# AWARENESS RAISING ON E-WASTE MANAGEMENT

# IN ETHIOPIA


## PESTICIDE ACTION NEXUS ASSOCIATION (PAN-ETHIOPIA)

## IN COLLABORATION WITH

## THE INTERNATIONAL POPS ELIMINATION NETWORK (IPEN)

**TADESSE AMERA**

**SEPTEMBER 2010, ADDIS ABABA, ETHIOPIA**

# 1. INTRODUCTION

Pesticide Action Nexus (PAN) Ethiopia is established to complement with the effort of the Ethiopian government in development and to contribute to the eradication of poverty in Ethiopia by raising the awareness of the public in order to prevent the public health and environmental impacts of pesticides and other hazardous substances.

The main objective of PAN-Ethiopia is to enhance and promote safe and sustainable environment suitable for dwellers which is protected from harm posed by hazardous substances by promoting the close collaboration of non-governmental organizations, government, interested groups, urban and rural communities.

In line with this, PAN-Ethiopia in collaboration with the Institute for Sustainable Development (ISD) participated in the process of developing the IPEN Anglophone Africa Regional Action Plan 2009-2013. PAN Ethiopia was granted SAICM Mini-grant in March 2009 through IPEN and conducted an activity on Information Dissemination on the Status of DDT Use in the Ethiopian Rift Valley.

This time PAN-Ethiopia received a small grant from IPEN ISIP for activities of awareness raising on E-waste management in Ethiopia. The Long Term Objective of this mini-project is to promote formulation/enactment and enforcement of a legislation/policy on the proper management of electronic and electrical wastes in Ethiopia; including a law which restricts the importation in any ways (business or donation) of end of life digital equipments to Ethiopia.

The specific objective is to convene a national stakeholders' workshop to appreciate the problem of e-waste in Ethiopia and plan for immediate intervention.

PAN-Ethiopia, therefore, conducted a one month assessment of E-waste situation and the national stand of Ethiopia with regard to e-waste management.

The pre-workshop assessment found out that E-waste law is not yet formulated in Ethiopia; but a computer refurbishment centre is established as a means of e-waste management facility.

The following article is taken from a local news paper just before our workshop:

***E waste law in authority's inbox***

*The environmental protection Authority (EPA) is preparing to produce a local electronic waste (e-waste) regulation for the management of discarded electrical goods.*

*The authority is currently working with consultants on framework, which it expect to be finished this current budget year at the end of July, according to Wondwosen Sintayehu , director of environmental systems design within the authority.*

*The information and communication technology development agency (ICTDA), has delivered a proposal input for the authority about electronic waste management and related issues and preliminary discussion are ongoing between the two parties.*

*One of the factories increasing the problem of e-waste is cheap, used computers imported from developed countries that expire quickly.*

*"This problem is causing pollution in Ethiopia" a source said most countries are using a de-manufacturing process to recycle PC parts for another purpose.*

*Recently, ICTDA inaugurated a computer refurbishment and training centre at the cost of 20 million Ethiopian Birr with the financial and technical support of the World Bank, Microsoft and International Business Leaders Forum (IBLF).*

*The centre plans to commence de-manufacturing PCs collected locally. "The establishment of the centre has a crucial role to play in preventing the environmental damage caused by electronic materials", officials at the authority said.*

*The centre is able to refurbish about 2000 second hand computers per month and give training to Technical and Vocational Education and Training (TVET) students from across the country.*

Having this information, PAN-Ethiopia, therefore, conducted a one day workshop with relevant stakeholders on April 30, 2010 and visited the established computer refurbishment centre on August 13, 2010. After the two events, PAN-Ethiopia discussed with EPA on the follow-up of the e-waste management activities we started. EPA informed us that they have a project proposal developed in 2007 with a secured fun amounting US$ 200,000 which is planned to be implemented in four cities of Ethiopia and asked PAN-Ethiopia if we can adopt the project proposal and implement it. We are, therefore, readjusting the proposal provided by EPA and planning to implement the activities in the coming two years (Please refer Annex 1 for the detail proposal provided by EPA).

# 2. OPENING REMARK

**By Sue Edwards, Director of ISD**

Why should we here in Ethiopia be concerned about electronic waste (e-waste). It is true that compared with other challenges of waste management in the fast expanding urban areas of the country, e-waste could hardly be considered a critical problem.

However, there are a number of features of e-waste that make it very different from the other forms of waste. The most important of these is that e-waste contains chemicals that are hazardous or toxic to human health and the environment when they are in the amounts found in all types of electronic equipment such as mobile phones, computers, television sets, refrigerators and even dry cell batteries. These toxic chemicals include lead, cadmium, beryllium, mercury, bromides, and many others.

E-wastes are highly hazardous. The Environmental Protection Authority of America defines hazardous waste as:

*"...Waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludges. They can be discarded commercial products, like cleaning fluids or pesticides, or the by-products of manufacturing processes.*

Figure 1: Ms Sue Edwards conducting opening remark

It is true that old, broken or obsolete electronics contain valuable materials if they can be extracted and collected together safely. But special training and equipment is needed to do this.

Ethiopia, in common with other developing countries, is now seen as an ‘open’ market for passing on old, almost obsolete electronic equipment. Although it may be done with genuine good intentions, equipping a school or office with old computers and printers without having them checked and given some sort of guarantee that they will work effectively for a few years, not months, is really only passing on the problem of safe disposal and recycling of such equipment from a developed country or organization in the developed world to us here in the Third World.

Mobile phones probably make up the greatest bulk of electronic equipment now found in Ethiopia; they are getting to all small villages and farmers. But where do the broken ones go? I don’t think anyone has studied this, let alone the disposal of larger electronic items.

Now is a good time for Ethiopia to give serious consideration on how to deal with the emerging mass of electronic waste before it starts to contaminate the environment, as has and is still continuing to happen in the developed countries.

In the United States of America, a number of organizations have been set up to collect, dismantle and sort the components in electronic waste. In the UNEP Annual Magazine called “One Planet” of 2008, a project was described from Cape Town, South Africa, where old computers and other electronic equipment is collected, dismantled and the various components that can be recycled are bulked up and sold. This is starting to generate enough income for the recycling facility to become sustainable. The article stated that the Project is even getting shipments of old computers from other countries outside Africa.

Here in Ethiopia, we need to build awareness of the problems from this type of waste, for me, starting with dry cell batteries, and then perhaps moving to mobile phones before tackling larger items. Civil Society should also work with the government and customs authorities to try and prevent the country becoming a dumping ground for basically useless e-waste.

I hope this meeting will be the first of a series on this issue, including raising funds for careful studies to be carried out on this emerging challenge.

Thank you

# 3. E-WASTE MANAGEMENT-OVERVIEW OF DEVELOPING COUNTRIES

**Haile Dinku, Addis Ababa City Waste Management Agency**

E-Waste for short – or Waste from Electrical and Electronic Equipment (WEEE) – is the term used to describe old, end-of-life or discarded appliances using electricity. It includes computers, consumer electronics, fridges etc which have been disposed of by their original users.

"e-waste" is used as a generic term embracing all types of waste containing electrically powered components. E-Waste contains both valuable materials as well as hazardous materials which require special handling and recycling methods.

Examples: Computers, LCD / CRT screens, cooling appliances, mobile phones, etc., contain precious metals, flame retarded plastics, CFC foams and many other substances.

Used electronic products are the most rapidly growing problem in our waste stream due to their quantity and toxicity. Electronic wastes, such as televisions, computers and computer components, contain toxic substances, including lead, mercury, cadmium, lithium, brominated flame retardants, phosphorous coatings, and PVC plastics that create dioxins when burned. These toxic materials can be released upon disposal, posing a threat to human health and the environment.

Figure 2: Mr. Haile Dinku presenting his paper

More than 50 million metric tons of E-waste (old and outdated electronics, such as computers, cell phones and fax machines) is produced worldwide each year. Experts speculate this number will rapidly increase well into the future.

Currently the vast majority of this waste is sent to developing countries, such as SE China. There, workers manually dismantle the equipment to reclaim the copper and other prized materials found in the products. Much of the E-waste is crudely processed, often by open burning, which releases a range of highly toxic contaminants (e.g. dioxins, insulators (PCBs), fire retardants (BDEs), heavy metals) into the environment.

Many electronic wastes are regulated as hazardous waste when generated by businesses. Televisions and computer monitors generated as waste by households must be managed in accordance with E-Waste Law, which establishes a system in which consumers, municipalities, and manufacturers share responsibility for ensuring that these items are properly recycled to reclaim all useable materials and prevent the release of toxics to the environment.

The UN Environmental Programme (UNEP) estimates that the world produces 50 million tons of e-waste - every year.

E-waste is now the fastest growing component of the municipal solid waste stream because people are upgrading their mobile phones, computers, televisions, audio equipment and printers more frequently than ever before. Mobile phones and computers are causing the biggest problem because they are replaced most often. In Europe e-waste is increasing at three to five percent a year, almost three times faster than the total waste stream. Developing countries are also expected to triple their e-waste production over the next five years.

E-waste now makes up five percent of all municipal solid waste worldwide, nearly the same amount as all plastic packaging, but it is much more hazardous. Not only developed countries generate e-waste; Asia discards an estimated 12 million tones each year.

## E-waste recycling in India

The electronics industry is the world's largest and fastest-growing manufacturing industry. Rapid growth, combined with rapid product obsolescence makes e-waste the fastest growing waste stream in the industrialized world. E-waste comprises both valuable materials (such as gold and copper) as well as highly toxic substances like lead and mercury.

While high-income countries all over the world are beginning to address e-waste as it inundates solid waste disposal facilities, low- and middle-income countries are affected in a way which in most cases they are not yet able to tackle. During the last few years, India and China have won worldwide fame for devastating problems caused by improper handling of e-waste.

In the case of India, almost all dismantling of e-waste happens in the informal sector. Currently, only two companies hold an authorization for e-waste processing from the Karnataka State Pollution Control Board. India receives huge amounts of e-waste from abroad. Due to the fact that second-hand computers are allowed to be imported, containers with few intact computers and much broken equipment enter the country. Buyers acquire containers at auctions and bring them into a market of small and informal enterprises. Many family enterprises operate in this market. Safety equipment is scarce.

In 2004, the Indian government held a national workshop on electronic waste management. The participants concluded that there is a need for proper e-waste management. The two-way strategy comprised a study on national level to learn more about the problem and its extent, and the formation of a working group with members from regulatory agencies, the industry, NGOs, including both experts and recyclers.

In the city of Bangalore, many international and national software companies develop their products at remarkable speed. Computers in the offices are replaced frequently; approximately every 2 years. Large numbers of computers become obsolete. At the same time, the quality standards of some companies do not allow to discharge of old equipment if proper infrastructure is not available. Therefore, some companies store huge quantities of computers. The informal sector does not have the capacity and competence to process computers in a way that complies with the requirements of Indian legislation or international environmental standards.

For the informal sector, these processes appear threatening. If proper e-waste management in the future is to be raised to a highly professional level, it is probable that informal sector processors will have to shift to either illegal activities or another sector.

Recently, the Indian government started to work on a law for the Management and Handling of Waste from Electrical and Electronic Equipment. If the training of members from the informal

sector proves to be successful, and if they manage to join their interests with those of the formal recyclers and the authorities, this might allow them room to operate within a future law. This would mean that a formerly informal sector is considered in formal structures. Something similar is in process in Brazil where the informal sector is being included in the current proposal for a new solid waste law.

## E-WASTE MANAGENENT IN ETHIOPIA

Even though vastly growing, there is no sufficient data on the type and quantity of e-waste in Ethiopia in General and even in the capital city, Addis Ababa, in particular. As far as the knowledge of our agency is concerned, this workshop is the first of its kind to raise the issue of e-waste in detail.

## E-WASTE CONTAMINATED SITE

**Figure 3: Aerial View of Reppi Solid Waste Disposal Site, Addis Ababa- Ethiopia**

## E-WASTE POLICY, LAW & REGULATION

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, usually known simply as the Basel Convention, is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries.

The Basel Convention defines “wastes” as substances or objects, which are disposed of or are intended to be disposed of or required to be disposed of by provisions of national law. A stockpile of a material could be considered a waste if it is intended for disposal or is required to be disposed of.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted in 1989 in response to widespread concern about the dumping of hazardous wastes in developing countries by companies from developed countries

The December 1999 Basel Declaration adopted by the fifth meeting of the Conference of the Parties (COP5) states that:

The fundamental aims of the Basel Convention [are] the reduction of transboundary movements of hazardous wastes and other wastes subject to the Basel Convention, the prevention and minimization of their generation, the environmentally sound management of such wastes and the active promotion of the transfer and use of cleaner technologies.

This convention is, therefore, adopted and ratified by Ethiopia and the Federal Environmental Protection Authority (EPA) is the Designated National Authority (DNA) for this convention.

**HEALTH & ENVIRONMENTAL IMPACTS OF E-WASTE**

The growing quantity of waste from the electronics industry is beginning to reach disastrous proportions. This is due to the lack of protective measures and the inadequate way of dismantling and processing in order to extract valuable components. This can lead to severe health and environmental hazards.

Public-health problems and environmental degradation caused by recycling of old computer equipment could skyrocket in the next two decades, as increasingly wealthy consumers in countries such as India and China ditch their obsolete hardware.

Within six to eight years, developing countries will be disposing of more old computers than the developed world, suggests a study published in Environmental Science & Technology. And by 2030, these nations will be disposing of two to three times as many computers as the developed world, perhaps resulting in up to 1 billion computers being dumped worldwide every year - up from a global total of around 180 million units per year now.

What this means, is that even if the flow of obsolete computers exported from the developed world for recycling is completely shut off, the developing world will still have to cope with a massive amount of domestic electronic waste.

The problem comes from efforts to reclaim precious metals from circuit boards and wires using "very primitive" methods. To obtain copper, for example, informal 'backyard' recyclers in the developing world simply burn off the insulation, producing a host of toxic chemicals from the burning plastic. And to obtain gold and other metals from circuit boards, they simply treat them with litres of nitric acid and cyanide. There's no proper way to dispose of the waste acid and cyanide, which ends up being dumped into local water or soils.

According to one study report, Chinese factory workers who dismantle computers and other E-waste are chronically exposed to high levels of dangerous chemicals that damage their DNA and are known to cause a variety of illnesses. This study highlights the high exposures and health hazards associated with handling E-waste under less controlled conditions. Workers had more damaged DNA than non-factory workers; 5-times more altered DNA after work than before and higher levels of some chemicals than reported in U.S. workers. Dust samples from the factories contained orders of magnitude higher levels of chemicals than have been reported in other worldwide studies. Many adverse health effects have been linked to the pollutants and this type of DNA damage can lead to cancer and premature aging.

Exposure to chemicals from e-waste - including lead, cadmium, mercury, chromium and polybrominated biphennyls - could damage the brain and nervous system, affect the kidneys and liver, and cause birth defects.

## THE WAY FORWARD

1. Public Awareness & Training
   Many lack knowledge about the consequences of unsafe recycling practices of e-waste. Training will be necessary so that the environmental and health impacts of certain ways of processing become clear to the informal recyclers.
2. Research

3. Policy, Law & regulation

4. Establishing e-waste management system

5. Occupational safety & Health (OSH)

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## 4. Public Health Hazards of E-Waste

## Tadesse Amera, PAN-Ethiopia

"Electronic waste" may be defined as all secondary computers, entertainment device electronics, mobile phones, and other items such as television sets and refrigerators, whether sold, donated, or discarded by their original owners.

Rapid technology change, low initial cost, and planned obsolescence have resulted in a fast-growing surplus of electronic waste around the globe.

An estimated 50 million tonnes of E-waste is produced each year. The USA discards 30 million computers each year and 100 million phones are disposed of in Europe each year. The Environmental Protection Agency estimates that only 15-20% of e-waste is recycled, the rest of these electronics go directly into landfills and incinerators.

Trade in electronic waste is controlled by the Basel Convention. The Basel Convention Parties have considered the question of whether exports of hazardous used electronic equipment for repair or refurbishment are not considered as Basel Convention hazardous wastes unless they are discarded. The burden of proof that the items will be repaired and not discarded rest on the exporter, and any ultimate disposal of non-working components is subject to controls under that Convention. In the Guidance document produced on that subject, that question was left up to the Parties.

Figure 4: Mr. Tadesse Amera presenting his paper

Like virgin material mining and extraction, recycling of materials from electronic scrap has raised concerns over toxicity and carcinogenicity of some of its substances and processes. Toxic substances in electronic waste may include lead, mercury, and cadmium. Carcinogenic substances in electronic waste may include polychlorinated biphenyls (PCBs). Capacitors, transformers, and wires insulated with or components coated with polyvinyl chloride (PVC), manufactured before 1977, often contain dangerous amounts of PCBs.

Up to 38 separate chemical elements are incorporated into electronic waste items. Many of the plastics used in electronic equipment contain flame retardants. These are generally halogens added to the plastic resin, making the plastics difficult to recycle. Due to the flame retardants being additives, they easily leach off the material in hot weather, which is a problem because when disposed of, electronic waste is generally left outside. The flame retardants leach into the soil and recorded levels were 93 times higher than soil with no contact with electronic waste. The unsustainability of discarding electronics and computer technology is another reason commending the need to recycle or to reuse electronic waste.

When materials cannot or will not be reused, conventional recycling or disposal via landfill often follow. Standards for both approaches vary widely by jurisdiction, whether in developed or developing countries. The complexity of the various items to be disposed of, the cost of environmentally approved recycling systems, and the need for concerned and concerted action to collect and systematically process equipment are challenges.

**Electronic waste substances**

Some computer components can be reused in assembling new computer products, while others are reduced to metals that can be reused in applications as varied as construction, flatware, and jewelry.

Substances found in large quantities include epoxy resins, fiberglass, PCBs, PVC (polyvinyl chlorides), thermosetting plastics, lead, tin, copper, silicon, beryllium, carbon, iron and aluminum.

Elements found in small amounts include cadmium, mercury, and thallium.

Elements found in trace amounts include americium, antimony, arsenic, barium, bismuth, boron, cobalt, europium, gallium, germanium, gold, indium, lithium, manganese, nickel, niobium, palladium, platinum, rhodium, ruthenium, selenium, silver, tantalum, terbium, thorium, titanium, vanadium, and yttrium.

## The list of toxic components in computers includes:

- Computer circuit boards containing heavy metals such as lead & cadmium
- Computer batteries containing cadmium
- Cathode ray tubes with lead oxide and barium
- Brominated flame-retardants used in printed circuit boards, cables and plastic casing
- Polyvinyl Chloride (PVC) coated copper cables and plastic computer casings that release highly toxic dioxins & furans when burned
- Mercury switches
- Mercury in flat panel screens
- Poly Chlorinated Biphenyls (PCBs) present in older capacitors & transformers

## Hazardous Materials and their Effects on Humans and the Environment

### *Lead*

The effects of lead are established and well recognized. Lead is known to cause damage to the central and peripheral nervous systems, blood system and kidneys in humans. Effects on the endocrine system have also been observed and its serious negative effects on children’s brain development are well documented.

Lead accumulates in the environment and has high acute and chronic toxic effects on plants, animals and microorganisms. Consumer electronics constitute 40% of lead found in landfills. The main concern in regard to the presence of lead in landfills is the potential for the lead to leach and contaminate drinking water supplies.

### *Cadmium*

Cadmium compounds are classified as toxic with a possible risk of irreversible effects on human health. Cadmium and cadmium compounds accumulate in the human body, in particular in kidneys. Cadmium is absorbed through respiration but is also taken up with food. Due to the long half-life (30 years), cadmium can easily be accumulated in amounts that cause symptoms of poisoning.

Cadmium shows a danger of cumulative effects in the environment due to its acute and chronic toxicity.

***Mercury***

When inorganic mercury is introduced into natural water systems, it is transformed into methylated mercury. Methylated mercury easily accumulates in living organisms and concentrates through the food chain, particularly in fish. Methylated mercury causes chronic damage to the brain. It is estimated that 22% of the yearly world consumption of mercury is used in electrical and electronic equipment.

***Hexavalent Chromium (Chromium VI)***

Some manufacturers still use this substance as corrosion protection of untreated and galvanized steel plates, and as a decorative or hardener for steel housings. Chromium VI easily passes through cell membranes and is then absorbed – producing various toxic effects within contaminated cells. It causes strong allergic reactions in even small concentrations. Asthmatic bronchitis is a typical allergic reaction linked to Chromium VI. Chromium VI may also cause DNA damage. In addition, hexavalent chromium compounds are toxic in the environment. It is well documented that contaminated wastes can leach from landfills.
Incineration results in the generation of fly ash from which chromium is leachable, and there is widespread agreement among scientists that wastes containing chromium should not be incinerated.

***PVC***

The use of PVC in computers is mainly found in cabling and computer housings, although many computer moldings are now made from somewhat more benign ABS plastics. PVC cabling is used for its fire-retardant properties – but there are concerns that once alight, fumes from PVC cabling can be a major contributor to fatalities and hence there are pressures to switch to alternatives for safety reasons. Alternatives include low-density polyethylene and thermoplastic olefins. PVC is a difficult plastic to recycle. It contaminates other plastics in the recycling process. More importantly, the production and burning of PVC products generates dioxins and furans. PVC, commonly used in packaging and household products, is a major cause of dioxin formation in open burning and garbage incinerators.

***Brominated Flame Retardants***

Brominated flame-retardants are a class of brominated chemicals commonly used in electronic products as a means of reducing flammability. In computers, they are mainly used in four applications: printed circuit boards, components such as connectors, plastic covers and cables. They are also used in furniture foam, plastic covers of TV sets and in domestic kitchen appliances.

Various scientific observations indicate that Polybrominated Diphenylethers (PBDE) might act as endocrine disrupters. Research reveals PBDEs in breast milk of every American woman tested and that levels of PBDEs in human breast milk are doubling every five years – and this has prompted concern because of the effect of these chemicals in young animals. A recent study found that newborn mice fed PBDEs show abnormal behavior when placed in new surroundings. Normal mice become very active when first transferred to a new environment, but gradually slow down as they complete their explorations. However, treated mice were less active at first but became more active after being in new surroundings for an hour. Researchers concluded that exposure to these chemicals in early life could induce neurotoxic effects similar to those caused by other toxic

substances such as PCBs and some pesticides. Other studies have shown PBDE, like many halogenated organics reduces levels of the hormone thyroxin in exposed animals and is shown to cross the blood brain barrier in the developing fetus. Thyroid is an essential hormone needed to regulate the normal development of all animal species, including humans.

**Beryllium**

About 1-15% of all people occupationally-exposed to beryllium in air become sensitive to beryllium and may develop chronic beryllium disease (CBD), an irreversible and sometimes fatal scarring of the lungs. Occupational exposure most often occurs in mining, extraction, and in the processing of alloy metals containing beryllium. The adverse health effects of beryllium exposure are caused by the body's immune system reacting with the metal, resulting in an allergic-type response.

Chronic beryllium disease (CBD) occurs when people inhale beryllium dust or fume and can take anywhere from a few months to 30 years to develop. CBD is caused by an immune system reaction to beryllium metal, with symptoms such as persistent coughing, difficulty breathing upon physical exertion, fatigue, chest and joint pain, weight loss, and fevers.

Acute beryllium disease (ABD) rarely occurs in modern industry due to improved industrial protective measures designed to reduce exposure levels. ABD is caused by breathing in relatively high concentrations of beryllium in dust and metal fumes (>100 µg/m3). High level exposures may lead to death or respiratory illness similar to pneumonia or bronchitis. Symptoms associated with ABD include difficulty breathing, cough, and chest pain. These symptoms occur much more rapidly than those associated with chronic beryllium disease (CBD). Beryllium and beryllium compounds are known to be human carcinogens according to the most recent Report on Carcinogens (RoC).

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# 5. VISIT OF THE COMPUTER REFERBISHMENT CENTRE IN ADDIS ABABA

As has been indicated in the introduction, the Ethiopian Information and Communication Development Agency (ICTDA) in collaboration with international organizations established a computer refurbishment centre which is capable of handling 2,000 computers per month. The centre also conducts trainings in courses of computer software and hardware.

Figure 5: PAN-Ethiopia team visiting the computer refurbishment centre

The centre demanufactures old computers and separates plastics, metals, CRTs and mother boards so as to sale these items to those who can reuse or recycle. Most of the items are indicated to be used by different factories but CRTs and mother boards are still stored and there is no clue what to do with these hazardous items.

Figure 6: Reusable and recyclable plastic and metal parts of sorted computer components

Figure 7: Sorted and stockpiled computer components with no clue on what to do

Figure 8: Sorted CRTs with no clue on what to do with it

## 6. CONCLUSION

The mini-grant of IPEN bridges PAN-Ethiopia for a better collaboration with Federal EPA so as to work together for the betterment of E-waste management in Ethiopia. A two years project on proper E-waste management with a system-wide approach which will initiate the formulation of an applicable policy framework is being prepared. PAN-Ethiopia will, therefore, update IPEN on regular progresses of the process

## 7. List of participants for E-waste management workshop

**April 30, 2010; Desalegne Hotel, Addis Ababa**

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