imports.

OGF prevented 7.600 tons of equipment from being imported and suspended 250 import licenses. Hence, the initiative boosted law enforcement and it contributed to reduce the level of contaminants in shipped bales.

In the long term, according to some commentator from the scrap recycling industry, this operation will “streamline the type of material coming into China and will limit the environmental impact” of e-waste shipments. For instance, shipments of certain types of plastic scraps, which can be better recycled in Europe, are likely to diminish. In addition, the initiative will force the recycling industry in exporting countries to adopt better sorting techniques improving the overall quality of scraps.

The recycling industry in China and developing countries will also benefit from the operation. Recycling companies will be forced to recycle scrap materials domestically and properly. Finally, OGF will increase and improve pre-shipment inspections in exporting countries.

The initiative has already proven fruitful. It has been reported that waste management companies in exporting countries have already started improving the quality of the bales to be shipped.

However, in order to bypass the ban, some traders have resorted to ship e-waste away from Chinese ports, through other countries ports. In China, entry points for illegal shipments have spread from the Guangdong Province to other regions and some of the rejected shipments have been discharged in landfills without undergoing processing. The operation limited shipments of hazardous substances, but it also reduced imports of plastic scrap and other materials, which are in high demand among local recyclers. Consequently, the lower supply caused a peak in prices which affected mostly recyclers, some of whom had to leave the market. In the Guandong province, approximately 30-40% of recycling facilities had to shut down.

Furthermore, it was argued that the operation affected disproportionately exporters in developing countries since creating bales with no more than 1.5% contaminants is possible only through “modern recycling equipment”. Coordination among enforcement agencies was not optimal either. In fact, the allocation of responsibility between CCIC was not clear. This uncertainty resulted in a duplication of controls and contrasting decisions. In 2009 Chinese government enacted a law on promoting the development of circular Economy. The main purpose of this law is to reduce, reuse and recycle the electronics products during the production, consumption and other processes. In 2011 a law regarding the Regulation on recycling and disposal of waste electrical and electronic equipment was passed and this made the recycling of WEEE mandatory. With the enacting of this legislation the producer’s responsibilities were increased and a special fund was established to assist the e-waste recycling. As a token for reward certain certification and awards were made to be given for the second hand appliances and recycling enterprises.

## 5.3 India: formal-informal collaboration in e-waste processing

In India, the Extended Producer Responsibility (EPR) principle has been applied to e-waste in 2010. However, its implementation is far from being achieved. Only a few manufacturers have set up an e-waste management system or joined one. Among the electronics companies operating in India, only four have established take-back schemes for their own products, one of which only for B2B equipment.

The association of manufacturers (MAIT) is trying to organize a joint initiative to set up collection networks, but so far there is no nation-wide organized formal system. The formal sector manages only 3% of the total e-waste generated. Similarly to other developing countries, India can count on a small number of large recycling facilities that struggle to gain access to e-waste while the informal sector is constituted by numerous individual recyclers or organized enterprise. In such conditions it is unreasonable to expect that the informal sector will be formalized. At the same time, the status quo cannot be satisfied as the formal treatment facilities need to process an adequate amount of e-waste in order to cover their fixed costs.

Therefore, in 2013, Attero, one of the largest waste management companies in India, launched a project - the Clean E-India Initiative - to integrate informal waste collectors in a formal management system. Attero has placed the organization of the informal sector at the core of its business strategy. In this view, the Clean E-India Initiative aims at, on one side, foster the collection of e-waste by establishing collection schemes in Delhi, Mumbai, Ahmedabad, and Hyderabad and take advantage of the company’s collection network that is already in place in over 22 States. On the other, it would provide training programs for informal recyclers, contracted or simply paid for collection and pre-processing operations. Investing in the training of informal recycling is fundamental in order to improve the environmental sustainability of e-waste management. To this aim, semi-skilled workers should be employed.

In order to maximize the economic value recovered and avoid the impact of improper practices on health and the environmental, WEEE is then transported to the only end-processing facility in the country (located in Roorke).

By raising awareness and increasing the number of collection points, the initiative aims also at reducing the amount of EoL equipment stocked in households which, according to Kumar and Shah (2014) accounts for 40% of the e-waste generated. In addition, the project intends to increase the amount of e-waste which is treated properly.

The project was co-funded by 15 major manufacturers operating in India and obtained USD 5mn from the International Finance Corporation (IFC, the World Bank group). It also received the endorsement from former Minister for Communications and Information Technology, Kapil Sibal.

The environmentally sound management of waste is a significant challenge for India. The Regulations / Rules and Acts for waste control are primarily listed as:

* The Environmental Protection Act 1986
* The Environmental Protection Rules 1986
* The Hazardous Waste (Management and Handling) Rules
* The Batteries (Management and Handling) Rules
* Bio-Medical Waste (Management and Handling) Rules, 1998
* The Water (Prevention and Control of Pollution) Act, 1974, amended 1988
* The Water (Prevention and Control of Pollution) Cess Act, 1971 amendment 2003 Air (Prevention and Control of Pollution) Act 1981, Amended 1987 and the Air (Prevention and Control of Pollution) Rules, 1982
* The Ozone Depleting Substances (Regulation and Control) Rules, 2000
* The Noise Pollution (Regulation and Control Rules) 2000
* The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008
* The Plastics (Manufacture, Usage and Waste Management) Rules, 2009 The E-Waste (Management and Handling Rules) 2011

In all, one can say that the rule 2011is a comprehensive piece of regulation for dealing with the e waste that at least refers to all important issues which even the developed countries like EU , US , Japan , China , Thailand etc initiatives have not been able to address till now. The Rule is not been able to completely address the measures of monitoring and enforcement mechanisms, the role of informal recyclers in India or how the import ban can be enforced. Informal e-waste recycling dominates the industry, accounting for 90 to 95 per cent of all recycling. The formalization of collectors and dismantlers may be effective, but as long as informal recyclers are able to pay more for e-waste, an incentive exists for market participants to shirk compliance and illegally sell toxic material to informal recyclers. The regulation‘s effectiveness at reducing the role of informal recyclers will entirely rest on the ability of the respective bodies to present a credible threat of enforcement. The maintenance of the registry of authorised market participants and compliance with the regulation‘s requirements will pose financial constraints as these are likely to be expensive. Adding administrative costs to formal recyclers who are already struggling to survive will find it difficult to run organizations formally. By concentrating on actions related to e-waste sources and associated aspects, the auctions provide Indian regulators with the control and ability to target their enforcement to some extent.

Recently, in 2016 Government of India passed E-waste Management Rules, 2016 will a sole purpose of to decrease the E-waste and to recycle these products and include collection targets as well as a requirement that producers implement a deposit-refund system (DRS). A similar legislation was carried out in 2016 for the hazardous and other waste management. This legislation involves the prevention minimization, reuse, recycling, recovery, and safe disposal of these waste.

## 5.4 Japan: the docket system

The 2001 Act on Recycrying of Specified Kinds of Home Appliance introduced a manifest system for appropriate recyclying of air conditioners, refrigerators, freezers, CRT TV sets and washing machines. Whereas later on Flat screen television and clothes dryer are also included in 2009.

When deciding to discharge their home appliance, consumers get a five-part manifest (or docket) from a retail store (if they decide to return the equipment there) or from a Post Office (if they take it directly to a collection point), and use it for payment of recyclying fee.

Consumers retain one copy of the manifest and apply another, which includes a bar code, to the appliance’s package. The bar code is scanned when the equipment is entrusted to a collection facility, and a recycling facility.

Each of the operators involved retain a paper copy of the manifest as proof. The data in bar code of the copy is sent to the Home Appliance Recycling Law Ticket Centre, a private association for common good in Japan, which is also responsible for the administration of the manifest system including the Post Office system.

Waste management operators register information regarding the handling of the equipment in a database. Data is also uploaded to the Association for Electric Home Appliances (AEHA) website to enable consumers and retailers to trace the equipment. Tracking is made possible because each manifest is assigned a reference number. This is linked to the appliance, its characteristics, the issuance date, as well as the name and address of the producer and retailer.

The system allows consumers and authorities to make sure that WEEE is managed properly by authorized operators only.

In addition, the system facilitates the compliance, identifying applicable collection points and recycling plants for each brand and category of WEEE. It also allows treatment facilities to identify the producer and receive compensation for recycling the appliance. Finally, the system improves the quantity and quality of data collected.

The Japanese manifest system for e-waste works because consumers are required by law to return their EoL appliance, and because retailers are requested to take it back and entrust it to the manufacturer or importer responsible for its management. In addition, despite its costs, consumers are willing to pay for the manifest.

As an initiative of E waste management in 1998, Japan enacted the Act on Recycrying of Specified Kinds of Home Appliance. The law requires recycling rates of between 50-60 per cent by weight, which could be addressed by reusing and recycling product and its components. The amended Act on Recycrying of Specified Kinds of Home Appliance has ensured the proper treatment of waste home appliances.

Japan enacted the Revised Act on the Promotion of Effective Utilization of Resources, which requires manufacturers of e products including computers and similar items, large electrical home appliances, which were not covered under the Act on Recycring of Specified Kinds of Home Appliance to design for disassembly, recycling and waste reduction and longevity of use.

The main purpose of enacting this act was the encouragement of the voluntary efforts among the producer to reduce the waste, reuse the recycled material and enhance the recyclability by adopting DfE. In 2006 an amendment of Government Order for this act was made and the producer and the importer are required to label the material content of the EEE containing six substances. i.e. Lead, mercury, chromium, Cadmium, PBB and PBDE.

In 2013, Act on Promotion of Recycling of Small Waste Electrical and Electronic Equipment was enacted for the recycling of the small household electrical appliances (SHEA). The primary purpose of this law was the recovery of valuable material from the WEEE waste because SHEA is often easy to waste even though it includes valuable materials. It is pertinent to mention that prior to this law, there was no such law for the recycling of the rare earth metal, which are heavily used in small electronics equipments.

## 5.5 Republic of Korea

Beneficial use practice of E-wastes in Korea was introduced to improve recycling activities including collection system and recovery center with facilities In order to improve the recycling of waste in Korea (Republic of). The act on the promotion of saving and recycling of resources was activated in 1992. Under the act, waste charges and waste deposit fee system were operated for several products from industries to promote recycling measurement. Due to the abolition of waste deposit system in 2002, the EPR system was introduced in 2003 by the amendment of recycling law Since early 2004, the Ministry of Environment of Korea has carried out a feasibility study to introduce an. “Eco-Assurance System (The ECOAS)” which would restrict the use of hazardous substances in electrical and electronic equipment and promote recycling of E-wastes by applying a systemic management for life cycle analysis from cradle to grave. On January 2008, the ECOAS in Korea has been implemented under the Act on the Resource. Circulation of Electrical and Electronic Equipment and Vehicles for resource circulation and environmental conservation in a joint legislation by the Ministry of Environment, the Ministry of Knowledge & Economy, and the Ministry of Land, Transport and Maritime Affairs According to the ECOAS in Korea, 5 product groups and 27 items of WEEE including refrigerator, personal computer, electric oven, audio, and mobile phone are controlled to intensify the recycling capacity in electronic industries. Beneficial use of practice of recycling E-Waste in Korea were examined to improve recycling activities including collection system, recovery center with facilities by the information of E-Waste generation and recycling, policy and regulations of E-Waste Even though total generation of E-wastes was almost constant recently, the generation trend of TV, refrigerator and washing machine was very increased because those products was used in household more than 2 times for past 10 years. Also, recycling rates of those E-wastes will be increased because recycling technologies have been improved and those E-wastes were readily decomposed by heavy parts.

Ministry of Environment of Korea has outlined a framework plan in 2002 in a comprehensive waste management plan and its goal was to establish a sustainable and resource circulating socio-economic foundation. Utilization of waste resources was one of the major aspect of this plan. It was able to reduce the amount of waste by 22% from 2002 to 2011 and increased recycling of these waste by 53%.

With aim to supplementation and extension of existing initiatives the ―Act on resource recycling of electric electronic equipment and vehicles came in 2008. The act have provisions for design and production considerations of recycling with aim to Elimination of hazardous substances, Design of product to easy to dismantle and use of easy-to-recycle substance in Environment friendly collection, treatment & recycling atmosphere. The act consists of precautionary and end-of-pipe regulation along with life cycle of the product.

## 5.6 Malaysia: E-waste management

The quantities of e-waste generated in Malaysia according to the Environment Quality Report by DOE is 1.1 million tonnes in 2008, 1.3 million tonnes in 2009, 1.6 million tonnes in 2010, and 1.5 million tonnes in 2011. The e-waste are slightly increases year by year. This is caused by the rapid increase in Electrical and Electronic Equipment (EEE) amount produced and imported into Malaysia as well as the increase of development of a growing its technology.

E-waste has been regulated in Malaysia since 2005. The Department of Environment (DOE) within the Ministry of Natural Resources and the Environment (NRE) is responsible for the planning and enforcement of regulatory requirements related to e-waste. Although there are no direct regulations to deal with e-waste, the management of e-waste is incorporated within the Environmental Quality (Scheduled Waste) Regulations 2005 and the Environmental Quality (Prescribed Premises) (Treatment, Disposal Facilities for Scheduled Waste) Regulations, 1989 (control on collection, treatment, recycling and disposal of scheduled waste including e-waste). In January 2008, the DOE issued the ‘Guidelines for Classification of Used Electrical and Electronic Equipment in Malaysia’ for assisting all stakeholders involved in e-waste management to identify and classify the used products according to the regulatory codes. The guideline provides a list of the types of electrical and electronic waste which may contain the hazardous compounds or materials. Currently the DOE is working on a draft regulation to manage e-waste, which will be known as the Environmental Quality (Recycling and Disposal of EoL Electrical and Electronic Equipment) Regulations. The purpose of this regulation is to make it a mandatory requirement for producers and manufacturers to design equipment to minimize hazardous components and facilitate ease of recycling including the requirement for producers and manufacturers to take back e-waste for recycling or disposal.

In Malaysia there are around 146 e-waste recovery facilities which are working with a total capacity of around 24000 metric ton to handle per month. 128 are the partial recovery small and medium sized operators who are engaged in the physical and manual segregation of e-waste for the further processing. There are around 18 recovery facilities which are useful for the processing of the e-waste to recover precious metals from the waste of electronics.

Currently, In Malaysia Solid Waste and Public Cleansing Management Act 2015 has been implemented and with its implementation the household e-waste is managed through the separation at source policy. As a part of the policy, it is compulsory for every household to separate their waste into recyclable and non-recyclable waste. This policy is monitored and administrator by Solid waste Corporation.

## 5.7 Pakistan: E-waste management

Using the information from StEP, the amount of e-waste in Pakistan is estimated for the year 2014, and is calculated as 316 kilotonnes approximately while UNU estimated it to be 266 kilotonnes with 1.4 kg per individual in 2014. These estimates, which are in fair agreement, are both higher than historical estimates; Breivik et al., (Robinson, 2009) estimated that Pakistan generated approximately 210 kilotonnes of e-waste in year 2005 which was estimated by distributing the global e-waste generated to individual countries using GDP as a surrogate. Assuming these estimates are reasonable, this implies that the e-waste generation in Pakistan may have increased by up to about 50% over the last decade. Although the data reflect domestic generation and do not include illegal imports, it indicates an increasing trend for domestic e-waste generation in Pakistan.

Pakistan has no regulations specifically targeting e-waste although the National Environment Policy has been active since 2005. The Ministry of Environment overseas the environmental protection and movement of chemicals and waste. There is no formal mechanism to manage e-waste at the national level. People use different methods to manage e-waste locally. The informal recycling sector is very active and a number of workers, including children, earn their living by dismantling the electronic scrap and extracting valuable metals. Open burning and open dumping of e-waste is very common in Pakistan. Therefore, the government of Pakistan first needs to enforce the rules that already exist, such as the Basel Convention, which restricts the import and transboundary movement of hazardous substances, becomes more effective. Apart from existing laws and regulations, government shall devise e-waste specific national level legislation. The legislation should be in line with the issues addressing recycling and disposal/management of e-waste in Pakistan.

The major Regulations / Legislations / Provisions are as follows:

Section 13 reads ―Prohibition of import of hazardous waste.—No person shall import hazardous waste into Pakistan and its territorial waters, Exclusive Economic Zone and historic waters.

Section 14 reads ―Handling of hazardous substances.— Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except

1. under a license issued by the Federal Agency and in such manner as may be prescribed; or
2. in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party.

National Policy, Legislation and Regulatory System in Pakistan includes:

* National Environment Policy 2005,
* Import Policy Order 2009,
* Day to day orders of Ministry of Commerce and Federal Board of Revenue (FBR) controls imports and exports, The regulating powers of Ministry of Industries and Production oversees manufacturing addresses e waste, As and when needed steps initiated by Ministry of Environment oversees environmental protection and controls import/export of restricted chemicals and waste.

## 5.8 Thailand: E-waste management

Pollution Control Department (PCD) estimated that the amount of E-waste generated in 2014 is 376,801 tons and 384,233 tons in 2015. This forecast was done for only 8 types of household appliances. It is expected that the actual amount of E-waste generation is much higher than this number and is likely to increase each year.

To have environmentally friendly management of E-waste, PCD drafted the National Integrated Strategy for the Management of Waste Electrical and Electronic Equipment to cope with E-waste problems in the country which included an action plan and a development of specific law to establish a comprehensive E-waste management in order to have a proper treatment of E-waste and rising public awareness about E-waste issues. Draft Act on the Management of Waste electrical and electronic Equipment and Other End-of-Life Product was approved from the cabinet on May, 19 2015. This is specific law to control E-waste management in order to have effective E-waste management system by integrated all stakeholders participation with EPR that producers have responsibilities to pay for E-waste management and improve more environmentally friendly product design by reducing the use of hazardous substances and design easy recycleable product to promote sustainable production and consumption. Moreover, this law allows the informal sector to join take-back system by registering with local administrative organization and must operate under the regulation which is good choice for informal sector to operate with good management. However, after this law was sent to The Council of State (Krisdika), it was changed and removed many key topics that may result in lower effective of E-waste management. And now, this law is in a process of improvement and consideration to promulgate.

# 6. Related international activities

## 6.1 Activities in SDOs

### **6.1.1 ITU (ITU-T & ITU-D)**

The ITU and their partners build the momentum of the agreement at WTSA-12 on a Resolution on e-waste, giving further impetus to ITU’s standardization work on the subject and mandating ITU’s standardization and development sectors, ITU-T and ITU-D, to assist Member States in instituting policy frameworks that limit e-waste’s negative environmental effects.

The ITU members represent a cross-section of the global ICT sector, from the world's largest manufacturers and telecom carriers to small, innovative players working with new and emerging technologies along with leading R&D institutions and academia (ITU, 2016). As the whole ICT/telecommunication sector is represented in ITU, collaboration towards meeting the e-waste reduction target is crucial. The ICT/telecommunication sector, including OEM, mobile and integrated network operators, internet service providers, content owners and infrastructure providers, among others; must actively participate in this process.

The e-waste target attainment and the implementation of the e-waste roadmap, must be addressed as a joint effort between ITU and its member states. This must be carried out in collaboration with the ITU sector members, in cooperation with existing platforms and organizations working on environmentally sound e-waste management worldwide.

The ITU-T activities can be understood by the aims to define the baseline of the ITU Connect 2020 agenda for e-waste target redundant e-waste by 50% by the year 2020 for the ICT/Telecommunication Sector. It covers the three main steps of the e-waste roadmap which sets the foundation for future accomplishment of the e-waste target under the Connect 2020 Agenda by the year 2020. ITU has established these e-waste targets based on the work carried out by ITU-T Study Group 5 (SG5) on “Environment and Climate Change”.

The ITU has been able to develop a meaningful e-waste target baseline and set the foundation for the implementation of the e-waste roadmap. This roadmap also allows to identify alternatives to develop future guidance and standardization mechanisms for the reporting of national ICT/telecommunication products life-cycle situations (import, products placed in the market, recycled, resold, disposed of, exported, etc.). The standardized assessment and baseline definition phase of the roadmap presented requires further adjustment of the numbers included in the assessment. This should be done on the basis of the public data provided and new calculation initiatives. This process should include the participation and engagement of data owners. A detailed statistical analysis of the different e-waste categories based on product categories have also been done on a country level. Standardization opportunities should be focused on the development of recommendation that includes a standardized definition of e-waste. Also, a framework to calculate e-waste generation flows; based on the work of ITU and other UN agencies, including the segregation of types of e-waste.

In addition, the work on Question 13 within ITU-T SG 5 “Environment and Climate Change” has generated a number of important new international technical standards including ITU-T L.1000, 1001 and 1100. ITU-T L.1000 ‘Universal Charger’ (Universal power adapter and charger solution for mobile terminals and other hand-held ICT devices) sets out technical specifications for a universal charger compatible with a wide variety of consumer electronic devices, reducing waste and improving user convenience. When fully implemented around the world, the new standard will eliminate an estimated 82,000 tonnes of redundant chargers and at least 13.6 million tonnes of CO2 emissions annually. In the same vein, ITU-T Recommendation L.1001 (External universal power adapter solutions for stationary information and communication technology devices) establishes technical specifications for a universal power adapter (UPA) designed to serve the vast majority of ICT devices.

The standard will substantially reduce the number of power adapters that need to be manufactured by widening their application to more devices, enabling their reuse and extending their lifetime, as well as cutting energy consumption and reducing the volume of e-waste. Rare metals are essential to the high-end functionality of ICT products, and the ICT industry has reached a level of sophistication where it is impossible to omit these metals from product design. A mobile phone contains no less than 20 rare metals, and the need to recycle these metals is clear – a tonne of gold ore yields just 5 grammes of gold, whereas a tonne of used mobile phones yields a staggering 400 grammes.

### **6.1.2 ISO**

There are currently two standards for electronics recyclers, with certification programs attached. Recyclers can be certified to show their conformance to these standards. One is called the e-Stewards Standard for Responsible Recycling and Reuse known as e-Stewards, and the other is called Responsible Recycling (R2) Practices.

R2 stands for “responsible recycling,” but, it falls well short of “responsible”, when it comes to handling toxic materials. In fact, the standard is so weak in the key areas that only two participating environmental groups (the BAN and the ETBC) both withdrew in protest from the multi-stakeholder process in the final stages. This is the standard supported by the recycling industry association.

Many recyclers have been certified to ISO 14001. This is a standard for how to design a company’s environmental health and safety program. An ISO certification alone is no indication that a company is a responsible recycler, because it has no specific guidance for electronics recyclers.

This is why the e-Stewards standard incorporates ISO 14001 into the e-Stewards standard: the e-Stewards part sets the bar for WHAT responsible recyclers should be doing, and the ISO part speaks to HOW they should be doing it. Recyclers being audited to the e-Stewards standard get their ISO 14001 audit at the same time. This is why the cost of e-Stewards audits appears higher than R2 audits – it includes the ISO auditing costs. R2 does not, and R2 recyclers would pay for their ISO audit (if they are doing one) separately.

Meanwhile, in 2015, the ISO has created a rare earth division in the technical committee (TC) 298. The scope of the TC is standardization in the field of rare earth mining, concentration, extraction, separation, and conversion to useful rare earth related materials. Rare earth elements(REE) refers to seventeen elements including scandium(Sc), yttrium(Y) and 15 lanthanides defined by IUPAC(International Union of Pure and Applied Chemistry). REEs are used in a variety of electronic products. In particular, rare earth permanent magnets with neodymium(Nd), dysprosium(Dy) and praseodymium(Pr) are indispensable components for motors used in computer hard disk drives, audio speakers and electric vehicles. Systematic recycling of REE related components is essential because REEs are not only disposed of in some areas(more than 97% of REES are produced in china), which also cause serious environmental problems during mining and smelting process.

Recognizing the importance of rare earth recycling, in ISO TC 298, the second working group(WG) after the ‘Term and definition’(WG1) was confirmed as ‘element recycling’ at the second plenary meeting in 06.2017. Since it is a newly created TC and WG, a specific standard has not yet been proposed. However, Nd and Dy are key elements in REEs, it is expected that standardization will focus on the method of recycling rare earth magnets in e-wastes and extracting rare earths.

### **6.1.3 IEC**

The International Electro-technical Commission (IEC) estimates that e-waste from computers and mobile devices come to more than 500,000 tons each year. The international standard was the product of cooperative effort within a group led by the IEC which include the USB-IF (Implementers Forum), CEN-CENELEC and ITU-T. The firms that participated in included Apple, Nokia, Research in motion, Emblaze mobile, Huawei Technologies, LGE, Motorola Mobility, NEC, Qualcomm, Samsung, Sony Ericsson, TCT Mobile(Alcatel),Texas Instrument and Atmel. These same firms also signed an MOU with the European Commission to underline their commitment to implementing it within EU.

There is the IEC 62684 Universal Smartphone Charger standard which allows consumers to use single one-fits-all charger with all new smartphones. This standard IEC 62684 is designed to make a universal platform for the today’s countless charger interfaces. It was first developed as an interoperability specifications (EU 62684:2010) of the external power supply (EPS) across Europe, and now it has become an international standards (IEC62684:2011) for universal chargers of data –enabled mobile phones.

Universal chargers will cut the hassle for consumers while significantly reducing the amount of e-waste related to power supplies. The total e-waste related to all kinds of chargers of information and communication devices exceeds half a million tons each year. Significantly a universal charger for laptop will also soon become a reality and significantly reduce e-waste. In December the IEC announced the publication of IEC Technical Specification 62700: DC power supply for notebook computers, is an IEC specification of a common standard for external laptop computer AC adapters. Laptops and AC adapters following this standard will have interchangeable power supplies, which will enable easy reuse of used power supplies (thereby reducing electronic waste) and make buying a new compatible power supply for a laptop simpler. This is the first globally relevant technical specification for a single external charger for a wide range of notebook computers and laptops and it comprises the input of industry experts from many countries around the world.

This new IEC Technical Specification covers critical aspects of external chargers for notebook computers, their connector and plug, as well as safety, interoperability, performance and environmental considerations. It will reduce e-waste by allowing consumers to use a single external charger with a wide range of notebook computers.

## 6.2 The activities in the related international organizations

### **6.2.1 OECD**

OECD published “e-waste statistics Guidelines on classification, reporting and indicators” in 2015. These guidelines describe a measurement framework presented that captures the dynamics of e-waste, in which the parameters relate to each other. A minimum requirement of e-waste statistics is also proposed, which can be obtained via household surveys. The central classification to categorize the data is called the UNU-KEYS. Existing harmonized statistical data, such as production statistics, international trade statistics and IT statistics, can be linked to this classification. The memo also presents indicators that can be compiled from the framework, and serve as a resource for policymaking. Harmonizing the framework and indicators will be a substantial step towards reaching an integrated and comparable global measurement system for e-waste.

### **6.2.2 GeSI**

In June 2012 the GeSI & StEP e-Waste Academy (EWA) 2012 took place in Accra, Ghana. The EWA changed its name to EWA-Managers Edition (EWAM) in January 2013. The second initiative, the EWA–Scientists Edition (EWAS) is a pioneering concept in the development of capacity on e-waste research and management to foster multi-stakeholder partnerships and establish opportunities for continued collaboration on e-waste research, policy and management. EWAS brings together young e-waste researchers from around the world, looking at solving the e-waste from different disciplinary perspectives. It aims to be the foremost forum available to young scientists to share their knowledge, interact with experts from academia, industry and policy and to develop collaborative partnerships. Three editions of the EWAS so far, between 2009 and 2011, have been extremely successful.

### **6.2.3 UNEP**

UNEP published Sustainable Innovation and Technology Transfer Industrial Sector Studies “RECYCLING – FROM E-WASTE TO RESOURCES” in 2009. It summaries; Due to the early stage of awareness for e-waste recycling in emerging economies, innovation hubs and centres of excellence have not been established yet. However, some organizations are currently establishing their e-waste competence and have a great potential to develop into innovation hubs.

Multilateral institutions, mainly National Cleaner Production Centres and Basel Convention Regional Centres develop into knowledge hubs for e-waste management in some countries. The current situation in China, India and South Africa indicate that smaller and less complex economies such as South Africa’s improve faster in awareness and competence. Crucial instruments and framework conditions for the development of innovation hubs include the possibility to participate in international knowledge partnerships programs.

It also has been observed that without clear legal framework and active participation of the government, the development of innovative technologies is hampered. The future success of technological innovation in environments with strong informal participation strongly depends on alternative business models with financial incentives, which allow the informal sector to still participate with “safe” recycling processes, while hazardous operations are transferred to state-of-the-art formal recyclers. The development of innovation hubs also demand for a fair competitive environment with common rules, clearly favouring the development and application of innovative technologies.

# 7. Case study and best practices in APT members

## 7.1. Japan

Cell phone and PHS companies started recycling activity since the 1990’s. However, in order to tighten up recycling activity, the industry actually started the MRN (mobile, recycle, network) in April, 2001. That gathered completely used terminals (body, battery, and charger) from 9,300 stores countrywide. All of the gathered terminals were recycled through thermal treatment.

The entrepreneurs delivered the returned cell phones to the recycling contractor. Then the recycling contractors took all the work after receiving the cell phones and PHS.

## 7.2. Republic of Korea

In March, 2002, the number of domestic subscribers of the mobile service had increased rapidly from 6.91million in 1997, to 30 million. However, Due to decrease of reuse and exportation of wasted cell phones, the treatment and processing of wasted cell phones had become an urgent problem.

In five years, from 1997 to 2001, the sales record of new mobile phones increased threefold, and the amount of wasted cell phones had increased nearly sixfold. There had been too many new cell phones with advanced technology from various competing companies. This is a reason why the numbers of wasted cell phones were growing. Wasted cell phones can be processed by several ways. This lead to decreased exportation of wasted cell phones. The cell phones were reused for testing and rental purpose, and some of them were recycled. In Korea, there are three enterprises of recycling the extraction of valuable metals from connecting terminals. But they are small-scale companies, and of weak performance. And also, there are no recycling companies to manage recycling batteries. There is no statistical data of the amount of recycling, but it is estimated at under the 10% of total amount of recovery. Lastly, the rest of uncounted wasted cell phones might be processed by incineration and landfill.

Valid disposal of the wasted cell phones was difficult due to industrial reasons. It need thorough state intervention. If neglecting the problem of wasted cell phones keep increasing, it could lead to a serious danger in the society. Therefore, it is necessary for the national plan about the recycling of wasted cell phones regarding the systemic management, collection and environmental friendly reuse systems.

It is necessary to make a solution for decreasing the amount of wasted cell phones. Tight regulation of subsidy and securing compatibility of charging system could reduce the amount of wasted cell phones, batteries and charger. Establishing a returning system of wasted cell phones would guarantee a profit from valuable metals in PCB and batteries. Therefore, it is urgent to make government policy or standards returning system for recycling the wasted cell phones and its industry. The technology level of recycling wasted cell phones is too low domestically.. The discarded PCB is emitted when a terminal is discarded, and almost all PCB are being exported to foreign countries at cheap price. It is necessary to prepare and develop more technologies focused on recycling and returning valuable metals, and to induce the industry. In addition, there is a need for a policy for a safe environment when the recycling companies treat a toxic substance such as Pb, and other substances from the part of cell phones.

Terminal: extraction of the valuable metals such as palladium, silver, and gold in the discarded PCB.

Battery: extraction technique of valuable metals such as lithium, and cobalt was developed in domestic, but not commercialize.

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