



Proceedings

Final Workshop

Project “Training Programme for E-wastes
and Demonstration Programme at a
Recyclable Waste Collecting Site of ESM of
the E-wastes “

27-28 December, 2010 in Phnom Penh,
Cambodia

Department of Pollution Control
Ministry of Environment

TABLE OF CONTENTS

1-INTRODUCTION.....	3
1.1 Objective of the Final Workshop.....	3
2-CEREMONIAL.....	3
2.1 Welcome Address by H.E.Mr. Lonh Heal , Director General of Technical Affairs to the Ministry of Environment.....	3
2.2 Keynote Speech by Ms. Cynthia Indriani , International Expert, Basel Convention Regional Centre for Southeast Asia.....	5
3.0-WORKSHOP PRESENTATIONS.....	7
3.1 Brief Overview of the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their disposal, and Brief overview of BCRC-SEA and BCRC,China, Ms. Cynthia Indriani , International Expert, Basel Convention Regional Centre for Southeast Asia.....	7
3.2 Basel Convention Implementation and E-wastes Management in Cambodia, Mr. Chin Sothun , Deputy Chief of Solid Waste and Hazardous Substances Management, Ministry of Environment.....	8
3.3 Introduction of Electrical and Electronic Wastes and Harmful Substances in E-Wastes including Its effects, Ms.Cynthia Indriani , Basel Convention Regional Centre for Southeast Asia	11
3.4 Result of Demonstration Programme of ESM of E-waste at the Recyclable Waste Collecting Site, Mr. Iv Sopal , Project assistant.....	13
3.5 Environmentally Sound Management of E-Wastes, Ms.Cynthia Indriani , International Expert, Basel Convention Regional Centre for Southeast Asia.....	14
3.6 Result of the Implementation of project on Training Programme for E-wastes and Demonstration at a Recyclable Waste Collecting Site of Environmentally Sound Management of the E-wastes”, Mr. Ken Choviran, Project coordinator, Ministry of Environment.....	15
3.7 Experience in dealing with ESM of E-wastes in other countries, Ms.Cynthia Indriani , International Expert, Basel Convention Regional Centre for Southeast Asia.....	16
3.8 Group Discussions on what is the future priorities activities to be followed up for the effectiveness of ESM of the E-wastes in Cambodia, facilitated by Ms.Cynthia Indriani , International Expert, BCRC-SEA and Mr. Ken Choviran , Project coordinator, Ministry of Environment.....	18
4.0 WORKSHOP CONCLUSION AND RECOMMENDATIONS.....	18

WORKSHOP REPORT



1- INTRODUCTION

The Ministry of Environment, Cambodia organized the Final Workshop as part of the Project “Training Programme for E-wastes and Demonstration at a Recyclable Waste Collecting Site of Environmentally Sound Management of the E-wastes” in Phnom Penh, Cambodia, from 27 to 28 December 2010. The Project has been developed and implemented by the Ministry of Environment of Cambodia in cooperation with the Secretariat of the Basel Convention and funded by the Government of Japan through the Basel Convention Technical Cooperation Trust Fund. The workshop was attended by 51 participants from the governmental ministries, academia, NGOs and private sectors in the provinces and cities in Cambodia. The list of participants is presented in the proceeding.

1.1 Objective of the workshop

The main objective of the workshop is to present the results and outcome of the demonstration programme to national stakeholders in order to raise awareness and support for the development of regulations and standards for the ESM of E-wastes in the future related work or projects.

2-CEREMONIAL

2.1 Welcome Address by H.E.Mr. Lonh Heal, Director General of Technical Affairs to the Ministry of Environment

Welcome remark made by H.E.Mr.Lonh Heal, Director General of Technical Affairs to the Ministry of Environment of Kingdom of Cambodia at the Final Workshop for Project “Training Programme for E-wastes and Demonstration at a Recyclable Waste Collecting Site of Environmentally Sound Management of the E-wastes”, 27-28 December 2010 at Himawari Hotel, Phnom Penh, Cambodia.

Ms.Cynthia Indriani, International Expert, Basel Convention Regional Centre for Southeast Asia

Distinguished delegates, Lady and Gentlemen!

On behalf of the Royal Government of Cambodia as well as the Ministry of Environment and myself, I am very appreciated to participate in the opening ceremony of the Final Workshop for Project “Training Programme for E-wastes and Demonstration at a Recyclable Waste Collecting Site of Environmentally Sound Management of the E-

wastes”, which will conduct from 27-28 December, 2010. In this occasion, I am very proud to be here to meet you all again from the governmental institutions, national and international organizations which related to the use, consumption and control of the EEE and UEEE and you always close cooperate with the Ministry of Environment in term of environmental quality protection in the Kingdom of Cambodia.

In this opportunity, I would like to express my profound thanks and appreciations to Ministry of Environment, Japan “MOEJ” for proving the fund through the Basel Convention Technical Trust Fund of the Secretariat of the Basel Convention which help the Ministry of Environment of Cambodia to implement the project related to e-wastes including this two-day workshop organization, which I think will contribute to the human resources development on the ESM of E-wastes in the Kingdom of Cambodia.

Distinguished delegates, Lady and Gentlemen!

The increase using of EEE worldwide have created concerns to the human communities in around the world, especially on the ecology system and human health. Many kinds of chemicals in UEEE have been released to the environment through improper toxic waste management which continues to spread out from the environment into the human bodies or animals through food chain or inhalant, as the result it has affected to the human health by generated serious illnesses and chronic diseases.

Nowadays, human resources development and the strengthening capacity of the governmental officials is one of the priorities of the government reform programs of the Kingdom of Cambodia. Therefore, I will evaluate as a high price for the hard working of participants as well as the resource persons who will give knowledge and experiences to participants related to ESM of E-wastes for strengthen their capacities and for decision to choose a properly using procedures as well as the management of e- wastes with a safe handling ways.

Distinguished delegates, Lady and Gentlemen!

Event the workshop is only two days. However, I hope that through the workshop and through the close cooperation between BCRC-SEA, SBC and MOEJ with the institutions concerned related to the use and control of e-wastes of the Kingdom of Cambodia is true that the officials from other institutions will gain additional knowledge on the ESM of E-wastes.

Once again, on behalf of the Ministry of Environment I would like to express my profound thanks and appreciations to the MOEJ for proving the fund through the Basel Convention Technical Trust Fund of the Secretariat of the Basel Convention and to **Ms.Cynthia Indriani**, International Expert, Basel Convention Regional Centre for Southeast Asia who have spend their value times and experiences on ESM of E-wastes.

In conclusion, I would like to express my best wishes for the resource persons and participants from various sectors with a great happiness.

I therefore open the Final Workshop for Project “Training Programme for E-wastes and Demonstration at a Recyclable Waste Collecting Site of Environmentally Sound Management of the E-wastes”. Thank you.

2.2 Keynote Speech by Ms.Cynthia Indriani, International Expert Basel Convention Regional Centre for Southeast Asia

Opening remark made by **Ms.Cynthia Indriani**, International Expert Basel Convention Regional Centre for Southeast Asia at the Final Workshop from 27 to 28 December, 2010 at Himawari Hotel, Phnom Penh, Cambodia.

Excellency Dr. Lonh Heal, Director General of Technical Affairs, Ministry of Environment of Cambodia

Distinguished Participants, Ladies and Gentlemen,

On behalf of the Basel Convention Regional Centre for South-East Asia and myself, I would like to express my sincerest thanks to the Ministry of Environment of Cambodia for inviting me to the Final Workshop of Project “Training Programme for E-Wastes and Demonstration at a Recyclable Waste Collection Site of Environmentally Sound Management of E-Wastes”. I am very happy and honoured to meet all of you here.

We are very pleased to have been invited to talk about about the Basel Convention and ESM of E-wastes since the beginning of this project in March 2010, as well as for the Inception Workshop of the Demonstration Project in August 2010. It is also our great pleasure to have been working with the Ministry of Environment of Cambodia on activities on e-wastes and illegal trade of hazardous waste prevention, such as to provide technical trainings, and to jointly organized the Regional Workshop on the ESM of E-wastes in 2007 and the Workshop 2010 of the Asian Network for Prevention of Illegal Transboundary Movement of Hazardous Wastes in Cambodia early this month.

Due to the rapid development in technology, people use more electronic products (e-products) in their daily life and therefore the use of e-products has become very worldwide. The technology of e-products which is getting higher while the price is getting lower with limited lifetime has also resulted in increase consumption and production of e-products. As a consequence, there is also increase in generation of second-hand e-products and e-wastes when these e-products are disposed of or has reached their end-of-life.

Some second-hand e-products can be reused, sometimes after being repaired or refurbished. Some of the e-wastes still contain valuable materials such as metals and plastics that can be reused or recovered. Therefore, it has also driven economic activities of some people, especially, in the developing countries. However, due to the hazardous properties of various electronic components as well as the way they are handled, e-wastes has also been posing hazards to both human health and the environment.

Most developing countries have no adequate technology and facilities for handling the e-wastes in an environmentally sound manner. So, either the used e-products or e-wastes will eventually pose serious health and environmental problems in such countries, especially when most developing countries have become destination for used e-products and e-wastes export.

The Basel Convention has set the e-wastes as one of its priority waste streams during its 6th Meeting of the Conference of Parties in 2002. E-waste is becoming an important issue and many activities to achieve ESM of E-waste has been or being conducted in Asia Pacific region under the Basel Convention Partnership Programme, which includes national inventories, regional workshops, database development, research project and trainings.

The Basel Convention Regional Centre for South-East Asia (BCRC-SEA) located in Indonesia has been established and operated since 1997 to assist the parties to the Basel Convention in the South-East Asian region in implementing the Convention. Since its development, with the support of the Secretariat of the Basel Convention and the other stakeholders, the BCRC-SEA has conducted a number of regional training workshops on e-wastes and developed technical guidelines for the ESM of E-wastes. BCRC-SEA is also currently developing a Regional Database on E-Waste Management and has recently organized a regional technical training workshop focusing on e-waste collection and separation in July this year in Indonesia, and also plan to organize another regional workshop early next year which will cover the ESM of Repair, Refurbishment, Reconditioning, Material recovery, Recycling, Storage and Final Disposal.

Cambodia is one of the first countries in the Southeast Asia region that have paid serious attention and have conducted many activities on ESM of E-waste under the Basel Convention, such as national e-waste inventories, hosting and organizing regional e-waste workshops, conducting national e-waste trainings for formal and informal sector, as well as awareness raising through televised debate and demonstration at recyclable waste collecting site. In this regard, we hope that Cambodia can continue the good activities as well as serve as a good model for ESM of E-waste activities in our region. In order to achieve the ESM of E-waste, adequate regulations need to be set up and strongly enforced and we hope that Cambodia can also achieve its plan for setting up the regulation on e-waste.

Distinguished Ladies & Gentlemen,

Finally, I hope that our cooperation and friendship will always last and I would like to wish you all a fruitful, enjoyable and productive workshop. Thank you.

3.0 WORKSHOP PRESENTATIONS

3.1 Brief Overview of the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their disposal, and Brief overview of BCRC-SEA and BCRC,China presented by Ms. Cynthia Indriani, International Expert, Basel Convention Regional Centre for Southeast Asia

The Basel Convention was adopted on 22 March 1989 and entered into force on 5 May 1992 with 175 Parties as of December 2010. Currently, 9 (nine) members of ASEAN are Parties to the Basel Convention (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Singapore, Thailand, Vietnam). The main goal of the Convention is to protect, by strict control, human health and the environment against the adverse effects which may result from the generation and management of hazardous wastes and other wastes, by controlling transboundary movement and environmentally sound management (ESM) of such wastes. The provisions of the Convention have to be implemented strictly, in full, by each Party. The 3 (three) key elements of the movement control system are notification, consent and movement document.

The definition of wastes by to the Basel Convention is according to Article 2 paragraph 1 and the wastes that are subject to the Convention is as in Article 1 of the Convention. There are 4 (four) stages of the procedures for the transboundary movement of hazardous wastes and other wastes, namely notification, consent and issuance of movement document, transboundary movement of wastes, and confirmation of disposal. The definition and sanctions of illegal traffic according to the Basel Convention is set out in Article 9 of the Convention.

The Basel Convention has provided support for implementation of the Convention by providing a number of manual and guidelines which can be downloaded from its website. Article 14 of the Convention also requires the establishment of the Basel Convention Regional Centres (BCRCs) which provide capacity building for Parties to implement the Convention. Currently there are 14 (fourteen) BCRCs in the world. In Asia Pacific Region, there are 4 (four) BCRCs, which are the Basel Convention Regional Centre for South-East Asia (BCRC-SEA), BCRC China, BCRC Iran and BCRC in South Pacific region.

BCRC-SEA, which covers 10 (ten) countries in south-east Asia, is located in Jakarta, Indonesia. Since 2006, BCRC-SEA has carried out a number of activities on ESM on E-wastes, which are the development of 2 (two) Technical Guidelines on E-Waste Inventory and 3 R (Reduce, Reuse, Recycle) of End-of-Life Electronic Equipment, as well as conducting several regional workshops on ESM of E-wastes in the region, providing resource persons for regional and national e-wastes management training, and is currently developing a regional database on ESM of E-wastes.

BCRC China is supported by Ministry of Environmental Protection of China and hosted by Institute of Environmental Science and Engineering, Tsinghua University, in Beijing, China. Some of the activities on e-wastes are projects on collection and treatment schemes for e-wastes, the import/ export management of e-wastes and used end-of-life-equipment (EEE), survey of the import and the ESM of electronic wastes in Asia-Pacific Region, e-waste management and pollution control in Macau, and also organizing national and international workshop and meetings on ESM of e-wastes.

3.2 Basel Convention Implementation and E-wastes Management in Cambodia presented by Mr. Chin Sothun, Deputy Chief of Solid Waste and Hazardous Substances Management, Ministry of Environment

A) Basel Convention Implementation

- Relevant activities have done by Cambodia under the BC's Framework include as follows:
 - ✓ Set up the technical working group for the Basel Convention implementation,
 - ✓ Research on ULAB flow, its consuming and ULAB waste in Cambodia,
 - ✓ Preparation of Action Plan on the Environmentally Sound Management of ULAB,
 - ✓ Research on EEE flow and their residues management,
 - ✓ Training organizations on ESM of E-wastes in 6 regions in Cambodia,
 - ✓ Demonstration Programme at Recyclable Wastes Collecting Site of ESM of the E-wastes.
- Relevant waste management activities link to BC such as:
 - ✓ Industrial waste management: storage, collect disposal, and dumpsite waste management (generated from industrial production process and wastewater treatment system).
 - ✓ Hazardous waste management within hospital/healthcare center/clinic.

Relevant Cambodian Legislation to Basel Convention

Currently, the environmental laws and related sub-decrees already entered into force for the protection of human health and the environment, such as the Sub-Decree on Solid Waste Management; Sub-Decree on Water Pollution Control. However, these are not specific to E-wastes management, and they do not control the transboundary movement of E-wastes. The matter of responsibility for the health and safety of the workers who are exposed to UEEE has to be resolved. It is unclear where the responsibility lies and this is further compounded in the absence of occupational health monitoring and any specific laws or regulations on the safety of handling UEEE

- Law on Environmental Protection and Natural Resources Management (1996)
 - ✓ Article 12 and Article 13 – focused on the preparation of mechanism to cope with toxic substances and hazardous substances in Cambodia.
- Sub-Decree on Solid Waste Management (1999)
 - ✓ Article 20: “The exportation of the hazardous waste from the Kingdom of Cambodia to abroad could be conducted if there are an agreement from the Ministry of Environment, export license from the Ministry of Trade, and permit from the import country. The exportation of the hazardous waste shall be consistent with the provisions and principles of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

- ✓ Article 21: “The importation of hazardous waste from abroad into the Kingdom of Cambodia is strictly prohibited.”
- ✓ Other relevant Article in Chapter 3 and Chapter 4
- ✓ Hazardous waste criteria highlighted in the Annex of the Sub-Decree
 - Article 8 of the Sub-Decree on Water Pollution Control, stipulated that “The disposal of solid waste or any garbage or hazardous substances into public water areas or into public drainage system shall be strictly prohibited. The storage or disposal of solid waste or any garbage and hazardous substances that lead to the pollution of water of the public water areas shall be strictly prohibited.”
 - Custom and Excise Department— Announcement on the Ban of importation of old computers and spare-parts for occupation purpose, except, for self consumption and/or charity in minor amount (12/03/02).
 - Sub-Decree on Business Facilitation by Risk Management (2006) is another important legal instrument of Cambodia, aiming at:
 - improving the imported/exported processes of goods and other facilities in complying with the national laws/regulations and international agreements/protocols,
 - effective management and monitor,
 - providing low cost in service comparing to other adjacent countries,
 - authorizing functions/duties of line institutions at check-points,
 - facilitating a rapid and easier way to importers/exporters.

B) E-wastes Management

- ☞ Brand new electric and electronic equipment (EEE) and used electric and electronic equipment (UEEE) are imported into Cambodia for domestic consumption.
- ☞ Cambodia is not a country that produces EEE products and/or exports to other countries.
- ☞ Some imported UEEE have low quality or improperly function, which required to either repair or dismantle.
- ☞ Awareness and capacity dealing with UEEE and its residues management is commonly limited.
- ☞ There is no information or official report addressing the Electronic and Electrical Waste collection (EEW), transportation, recycling, as well as environmental and health related issues:
 - Repairing, dismantling and recycling activities
 - Collection, storage, transportation and disposal of EEW, which generated from households, business entities, and residues from repairing and dismantling process

- ☞ Some recyclable wastes were locally collected reflecting to domestic and international markets.
- ☞ There is not a specific institution that responsible for managing and recycling EEW.
- ☞ Specific law and/or regulation to properly manage, recycle and dispose EEW has not yet existed.
- ☞ The project namely “Environmentally Sound Management of Electrical and Electronic Waste in Cambodia” provides opportunity to Cambodia to do an UEEE inventory – a basic preparedness of strategic plan and activities to manage UEEE and its residues in a proper way.
- ☞ Today training course is prioritized as major part of the UEEE management strategic plan.

Repairing/dismantling/recycling

- ☞ Repairing and dismantling process to few items of UEEE is simply done, due to insufficiency of modern technology, and sectoral awareness.
 - First testing to identify problems as well as other useable parts
 - Connecting or replacing a spare-part from dismantled items to get a new one with appropriate functioning, although it has lower quality
 - Retesting will be done in order to emphasize the function of repaired EEE. If this repaired EEE does not function and/or improperly function, the repairing will be done once more.
- ☞ Beside the use of simple method of repairing, some broken/un-functioning EEE, e.g. laptop computer was sent to overseas for repairing in according to the negotiation between shop owner/manager and customer.
- ☞ Same as a repairing process, there is no technology has been presented and used for dismantling and recycling of the six selected items of UEEE although in Phnom Penh Municipality

Disposal of EEE residues

- ☞ Two ways of disposal found in Cambodia: (i) the residues from dismantling and repairing operation, which disposed directly to municipal trash-bin; and (ii) some residue sell to waste-picker (and finally to scrap yards).

- ☞ Cambodia does not have a technology and capability to do an EEE/EEW recycle itself.
- ☞ Cambodia does not have a formal EEW collection system. Take/buy back policy to EEW by produced countries does not take into account.
- ☞ Lacking of specific capacity/capability in EEW management and recycling as well as take back policy, therefore, EEW are being improperly disposed at dumpsites and opened areas as well.

Lifetime uses of EEE/UEEE

- ☞ The consuming lifetime of EEE (brand-new and second-hand) is varied depending on:
 - Type, quality, particular maintenance and consuming condition
 - Changing of updated series/models
 - Providing to someone, who has less affordability in buying it.

Environmental and human health related issues

- ☞ As an observation during the field survey, there is not any cause and/or harmful problem to the environment, although environmentally unsound reuse/recycling or disposal of used EEE were done.
- ☞ Incident might be rarely occurred due to either technical mistake or carelessness, for example, capacitor-exploded, cable-fired.
- ☞ However, some impacts might be occurred to human health, especially, one who get directly involve with the processing of UEEE repairing/dismantling without using safety facilities, for example, mass, glove, sun-glasses, etc.
- ☞ Residues of UEEE mixing with domestic wastes are disposed at dumpsites and burned. That is a cause of potential risk and hazard to scavengers/waste pickers and atmospheric pollution (also releasing of unintentional POPs by-products)
- ☞ In some areas, EE residues are disposed closed to/behind the repairing/dismantling shops, and finally are burned while municipal-waste collection service cannot access.

3.3 Introduction of Electrical and Electronic Wastes and Harmful Substances in E-Wastes including Its effects presented by Ms.Cynthia Indriani, Basel Convention Regional Centre for Southeast Asia

There are several definitions on e-wastes, among others, which are according to the European Union on Waste Electrical and Electronic Equipment (EU WEEE) Directive, Basel Action Network, and Organisation for Economic Co-operation and Development (OECD). E-wastes generation can be caused by normal use and disaster. According to the EU WEEE Directive, there are several categories of e-waste and also examples of

each of the category. The categories are large household appliances, small household appliances, IT and telecommunications equipment, consumer equipment, lighting equipment, electrical and electronic tools, toys, leisure and sports equipment, medical devices (except implanted and infected), monitoring and control instruments and automatic dispensers. E-wastes contain several components, which are the casing, mechanical parts, electronic parts, display, output, input and power unit. The major materials in e-wastes are metals, plastics, rubber, glass, and other chemical compounds. Some examples of the chemical content in e-products are lead in cathode ray tube (CRT), nickel-cadmium, lead and lithium in batteries, and various metals and plastics in printed circuit board.

Based on literature review on e-wastes management in developed and developing countries, there are several common e-waste handling practises. Those practises are repair, reuse, recycle and disposal. The methods used for disposal are thermal treatment, by incinerator and open burning, and land disposal, by landfill and open dumping.

The hazards related to e-waste are caused by intrinsic hazard of materials, in form of physical and chemical hazard, and by improper handling practises. E-wastes also pose risks to occupational health and safety, such as inhalation of dust and fume and to environment through contamination to air, soil, groundwater, and water.

The harmful substances in e-wastes are halogenated compounds, heavy metals and other metals, radio active substances and others, such as toner dusts. Each of the substances can be found in various parts of e-wastes, e.g, polychlorinated biphenyls in condensers and transformers, polyvynil chloride in cable insulation, lead in CRT screens, batteries, and printed wiring boards, etc.

These hazardous substances in e-wastes also have many effects on human health, which affect various organs of human body, such as lung cancer, damage to heart, liver, spleen, kidney, severe hormonal disorders, etc. They can be released from e-waste during various processes of e-wastes recycling and disposal. For example, barium oxide as dust, can be released during the dismantling and handling of CRTs of TV and PC monitor, and beryllium, cadmium and lead may be released as oxide dust during high temperature of metal processing, etc.

Based on study by Basel Action Network on unenvironmentally sound processes of e-wastes in Guiyu, China in 2002, there is a list of potential occupational and environmental hazards caused by those processes. For example, breaking and removal of copper yoke and dumping of CRTs can cause silicosis, cuts, and inhalation or contact with phosphor containing cadmium or other metals, as well as leaching of lead, barium and other heavy metals into groundwater and release of toxic phosphor. Another examples are inhalation and air emission of tin, lead, brominated dioxin, beryllium, cadmium and mercury caused by de-soldering and removing computer chips of printed circuit boards.

3.4 Result of Demonstration Programme of ESM of E-waste at the Recyclable Waste Collecting Site presented by Mr. Iv Sophal, Project assistant

The recyclable wastes collecting site located in Phnom Penh City. The site buys and sells all kind of e-wastes such as TV sets, computers, tape player, washing machine, and radio ...etc. The site has been operating since 2007 and there are around 20 workers in the recyclable wastes collecting site. Those electronic and electrical wastes was dismantled to collect the valuable material as plastic housing, circuit board for resale or reuse as a spare part in other equipment .With regard to the E-wastes dismantling process, the workers usually breaks it down manually and these processes is carried out mostly at rear of the site. The plastic housings and other plastic component are milled into small pieces before selling to the recycling facilities in abroad. The plastic milling machine was very old and has been operated 2-4 times a week depends on the amount of plastic collected. The water are used for the milling process and it is discharged directly into the public sewage system. Some non recyclable wastes generated during dismantling process of used electronic and electrical wastes such as plastic, lamp...etc. are collected by household wastes collection company and disposed at the wastes dumping site. All processing of E-waste is on the environmentally unsound management, and many problems have been identified during the demonstration programme such as lack of the environmental awareness to protect the environment and human health against the adverse effect caused by the environmentally unsound way and no data of e-wastes in the recyclable wastes collecting site and no e-wastes audit system has ever been introduced in this site. Furthermore, The Basel Convention and the technical guidelines on e-waste management prepare under the Basel Convention or by other international bodies are not transferred sufficiently to stakeholders involved at the national and local level. However, there were modifications made to the project to address these findings such as trainings on the environmental and health effect caused by e-wastes and e-wastes guideline .As the result, all workers are very interested in using protective equipment, particularly the masks during working at the recyclable wastes collecting site.

During implementation of the Demonstration Programme, the form to record the incoming and outgoing e-wastes were developed and disseminated to workers including trainings of how to use it at recyclable wastes collecting site. As the result, amount of e-wastes are collected during the implementation of the Demonstration Programme.

The pilot project clearly identify that the main problem areas associated with the Environmentally Sound Management of E-wastes are dismantling, sorting, collecting and legitimate transport to the recycling plants. An isolated example of plastic milling operation could indicate that there may be others, but that is probably unlikely as the export trade in e-wastes is a thriving operation. These problems are exacerbated because of the inadequate knowledge and understanding of the people working in the sector of the potential health risks to themselves and the environment damage caused by the e-wastes. The workers lack of understanding means that they have adopted poor safety operating practices when handling the e-wastes and none of the people involved

in exporting illegally the e-wastes to Vietnam or Thailand follow the correct legal procedures or international conventions.

3.5 Environmentally Sound Management of E-Wastes presented by Ms.Cynthia Indriani, International Expert, Basel Convention Regional Centre for Southeast Asia

The ESM practises for e-wastes cover collection, transport and handling, sorting and temporary storage, dismantling of end of life appliances and transboundary movement. Sources of used electronic appliances can be from formal and informal sectors. Collection frequency depends on the kind of appliances to collect, sources of used electronic appliances, staff in charge for collection, collections time, and type and availability of vehicle. ESM practises for collection include good working relationship with local authorities and retailers, separate collections with other household goods in future, etc.

For transportation, there are requirements such as appropriate vehicles and equipment (weight, height, space for desired amount of items), items are loaded and handled correctly, secured in the vehicle, in the correct position for transportation, protected by a reusable wrapping, etc. There is also a check list for transportation such as to consider chance of people being struck or run over by the vehicles and what might cause that, appropriate layouts of the routes, vehicle safety features, appropriate vehicle maintenance, etc. There is available reference for transportation which is the United Nation Recommendations on the Transport of Dangerous Goods and United Nation Globally Harmonized System for Classification and Labeling of Chemical. (<http://www.unece.org>).

ESM practises for sorting and temporary storage, among others, are to have procedures for the sorting of appliances, set up records and labeling for spares and stored materials, and good facilities for storage, which include a designated collection bay for first-point assessment and sorting, adequate number of storage areas, waste appliances storage, waste materials containers or bays, hazardous waste materials storage, etc.

The legislation of a country should result in industry and the regulators setting standards and codes of practice for the dismantling of waste appliances. It is therefore advisable that all workshops try to meet expected guidelines and become accredited.

Parties to the Basel Convention should ensure that the transboundary movement of hazardous wastes and other wastes is reduced to the minimum consistent with the environmentally sound and efficient management of such wastes. The transboundary movement of those wastes should follow the procedures of the Basel Convention on Transboundary Movement of Hazardous Wastes and their Disposal.

3.6 Result of the Implementation of project on Training Programme for E-wastes and Demonstration at a Recyclable Waste Collecting Site of Environmentally Sound Management of the E-wastes” presented by Mr. Ken Choviran, Project coordinator, Ministry of Environment

Since the implementation of the project from January to December 2010, the Project Team accomplished the following activities:

i) Training on ESM of E-wastes:

The Ministry of Environment, Cambodia organized a training course on the Environmentally Sound Management of Electronic and Electrical Wastes (E-Wastes) in Phnom Penh, Cambodia, from 31 March to 1 April, 2010. The objective of the training course is to promote the awareness of the workers and scavengers towards the Environmentally Sound Management of Electronic and Electrical Wastes in the twenty four project participating provinces and cities in Cambodia. The training course was attended by 55 workers and scavenger involved with used electronic and electrical equipment and electronic and electrical wastes in the twenty four project participating provinces and cities in Cambodia (Phnom Penh Municipality, Kampong Chhnang Province, Pursat Province, Battambang Province, Banteay Mean Chey Province, Stung Treng Province, Rotanakiry Province, Mondolkiry Province, Kratie Province, Prey Veng Province, Svay Rieng Province, Kampong Cham Province, Kampong Thom Province, Siem Riep Province, Prea Vihear Province, Oudor Meanchey Province, Paylin City, Koh Kong Province, Keop City, Sihanoukville City, Kampot Province, Kandal Province, Takeo Province and Kampong Speu Province), The list of participants is presented in the proceeding.

ii) Televised Debate of e-waste issues

The Debate Program of E-wastes was conducted and broadcasted via National Television of Cambodia (TVK) in collaboration with Directorate of National Television of Cambodia. Debate performance was took place on 25th June 2010 at TVK studio, Phnom Penh. There are about 150 persons participated in the debate performance, in which they are coming from Ministry of Environment, TVK staff including master ceremony and debate's chair persons, Students from Buildbright and Mekong Universities, Representative of E-Wastes Project Team, Representative from MoE, Japan, Honorable guests (MOE delegate) and Artistes (comedy team, singers and dancers). The main objective of the Debate is focusing on environmental pollution caused by e-wastes, sound wastes management approaches of e-wastes, which is aiming to distribute information and promote people's understanding about the e-wastes issues and raise public awareness and convey message to decision makers on the connection between impacts of pollution caused by e-wastes and ecological protection

and conservation, social development, and economic growth, and their link to poverty reduction approaches and health risk prevention.

The theme for the debate was "Should Cambodia stop importing second-hand (used) electronic and electrical equipment?". The debate was followed by performances a comedy "The second-hand millionaires" and a song "Environment destructed, species gone". Based on verbal feedback to the debate organizing team, received from participants attending the debate performance, it was noticed that this debate is so important and useful to raise environmental awareness and knowledge of the general people, officers, decision makers, students related to e-wastes. In addition, this program also encourages the participation of the public in the protection and preservation of Cambodia environment that can be polluted by E-wastes.

Upon completion of the debate, the evaluation panel determined two winning teams. The first winner was the Mekong University's Team and the second one was the Buildbright University's Team. In addition, the evaluation panel also recognised the best speaker among the participating debate teams who was a student of the Buildbright University. Each speaker was awarded a certificate from the representatives of the Ministry of Environment of Cambodia and the Ministry of Environment of Japan.

iii) **Demonstration Programme of ESM of E-wastes**

Demonstration Programme were implemented from 1 August to 30 November 2010 at the recyclable wastes collecting site located in Phnom Penh City with the objective to build the capacity and raise awareness on the ESM of e-waste including collection, transport, storage, refurbishment and repair to workers and other stakeholders involved.

3.7 Experience in dealing with ESM of E-wastes in other countries Presented by Ms.Cynthia Indriani, International Expert, Basel Convention Regional Centre for Southeast Asia

There are 4 (four) main stakeholders in e-wastes management in Switzerland, namely SWICO, SLRS (Swiss Lighting Recycling Foundation), SENS and INOBAT. They are the Producer Responsibility Organisations (PROs), which are cooperative industry effort to bear responsibilities of its member companies collectively and meet their Extended Producer Responsibility (EPR) obligations by organising the financing, collection, transport and control system, deciding the product categories covered, amount of Advanced Recycling Fee (ARF) and licensing of recyclers and logistics providers. They can also have various functions e.g education & training of producers and consumers, controlling, reporting and supporting research and development. Most PROs collect a fee directly from the producers based on a specific fee structure. Other actors in the e-wastes management are the manufacturers/importers, retailers, consumers, recyclers, government, refiners, and disposers.

The policy and legislation for e-waste management are the Ordinance on the Return, the Taking back and the Disposal of Electrical and Electronic Equipment (ORDEE), issued in 1998. According to the legislation, retailers, manufacturers, and importers must take back for free appliances of the kind they normally stock. Customers must

return end-of-life appliances and must not dispose of them via house hold waste or bulky item collection. There is also voluntary EPR.

The e-waste “wheel of life” in Switzerland are as follow :

i) Buy

Any EEE (e.g consumer electronics / office , information and communication equipment / electric tools and toys / cooling appliances / lighting equipment including lamps and all kind of batteries) are charged an Advance Recycling Fee (ARF) or also Advance Disposal Fee (ADF). The amount of ARF is defined by the type of the product, included in its sales price and normally stated separately on the price tag and invoice. Consumers can return retired equipment free of charge at all collection sites.

ii) Return

Consumers are not allowed to dispose of WEEE through other than dedicated collection points. Retailers, traders and manufacturers are obliged to take back WEEE free of cost and independent of any purchase for all types of products they sell. Producers have to dispose of collected WEEE safely through the 4 (four) independent PROs or by setting up their own management system.

iii) Shred

It is a mechanical process and normally an industrial large scale operation to obtain concentrates of recyclable materials and to further separate hazardous materials. The gas emissions are filtered and effluents are treated to minimise environmental impact. Indoor exposure is monitored and assessed and kept within Swiss Maximum Allowable Concentration (MAC)-levels to assure workers safety

iv) Refine

Most of the fractions need to be refined or conditioned to be sold as secondary raw materials or to be disposed of in a final disposal site. Many refining processes take place outside Switzerland, entailing greater transport distances. 3 (three) flows of materials paid attention to are metals, plastics and glass.

The process of non CRT e-waste recycling plant in Switzerland include shredding, electro - magnetic separation of ferrous and nonferrous metals, liberation of non ferrous metals and eddy current separation of course metal fraction and separator for plastic.

Overview of ESM of e-wastes in other developed countries can also be seen at E-Waste Volume II : E-Waste Management Manual, compiled by UNEP Division of Technology, Industry and Economics – International Environmental Technology Centre in 2007.

3.8 Group Discussions on what is the future priorities activities to be followed up for the effectiveness of ESM of the E-wastes in Cambodia, facilitated by Ms.Cynthia Indriani, International Expert, BCRC-SEA and Mr. Ken Choviran, Project coordinator, Ministry of Environment

After initial presentation, the participants were divided into two groups. The task was to discuss and present the outcomes of the groups on what are the future priorities activities to be followed up for the effectiveness of ESM of the E-wastes in Cambodia. The outcomes of both groups, based on their presentations, are as following:

a) Sub decree on the ESM of E-wastes

Need to set up e-wastes legislation such as Sub decree on the ESM of E-wastes in order to insure the effectiveness of the e-wastes management in the country including collection, storage and transport of e-wastes...etc.

b) Public awareness rising of e-wastes

Continuity of awareness rising of e-wastes through training programme, workshops, forums and televised debates to stakeholders involved not only at the national level, but also at local level.

c) Legislation enforcement

Need to establish the National Committees for monitoring and enforcing the e- wastes legislation.

d) Polluter Pay Principle

Strong need to apply the Polluter Pay Principal for EEE and UEEE in the country.

4.0 WOKRSHOP CONCLUSION AND RECOMMENDATIONS

Based on the discussion in the plenary and questionnaire received, participations agreed to a number of recommendations. Those are summarized below:

- i) The participants expressed that the workshop was very interesting and thanked to the project team and resource person for organizing this workshop, and the Government of Japan and the Secretariat of the Basel Convention for providing supports,
- ii) The participants expressed that the presentation materials are very useful, particularly the result of Demonstration programme,
- iii) Participants expressed the need to continue the awareness rising programme for workers at the recyclable waste collecting site at the local level.
- iv) The participants agreed that there is need of legislation development related to ESM of E-wastes including the issue of import of second hand of EEE.

Appendix - I Programme of the Workshop

Time	Contents
DAY ONE: 27 December 2010	
8:00 - 8:30	Registration
8:30 - 9:15	1)- Opening Ceremony - Opening address by Ms. Cynthia Indriani , Basel Convention Regional Centre for Southeast Asia “BCRC-SEA” - Opening address by H.E.Mr. Lonh Heal , Director General of Technical Affairs, Ministry of Environment, Cambodia 2)- Photos session
9:15- 9:45	Coffee break
9:45 – 10:55	- Brief Overview of the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their disposal - Brief overview of BCRC-SEA and BCRC,China Presented by Ms.Cynthia Indriani , International Expert, BCRC-SEA
10:55-11:05	Discussion
11:05-11:50	Basel Convention Implementation and E-wastes Management in Cambodia Presented by Mr. Chin Sothun , Deputy Chief of Solid Waste and Hazardous Substances Management, Ministry of Environment
11:50-12:00	Discussion
12:00-13:30	Lunch
13:30-14:30	Introduction of Electrical and Electronic Wastes and Harmful Substances in E-Wastes including Its effects Presented by Ms.Cynthia Indriani , International Expert, BCRC-SEA
14:30-14:40	Discussion
14:40-15:25	Result of Demonstration Programme of ESM of E-waste at the Recyclable Waste Collecting Site Mr. Iv Sophal , Project assistant

15:25-15:35	Discussion
15:35-16:00	Coffee break
16:00-16:50	Environmentally Sound Management of E-Wastes Presented by Ms.Cynthia Indriani , International Expert, BCRC-SEA
16:50-17:00	Discussion
DAY TWO: 28-December-2010	
8:30 - 9:30	Result of the Implementation of project on Training Programme for E-wastes and Demonstration at a Recyclable Waste Collecting Site of Environmentally Sound Management of the E-wastes” Presented by Mr. Ken Choviran , Project coordinator, Ministry of Environment
9:30-9:40	Discussion
9:40-10:10	Coffee break
10:10-11:10	Experience in dealing with ESM of E-wastes in other countries Presented by Ms.Cynthia Indriani , International Expert, BCRC-SEA
11:10-11:20	Discussion
11:20-12:00	Group Discussions on what is the future priorities activities to be followed up for the effectiveness of ESM of the E-wastes in Cambodia, facilitated by Ms.Cynthia Indriani , International Expert, BCRC-SEA and Mr. Ken Choviran , Project coordinator, Ministry of Environment
12:00-13:30	LUNCH
13:30-17:00	Continuity of Group Discussions on what is the future priorities activities to be followed up for the effectiveness of ESM of the E-wastes in Cambodia, facilitated by Ms.Cynthia Indriani , International Expert, BCRC-SEA and Mr. Ken Choviran , Project coordinator, Ministry of Environment

Appendix - II Participants List

No	Name	Position /organization
1.	H.E. Mr. Lonh Heal	Director General, Ministry of Environment, Phnom Penh
2.	Ms. Cynthia Indriani	International Expert, BCRC-SEA, Indonesia
3.	Mr. Ken Choviran	Project coordinator, Ministry of Environment, Phnom Penh
4.	Mr. Iv Sophal	Project assistant, Ministry of Environment, Phnom Penh
5.	Mr. Chin Sothun	Solid Waste and Hazardous Substances, MoE, Phnom Penh
6.	Mr. Seng Rina	Waste collection company, Mondolkiry Province
7.	Ms. Kong Danet	Department of commerce, Mondolkiry Province
8.	Mr. Ly Hout	Department of commerce, Kratie Province
9.	Mr. Bun Sikhent	Waste collection company, Kratie Province
10.	Mr. Soth Channara	Department of Transport, Kampong Chhnang Province
11.	Mr. Pak Vannly	National Ozone Unit, Ministry of Environment, Phnom Penh
12.	Mr. Nguon Narin	Department of Industrial Technique, Ministry of Industry, Phnom Penh
13.	Mr. Phay Dara	Ministry of Industry, Phnom Penh
14.	Mr. Sok Vuthear	UEEE repairing shop, Phnom Penh
15.	Mr. Nhin Sokun	Telecommunication and Post, Banteay Mean Chey Province
16.	Mr. An Tora	Department of Environment, Kandal province
17.	Ms. Chreang Phollak	Authority of Toul Kok District
18.	Mr. Thor Sopheap	Department of Environment, Kandal province
19.	Mr. Seng Bunthearith	Student, University of Build Bright, Phnom Penh
20.	Ms. Seak Eng	Custom office, Phnom Penh
21.	Mr. Khem Theara	Telecommunication and post office, Paylin City
22.	Mr. Pich Sengly	Transport office, Paylin City
23.	Mr. Vutha Soktheory	Waste collection company , Prea Vihear Province
24.	Ms. Lun Sreynak	Compost organization, NGOs in Phnom Penh
25.	Ms. Tun Sodalim	Authority of Chamkarmon, Phnom Penh
26.	Mr. Sun Sethy	Authority of Chamkarmon, Phnom Penh
27.	Mr. Nuong Sumlivung	CAMCONTROL, Ministry of Commerce, Phnom Penh
28.	Ms. Pech Sathaserey	Custom office, Koh Kong Province
29.	Ms. Chuth Lengvanny	Cambodia Mekong University, Phnom Penh
30.	Mr. Khem Luch	UEEE retail shop
31.	Ms. Ann Chantey	Legal office, Kampong Thom Province
32.	Mr. Heng Chanreth	Ministry of Health, Phnom Penh
33.	Mr. Renh tilo	Waste collection company, Siem Riep Province
34.	Ms. Khuy Kuyuny	Department of Environment, Municipality of Phnom Penh
35.	Mr. Nget Bol	Department of Pollution Control, Ministry of Environment, Phnom Penh
36.	Mr. Em Sitha	Authority of 7 Makara, Phnom Penh
37.	Ms. Tiang Dany	Student, University of Build Bright, Phnom Penh
38.	Mr. San Siadarong	Cambodia Mekong University, Phnom Penh
39.	Mr. Seng Kakada	Student, Cambodia Mekong University, Phnom Penh
40.	Ms. Rath Sreyneang	Student, Cambodia Mekong University, Phnom Penh
41.	Mr. Mey Sophoan	UEEE repairing shop, Takhmao City
42.	Ms. Sor Sotheary	Waste Collection company, Kampong Thom Province
43.	Mr. Long Lim	Worker , Recyclable Waste Collecting Site, Phnom Penh
44.	Mr. Pan Rath	Worker, Recyclable Waste Collecting Site, Phnom Penh
45.	Ms. Khuch Im	Worker , Recyclable Waste Collecting Site, Phnom Penh
46.	Mr. Sam Sameang	Worker , Recyclable Waste Collecting Site, Phnom Penh
47.	Mr. Suos Sokha	Telecommunication office, Svay Rieng Province
48.	Mr. Cheng Chinneth	Commerce office, Kampong Cham Province
49.	Mr. Pen Thann	Custom office, Kampong Cham Province
50.	Mr. Thong Sokvongsa	Waste water management office, MoE Phnom Penh
51.	Mr. Chim Poly	Waste collection company, Phnom Penh