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IMPACT OF THE WASTE OF ELECTRICAL AND ELECTRONICS EQUIPMENTS IN INDIA

Dr. R. A. Jaikumar*, R. A. Senthilkumar & S. Radhika*****
* Ex Principal, Sri Basaweshwara Institute of Technology, Karnataka
** P.G Scholar (Law), Annamalai University, Chithambaram, Tamilnadu
*** Research Scholar, St. Peter's University, Avadi, Chennai, Tamilnadu

Abstract:

In this paper has discussed with the problem the major problem that the human race is facing now is the effects of the E-pollution caused by the waste of Electrical and Electronics Equipments. Dumping of WEEE in public places and water resources are creating serious health hazards and unless and until it is controlled the reaction out of this world cause infection which would create a lot of disadvantage to the society .So, there should be a rule to prevent the people from damaging the ecosystem of our country to save nature to save people. The implementation of strict law for the prohibition of dumping WEEE should be sanctioned by the legal system and it should be activated by the Indian Penal Code. There are about 94 types of electronic products as re-selling illegally by recycling methods. An economic is designed to achieve an optimal source to reuse and reduce the WEEE.

Keywords- E-Pollution, Backyard Recycling, Energy Re-Usage, Innovation, Growth Ratio & Impacts

I. Introduction:

Electronic waste or e-waste is any broken or unwanted electrical or electronic appliance. E-waste includes computers, entertainment electronics, mobile phones and other items that have been discarded by their original users. E-waste is the most rapidly growing waste problem in the world. It is a crisis of not quantity alone but also a crisis born from toxics ingredients, posing a threat to the occupational health as well as the environment. Rapid technology change, low initial cost, high obsolescence rate have resulted in a fast growing problem around the globe. Legal framework, proper collection system missing. Imports regularly coming to the recycling markets. Inhuman working conditions for recycling.

II. Environmental Impact:

In the Earth's crust, aluminium is the most abundant (8.3% by weight) metallic element and the third most abundant of all elements (after oxygen and silicon). Because of its strong affinity to oxygen, however, it is almost never found in the elemental state; instead it is found in oxides or silicates. Feldspars, the most common group of minerals in the Earth's crust, are aluminosilicates. Native aluminium metal can be found as a minor phase in low oxygen fugacity environments, such as the interiors of certain volcanoes. It also occurs in the minerals beryl, cryolite, garnet, spinel and turquoise Aluminium is 100% recyclable without any loss of its natural qualities. Recovery of the metal via recycling has become an important facet of the aluminium industry[1].Recycling involves melting the scrap, a process that requires only 5% of the energy used to produce aluminium from ore. However, a significant part (up to 15% of the input material) is lost as dross (ash-like oxide)[2]. The dross can undergo a further process to extract aluminium. Recycling was a low-profile activity until the late 1960s, when the growing use of aluminium beverage cans brought it to the public awareness. If drives are repairable or usable they are sold in the market; if not, they are broken into pieces with circuits and other parts separated accordingly Circuit Boards, including Motherboards, Cards, Chips and Processors The methods by which these metals are

extracted are very harmful to the workforce due to the fumes emitted during heir burning and melting. The circuit boards are first heated by blow-torch and then the valuable chips are removed for further sale or precious metal extraction[3]. The material removed from the boards that is suspected of containing gold is taken to another operation known as Environmental and Occupational Impacts in Asia

a. Sediment and Water Sample Results:

The investigative team took one water sample, one sediment sample, and three soil samples in one area along the Lianjiang River where charred circuit boards had been treated with acid and fire and dumped along the banks. A year previously, in 2000, a Hong Kong reporter from Eastweek magazine, a Chinese language journal, had visited the very same site when operations there were active. After the publication, the government halted the operations in that locale. All of the test results taken by BAN and the reporter were analyzed by the Hong Kong Standards and Testing Centre Ltd. Later, BAN took one more sample in another location along the Lianjiang River downstream from where wires were routinely burned[4]. The test results revealed alarming levels of heavy metals that correspond very directly with those metals most commonly found in computers .The single water sample taken by the reporter in 2000 adjacent to a location where circuit boards had been processed and burned in the past, revealed lead levels that were 2,400 times higher than World Health Organization (WHO) Drinking Water Guidelines[5]. In December of 2001, when BAN visited the site, the levels were found to still be 190 times the threshold WHO level.

b. Dumping of E-waste Hazards:

WEEE equipments are made up of a number of components – some containing toxic substances which can have an adverse impact on human health and the environment if not handled properly. Often these hazards arise due to the improper recycling and disposal processes used. For instance, Cathode Ray Tubes (CRT) has high content of carcinogens such as lead, barium, phosphor and other heavy metals[6]. When disposed carefully in a controlled environment, they do not pose any serious health or environmental risk. However, breaking, recycling or disposing off CRTs in an uncontrolled environment without the necessary safety precautions can result in harmful side effects for the workers and release toxins into the air, soil and groundwater. Another dangerous process is the recycling of components containing hazardous compounds such as halogenated chlorides and bromides used as flame-retardants in plastics, which form persistent dioxins and furans on combustion at low temperatures (600-800 degrees centigrade). Copper, which is present in printed circuit boards and cables act as a catalyst for dioxin formation when flame-retardants are incinerated[7]. The PVC sheathing of wires is highly corrosive when burnt and also induces the formation of toxins. Land-filling of e-waste, one of the most widely used methods of disposal, is prone to hazards because of leachate which often contains heavy water resources. A tremendous amount of imported E-waste material and process residues are not recycled but simply dumped inopen fields, along riverbanks, ponds, wetlands, in rivers and in irrigation ditches. These materials include leaded CRT glass, burned or acid-reduced circuit boards, mixed, dirty plastics including mylar and videotape, toner cartridges, and considerable material apparently too difficult to separate. Also dumped are residues from recycling operations including ashes from numerous open burning operations, and spent acid baths and sludges[8]. It is this indiscriminate dumping which has no doubt led to the severe contamination of the drinking water supply of Guiyu. Although we are not aware of whether the government

has conducted tests of the groundwater or local sediments, BAN did take some samples along two rivers which we analysed[9]

c. Dumping of E-Waste: Computer – A storehouse of Toxic Substances:

A computer is a storehouse of several toxic substances[10]. Key components of the computer are broken down by the kabadies, often in a crude and hazardous manner to extract whatever worth that is possible from them. Key items of computer waste that finds their way to scrap dealers are:

Monitors:

Scrap dealers least prefers the monitors once they enter the post-consumer phase unless the cathode ray tube (CRT) is in working condition. The recovered CRT is procured by TV mechanics, which in turn use it in portable TV sets.

Circuit Boards and Motherboards:

Circuit boards and motherboards are used to recover working components manually after which the boards are heated to recover thin copper sheets. In some recycling units they are cut into 5-10 mm bits and then they are exported for recovery[11].

Printers:

The most important components recovered from a printer are the motor and the circuit boards.

Hard Disks:

Hard disks are either resold or broken to recover the steel casing, actuator (magnet), platter, and circuit board inside. These are sold separately. Dumping of these above mentioned toxic substance will cause consumptios of the earth space will exponentially high[12] . This will leads the environmental issues, prevent the flow of water content to the each surface and will cause the weather fore cast condions[13].

d. Dumping of E-Waste: Plastics

Nearly 20 per cent of a computer is made up of plastics – primarily Alpha Butadiene Styrene (ABS) used for making CPU and keyboard housings. In recent years, even polycarbonate is used to enhance the aesthetics. ABS plastics are a high quality plastic and harder than most other varieties. Their hardness and the requirement of specialised equipment for their recycling discourage its retrieval. ABS plastics from computer components are separated and sold on weight basis to plastic recyclers. These recyclers collect ABS plastics from various other sources, and after pelletising them, pack them off to Mumbai or Delhi where the pellets are recycled into chairs and trays. According to experts from the Central Institute of Plastics Engineering and Technology (CIPET) there is very little chance of this coming back to the manufacturing stream. Circuit boards are considered hazardous by virtue of the fact that they contain lead, mercury, nickel-cadmium batteries, etc. If they did not contain these materials then they might not be considered hazardous[14]. Plastics containing BFRs and PVC are listed here to highlight the fact that most of the world is ignoring this serious issue. Under the Basel Convention they could be considered hazardous particularly if they are converted to dioxins and furans during the recycling or disposal process or contain brominated or chlorinated dioxins and furans as contaminants. But far too little study has been done on the downstream impacts of these ***"dirty" plastics***[15]***.***

III. Health Impact:

E-waste contains over 1,000 different substances, many of which are toxic, and creates serious pollution upon disposal. Just some of the materials found in computers. A full discussion of the hazardous characteristics of E-waste is at the Hazards in E-Waste section of this section. Although it is hardly well known, E-waste contains a witches' brew of toxic substances such as lead and cadmium in circuit boards[16]; Lead

oxide and cadmium in monitor cathode ray tubes (CRTs); mercury in switches and flat screen monitors; cadmium in computer batteries; polychlorinated biphenyls (PCBs) in older capacitors and transformers; and brominated flame retardants on printed circuit boards, plastic casings, cables and polyvinyl chloride (PVC) cable insulation that release highly toxic dioxins and furans when burned to retrieve copper from the wires. Due to the hazards involved, disposing and recycling Ewaste has serious legal and environmental implications. When computer waste is landfilled or incinerated, it poses significant contamination problems. Landfills leach toxins into groundwater and incinerators emit toxic air pollutants including dioxins. Likewise, the recycling of computers has serious occupational and environmental implications, particularly when the recycling industry is often marginally profitable at bestand often cannot afford to take the necessary precautions to protect the environment and worker health. In very high doses, aluminium can cause neurotoxicity, and is associated with altered function of the blood-brain barrier. A small percentage of people are allergic to aluminium and experience contact dermatitis, digestive disorders, vomiting or other symptoms upon contact or ingestion of products containing aluminium, such as deodorants or antacids[17]. Although the use of aluminium cookware has not been shown to lead to aluminium toxicity in general, excessive consumption of antacids containing aluminium compounds and excessive use of aluminium-containing antiperspirants provide more significant exposure levels. Studies have shown that consumption of acidic foods or liquids with aluminium significantly increases aluminium absorption,[18] and maltol has been shown to increase the accumulation of aluminium in nervous and osseus tissue.[19] Furthermore, aluminium increases estrogen-related gene expression in human breast cancer cells cultured in the laboratory.

Lead:

The negative effects of lead are well established and recognized. It was first banned from gasoline in the 1970s. Lead causes damage to the central and peripheral nervous systems, blood systems, kidney and reproductive system in humans. Effects on the endocrine system have 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 effects on plants, animals and micro-organisms.[20] The main applications of lead in computers are: glass panels and gasket (frit) in computer monitors (3-8 pounds per monitor), and solder in printed circuit boards and other components.

Cadmium:

Cadmium compounds are toxic with a possible risk of irreversible effects on human health, and accumulate in the human body, particularly the kidneys.21 Cadmium occurs in certain components such as SMD chip resistors, infra-red detectors, and semiconductor chips. Cadmium is also a plastics stabilizer and soe older cathode ray tubes contain cadmium.

Mercury:

Mercury can cause damage to various organs including the brain and kidneys, as well as the fetus. Most importantly, the developing fetus is highly susceptible through maternal exposure to mercury. When inorganic mercury spreads out in the water, it is transformed to methylated mercury in the bottom sediments. Methylated mercury easily accumulates in living organisms and concentrates through the food chain, particularly via fish. It is estimated that 22 % of the yearly world consumption of mercury is used in electrical and electronic equipment. It is used in thermostats, sensors, relays, switches (e.g. on printed circuit boards and in measuring equipment),

medical equipment, lamps, mobile phones and in batteries. Mercury, used in flat panel displays, will likely increase as their use replaces cathode ray tubes.

Hexavalent Chromium/Chromium:

Chromium VI is still used as corrosion protection of untreated and galvanized steel plates and as a decorative or hardener for steel housings. It easily passes through cell membranes and is then absorbed producing various toxic effects in contaminated cells. Chromium VI can cause damage to DNA and is extremely toxic in the environment.

Plastics including PVC:

Plastics make up 13.8 pounds of an average computer. The largest volume of plastics (26%) used in electronics has been poly-vinyl-chloride (PVC). PVC is mainly found in cabling and computer housings, although many computer moldings are now made with the somewhat more benign ABS plastics. PVC is used for its fire-retardant properties. As with many other chlorine-containing compounds, dioxin can be formed when PVC is burned within a certain temperature range.

Brominated flame retardants (BFRs):

BFRs are used in the plastic housings of electronic equipment and in circuit boards to prevent flammability. More than 50% of BFR usage in the electronics industry consists of tetra-bromo-bis-phenol – (TBBPA), 10% is polybrominated diphenyl ethers (PBDEs) and less than 1% is polybrominated biphenyls (PBB). Some BFRs have been targeted for phase out by the European Parliament between the years of 2003 and 2006.

Barium:

Barium is a soft silvery-white metal that is used in computers in the front panel of a CRT, to protect users from radiation . Studies have shown that short-term exposure to barium has caused brain swelling, muscle weakness, damage to the heart, liver, and spleen[23]. There is still a lack of data on the effects of chronic barium exposures to humans. Animal studies, however, reveal increased blood pressure and changes in the heart from ingesting barium over a long period of time.

Beryllium:

Beryllium is a steel-grey metal that is extremely lightweight, hard, a good conductor of electricity and heat, and is non-magnetic. These properties make beryllium suitable for many industrial uses, including, electronic applications such as computers. In computers, beryllium is commonly found on mother-boards and “finger clips” as a copper beryllium alloy used to strengthen the tensile trength of connectors and tinyplugs while maintaining electrical conductivity. Beryllium has recently been classified as a human carcinogen as exposure to it can cause lung cancer[24]. The primary health concern is inhalation of beryllium dust, fume or mist. Workers who are constantly exposed to beryllium, even in small amounts, and who become sensitized to it can develop what is known as Chronic Beryllium Disease (beryllicosis), a disease which primarily affects the lungs[25]. Exposure to beryllium also causes a form of skin disease that is characterized by poor wound healing and wart-like bumps.34 Studies have shown that people can still develop beryllium disease even many years following the last exposure.

Toners:

One of the ubiquitous computer peripheral scraps and post consmuer E-waste is the plastic printer cartridge containing black and color toners. The main ingredient of the black toner is a pigment commonly called, carbon black35 - the general term used to describe the commercial powder form of carbon. Inhalation is the primary exposure pathway, and acute exposure may lead to respiratory tract irritation[26]. The

International Agency for Research on Cancer has classified carbon black as a class 2B carcinogen, possibly carcinogenic to humans.37 Little information exists on the hazards of colored toners. Some reports indicate that such toners (cyan, yellow and magenta) contain heavy metals.

Phosphor and Additives:

Phosphor is an inorganic chemical compound that is applied as a coat on the interior of the CRT faceplate. Phosphor affects the display resolution and luminance of the images that is seen in the monitor. The hazards of phosphor in CRTs are not well known or reported, but the U.S. Navy has not minced words about the hazards involved in some of their guidelines: "NEVER touch a CRT's phosphor coating: it is extremely toxic. If you break a CRT, clean up the glass fragments very carefully. If you touch the phosphor seek medical attention *immediately*.[27]" The phosphor coating contains heavy metals, such as cadmium, and other rare earth metals, e.g. zinc, vanadium, etc. as additives. These metals and their compounds are very toxic. This is a serious hazard posed for those who dismantle CRTs by hand. It was in an effort to counter the unsustainable and unjust effects of free trade in toxic wastes, that an international treaty known as the Basel Convention was created in 1989. And it was also for this reason that the Basel Convention in 1994 agreed to adopt a total ban on the export of all hazardous wastes from rich to poor countries for any reason, including recycling (see section on Basel Convention).

e. Toner Sweeping:

Certain areas of Guiyu are dedicated to printer dismantling. In those areas the operations strictly deal with toner cartridges – both black as well as the cyan, magenta and yellow toners of color copiers and printers. We observed that the only recycling taking place involved the small amounts of residual toner, with the black cartridge plastic largely discarded. Workers without any protective respiratory equipment or special clothing of any kind opened cartridges with screw drivers and then used paint brushes and their bare hands to wipe the toner into a bucket. The final end-use of the recovered toner is uncertain. The process created constant clouds of toner that billowed around the workers and was routinely inhaled. In the course of the workday, the worker's skin and clothing was blackened. Material Safety Data Sheets (MSDS) provided by Xerox and Canon indicate that although carbon black and other black toner ingredients are not toxic *per se*, they will cause lungand respiratory irritation. Other documentation claims that carbon black is a possible human carcinogen. No reference indicating what chemicals are present in color toners has been found. The MSDS sheets are careful to note that under *normal* use the black toners will cause no health problems. Clearly what takes place in Guiyu is not normal use.

Open Burning:

In the process of dismantling computers, a considerable amount of material is collected and dumped outside of town along the river where much of the dirtier operations of Guiyu take place. There, a small village has stood (for two years now) where the residents make their living entirely by burning these wires to recover copper. The village exists in a landscape of black ash residue which covers the ground and the houses of the village. The burning always takes place in the middle of the night, indicating that local authorities have likely frowned upon the black smoke plumes.

f. CRT Cracking and Dumping:

Prior to leaving for China we had heard reports that cathode-ray tubes (CRTs) from computer monitors and televisions were sold to China for refurbishing into "new" television sets or computers. Unfortunately, this is not what was witnessed in Guiyu.

Rather, invariably we saw the copper-laden yokes from the end of the tube broken off with the CRT itself being cracked and discarded in the process. We were informed that the yokes were sold to copper recovery operations. It is extremely likely that due to the presence of PVC or brominated flame retardants in wire insulation, the emissions and ashes from such burning will contain high levels of both brominated and chlorinated dioxins and furans – two of the most deadly persistent organic pollutants (POPs). It is also highly likely that cancer-causing polycyclic aromatic hydrocarbons (PAHs) are also present in the emissions and ash.

g. Pen Burning of Wires:

Pen burning of wires and other parts to recover metals such as steel and copper is commonplace. Dioxins and furans can be expected due to the use of PVC and brominated flame retardants**,** about 100 people live in the village, including pregnant women. Scores of small children play among the ash heaps. Drinking, cooking and washing are done with local ashcontaminated surface waters. Additionally, the village lies adjacent to two fish ponds which provide the villagers with their food and protein supply. It is extremely likely that in this endeavor. They place the circuit boards on shallow wok-like grills that are heated underneath by a can filled with ignited coal. In the wok-grill is a pool of molten lead-tin solder. The circuit boards are placed in the pooled solder and heated until the chips are removable. These are then plucked out with pliers and placed quickly in buckets. In any case, the lead-laden monitor glass, which qualifies as a hazardous waste in the Basel Convention and fails U.S. EPA's leachate tests (TCLP), was regularly dumped on open land or pushed into rivers. In Guiyu itself, a former rice growing village, the ancient granite-lined irrigation canals were routinely filled with the broken monitor glass and other un-recycled plastic E-waste[28]. Once these were filled, bulldozers were brought in to push the material out into trucks to be hauled away elsewhere. It is likely that this routine dumping of monitor glass is at least partially responsible for the severe well-water pollution.

h. Plastic Chipping and Melting:

The plastic parts of E-waste, and in particular the housings of computers, monitors, and plastic keyboard parts, etc. were all sent to one of the Guiyu villages that was preoccupied with processing plastics. Much time is spent there, chipping plastics into small particles, and then separating the various colors of plastics so that a clean colored remelt would be possible. Often children are employed for this tedious job. Then the chips are bagged and sent to melting and extruding operations. The melting of the computer plastics is done in rooms with little ventilation and with no respiratory protection. It is not even known if such protection were to be used, whether it would be possible to filter out the dangerous hydrocarbons, including the dioxins and furans, that are likely to be produced when melting brominated flame retardant-impregnated plastic or PVC plastic. Despite the attempt to recycle much of the plastic from the E-waste stream, it was clear that a large percentage was deemed unrecyclable due to impurities or the difficulty in separating it, or matching the colors[29]. The result of this was that many, many tons of plastic Ewaste was seen in countless piles dumped throughout the landscape and most often near waterways[30].

IV. Economical Impact:

There are two fundamental reasons for banning the economically motivated trade in hazardous wastes:

a. Downstream Impacts:

Hazardous waste trade is fundamentally unjust and environmentally damaging since it victimizes the poor, burdening them with toxic exposure and environmental

degradation. This is especially egregious when the victims get little benefit from the industrialization that created the waste in the first place.

b. Upstream Impacts:

Hazardous waste trade allows waste generators to externalize their costs, creating a major disincentive to finding true solutions upstream for the problems they create. As long as one can cheaply dump their waste problems on poorer economies, there will never be incentives to minimize hazardous waste at the source. This forestalls the necessary innovation to solve environmental problems through design. The latter reason is extremely important and comes into play even if the recipient country possesses a so-called state-of-the-art hazardous waste recycling facility. No hazardous waste recycling facility is without its toxic impacts, residues, emissions and worker exposure. It is a risky and polluting enterprise even in optimal conditions. The ultimate answer is to miminze the generation of hazardous wastes, not recycle them. Yet via economically motivated export, the preferable goal of zero hazardous waste generation will be forestalled. The U.S. failure to join the consensus of the international community in condemning waste trade has enabled the U.S. electronics industry to continue a head-in-the-sand, businessas- usual, for-as-long-as-possible approach, with little incentive to aggressively pursue greener product design and producer responsibility[31]. "For money, people have made a mess of this good farming village. After they have dismantled the computers, they burn the useless parts. Every day villagers inhale this dirty air; their bodies have become weak. Many people have developed respiratory and skin problems. Some people wash vegetables and dishes with the polluted water, and they get stomach One impact that has not gone unnoticed has been the deterioration of the local drinking water supply. The E-waste industry in Guiyu has been going for six years; for the last 5 years, due to groundwater pollution, water has had to be trucked in from the town of Ninjing, 30 kilometers away. The local residents claim that the water has become foul tasting. It is unknown whether the government has warned the public not to drink it. But in any case, a new business has developed with a constant parade of tractors carrying large plastic tanks of fresh water into Guiyu every day. The relatively small scale of the many individual operations belies the magnitude of the operations multiplied in their totality. After three days of driving about Guiyu and its many back-streets and neighborhoods, we did not even come close to seeing all of the operations. Chinese press accounts placed the total employed in the E-waste sector in Guiyu at 100,000; but it would be a very difficult number to estimate, due to a fluctuating migrant workforce. Most of the labor force working in the recycling operations comes from outlying agrarian regions. The former farmers migrate to Guiyu from provinces such as Hunan or Anhui to take the menial jobs of dismantling and processing the imported E-waste for an average wage equivalent to $1.50 per day. Many of the workers are women and children. It is also virtually impossible to estimate how much E-waste is processed there annually. However, the anecdotal observation is one of very high turn-over with hundreds of trucks moving in and out daily, and a steady rumble and buzz of activity. These observations led us to conclude that Guiyu is a very significant destination for the world's E-waste[12].

c. Hazardous Waste on Society:

Hazardous waste is any discarded solid or liquid material that is toxic, ignitable, corrosive, or reactive enough to explode or release toxic fumes. According to the UN Environment Programme, developed countries produce 80-90% of these wastes. The US centers for Disease control and prevention (CDC) estimates that at least 400000US children still have unsafe blood levels of lead caused by exposure from the number of

sources. National academy of science and numerous other studies indicate "there is no safe level of lead in children's blood[33]". Lead is especially harmful to children and is still used in leaded gasoline and household paint in about 100 countries Although it is hardly well known, E-waste contains a witches' brew of toxic substances such as lead and cadmium in circuit boards; lead oxide and cadmium in monitor cathode ray tubes (CRTs); mercury in switches and flat screen monitors; cadmium in computer batteries; polychlorinated biphenyls (PCBs) in older capacitors and transformers; and brominated flame retardants on printed circuit boards, plastic casings, cables and polyvinyl chloride (PVC) cable insulation that release highly toxic dioxins and furans when burned to retrieve copper from the wires. Due to the hazards involved, disposing and recycling E-waste has serious legal and environmental implications. When computer waste is landfilled or incinerated, it poses significant contamination problems. Landfills leach toxins into groundwater and incinerators emit toxic air pollutants including dioxins. Likewise, the recycling of computers has serious occupational and environmental implications, particularly when the recycling industry is often marginally profitable at best and often cannot afford to take the necessary precautions to protect the environment and worker health. Causes damage to the central and peripheral nervous systems, blood systems, kidney and reproductive system in humans. Effects on the endocrine system have 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 effects on plants, animals and micro-organisms.[34] The main applications of lead in computers are: glass panels and gasket (frit) in computer monitors (3-8 pounds per monitor), and solder in printed circuit boards and other components.

V. Conclusion:

WEEE recycling is the process of converting WEEE into usable things which is good for the economy due to five main reasons. Safe disposal of electrical and electronic wastes can be done. Materials like precious metals, plastics etc., can be recovered and also can be reused. More employment opportunities can be made separately for this process.

Environmental and commonly all other pollutions can be controlled to a considerable amount by this process. Economical down flow can also be controlled by using this recycling process. The various solutions including recycling, re-use, standardization of technologies and implementation of law for less rapid obsolesce are applied. In 2030 the formation of WEEE will be above 50000 tonnes per day following the four R's resource use to control the WEEE: Refuse, Reduce, Reuse, and Recycle.

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