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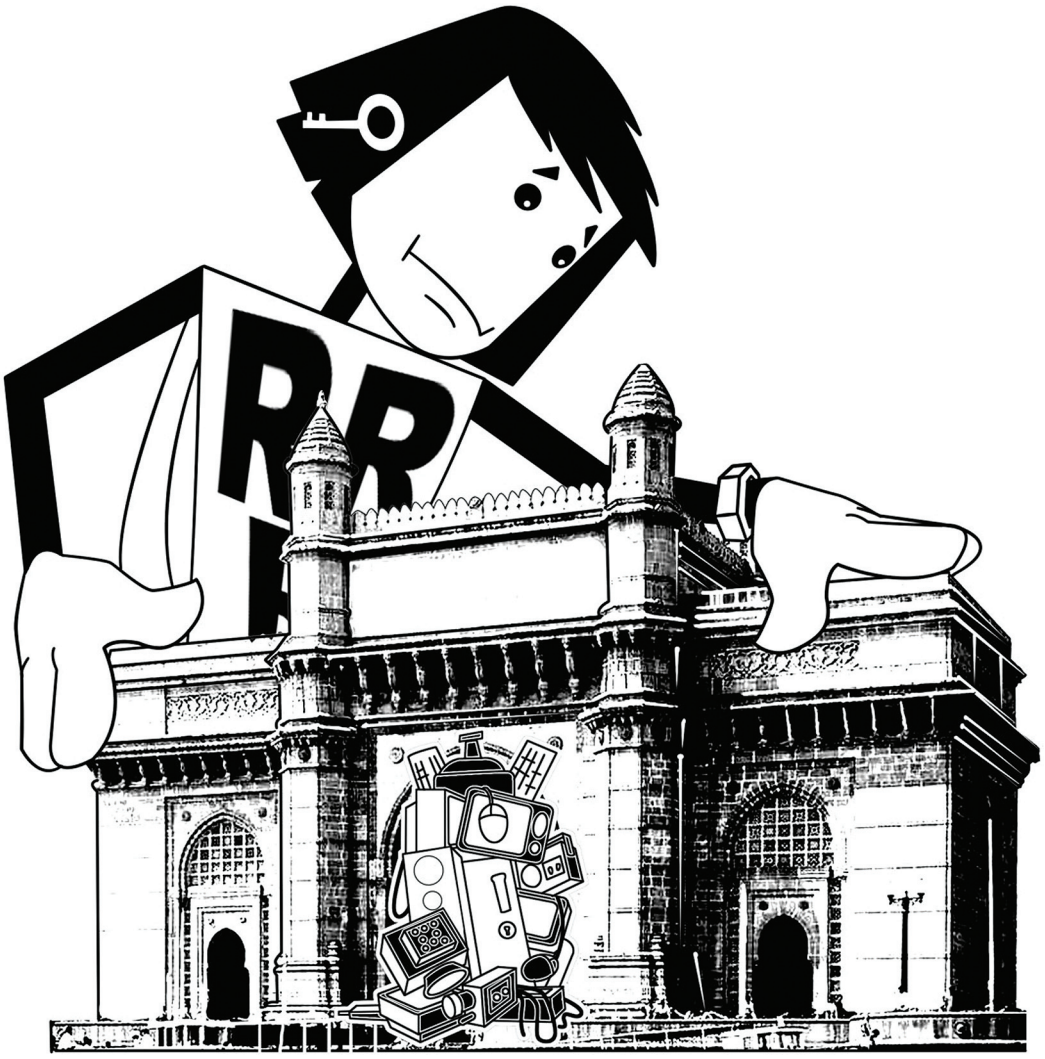
Mumbai: Choking on e-waste



Over the last few years, India has emerged as one of the most significant global hotspots for electronic waste, also termed as Waste from Electronic and Electrical Equipment (WEEE). Not only does this study confirm the suspicion that Mumbai is the single largest generator of WEEE in India, it reveals that the city's e-waste problem is far greater than previously imagined

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MUMBAI: CHOKING ON E-WASTE

A STUDY ON THE STATUS OF E- WASTE IN MUMBAI

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Toxics Link
New Delhi ♦ Mumbai ♦ Chennai

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FOREWORD

This study on the status of Waste from Electronic and Electrical Equipment (WEEE) in Mumbai is a part of our ongoing efforts to create a body of research that, we hope, will help to fill the void of information on the issue and, eventually, facilitate a strong legislative action in the country.

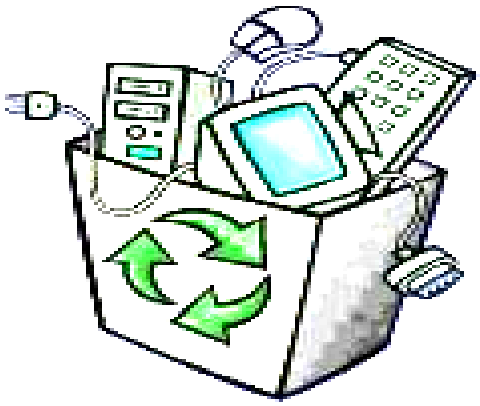
Since the release of 'Scrapping the High-tech Myth: Computer Waste in India', in 2003, we have seen the menace of e-waste grow consistently. On the good side, with it have grown the calls for action, both internationally and nationally. Carrying out these assessments guides our campaign for installing proper and adequate e-waste management systems in India. These assessments along with our other information, awareness materials and suggested models (all these documents available on our website **www.toxicslink.org**) serve to form a package to help implement such systems.

It is our endeavour that we move towards cleaner production and material use in the electronics industry, and that the waste stream becomes less toxic and easier to handle safely. However, in the meanwhile it is important that we set up systems of managing e-waste, which are based on industry participation and Extended Producer Responsibility (EPR), along with protecting the lives and livelihoods of the urban poor currently engaged in hazardous recycling operations.

Also, we hope to prevent the import of e waste, which is growing in India. The waste comes in both misclassified as 'metal scrap' as well as end of life products as 'second hand goods'. Currently, customs are not able to screen or monitor the import of hazardous waste, and this needs to be stopped.

Proper systems are possible with enabling legislation and clarity of the roles and responsibilities of each stakeholder. The Government needs to act urgently before the problem becomes much too large to handle. We hope this report will add to the sense of urgency.

Ravi Agarwal
Director
Toxics Link



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EXECUTIVE SUMMARY

India has emerged as one of the most significant global hotspots for electronic waste, also termed as Waste from Electronic and Electrical Equipment (WEEE) - generation and recycling over the past decade or so. Economic extremities and rampant urban poverty have made the processing of old and discarded electronic products - a dangerous and booming 'cottage' industry for a substantial population of recyclers, waste dealers and middlemen. But the fact that this possesses a very serious threat to the environment and human health cannot be emphasised enough.

India generates about 150,000 tons of WEEE annually and almost all of it finds its way into the informal sector, as there is no organised alternative available at present. The trend is likely to increase manifold in proportion to the growth in the consumption of electronic products.

Cheap labour and crude but dangerous, recycling methods, along with an absence of import regulations, have made India a favoured destination for dumping of WEEE by the developed world. It is much more expensive in the developed countries to recycle or dispose off electronic waste, as there are many more environmental safeguards that have to be addressed while handling hazardous waste.

The threat posed by WEEE, and the need to manage its ever-increasing volumes, has propelled social and civil society campaigns in the recent times. However, an assessment of the quantum of WEEE, the sources of its generation and prevailing recycling practices need to be exhaustively highlighted for facilitating any policy action.

This study is a part of Toxics Link's effort to create a body of research that not only highlights the issue of WEEE in its entirety, but also propels legislative action for creating hazard-free recycling systems in the country.

Mumbai has been dubbed as the single largest generator of WEEE in India. This needed to be evaluated, verified and re-emphasised for raising an alarm over the sheer magnitude of the problem. This, in essence, is the most important part of the study. A mere calculation of PCs as WEEE leaves out a wide spectrum of popular consumer electronic products. There was also a need to ascertain its contribution to the total volume.

A multi-pronged approach was employed for the study, as accurate figures on WEEE are hard to come by. In simple terms, a blend of qualitative and quantitative methods was used. The methodology broadly involved:

1) Review of existing literature to understand the electronics industry in India and Mumbai
2) Extensive field surveys to explore existing practices used for handling WEEE and existing choices for disposing electronics and computer waste
3) Interviews with stakeholders to obtain viewpoints on the problems vis-à-vis WEEE recycling
4) Analysis of secondary data to establish the generation and sources of WEEE

Key findings of the study are:

- Mumbai generates roughly 19,000 tonnes of WEEE annually, which is substantially higher than the existing approximation. This figure includes not just computers, but also televisions, refrigerators and washing machines. The actual WEEE quantity is expected to be much higher, as several other electronic products, which have not been used in the study, are being dumped into the city's waste stream, and also because there are no figures available on imports from developed nations.

- A substantial part of Mumbai's WEEE, both imported and locally generated, is sent to recycling markets located in other parts of the country. The National Capital Region of Delhi is a preferred recycling destination for printed circuit boards (PCBs) originating from the city. In other words, Mumbai's unregulated WEEE is travelling to other parts of the country through informal trade channels and thus sustains this deadly and environmentally hazardous activity.

- Being the hub of India's commercial and financial activities, the banks and financial institutions in Mumbai generate huge amounts of WEEE, but they do not have any method for its safe handling contributing to disastrous health and environmental impacts of WEEE. The issue of security of data on discarded computers is adequately addressed when such waste is auctioned to waste dealers as scrap.

- Mumbai has a large network of scrap traders. The hotspots that handle WEEE in and around Mumbai are: Kurla, Saki Naka, Kamthipura-Grant Road, Jogeshwari and Malad. Recycling in these shops and rooftops not only exposes those involved in the activity to serious health hazards, but also pollutes the surrounding environment. The rate of WEEE generation and the current methods of disposal in Mumbai pose grave environmental and health risks to the city at large due to its dense population and spatial character.

- The current handling practices suffer from use of crude methods for dismantling and storage, minimal capital input and zero health and environmental safeguards.

- Lack of a legislative framework to address the issue of WEEE management by taking on-board all stakeholders is hampering solution implementation.

- Extended Producers Responsibility (EPR) approach, which broadly implies that producers be made responsible for their product even after the consumer has bought and used it, is emerging as popular alternative for e-waste management in various countries of the world. India needs to take steps in this direction.

INTRODUCTION

The world's second most populous nation is aiming to join the famed league of developed nations by the year 2020. This target appears to be within an achievable range with India undergoing a phase of accelerated industrial growth and averaging eight per cent of GDP. Within this vision, the Information Technology (IT) sector is being pegged as the main driver for India's future economic growth.

Globally too, the electronics industry is poised for an exponential growth, thanks to a large and growing middle class of 320-340 million, with rising disposable incomes and an insatiable appetite for latest electronic gadgets.[1]

However, the twin-processes of increased production and matching demands have led to a phenomenal increase in the overall waste generation and new varieties of trash is being added to the waste stream. Currently, in India, this category of waste is being handled by its mammoth informal sector without any concern towards its impact on health and environment.

Common WEEE includes PCs, televisions, telephones, cell phones, air conditioners, electronic toys, washing machines, etc. According to an estimate, more than 500 million PCs were in use in 2002 and this number has been growing at 11.4 per cent annually. Even if the figure of 500 million were taken as the baseline, that many PCs would contain 2.87 billion kg of plastics, 716.7 million kg of lead and 286,700 kg of mercury. Recycling of WEEE has emerged as a lucrative business and these products are stripped down to yield valuable metals like platinum, gold and copper.

Though India has a relatively small electronics market in global terms, and is ranked 26th worldwide, its electronic imports have steadily increased in the recent years - accounting for 41 per cent of the market in 2001 compared to 16 per cent in 1993.[2]

Technological advancement and new hardware requirements render electronic equipments obsolete in a very short span of time. These gadgets eventually become a part of the fast-growing waste stream of WEEE.

The study below attempts to arrive at the quantum of WEEE generated in the commercial capital of India which includes both PCs and regular consumer electronics, the sectoral break-up of the generators, the current recycling methods and the hotspots for these activities. It is essentially an exploratory look at the WEEE scenario in Mumbai.

1 http://www.instat.com/catalog/Scatalogue.asp?id=239#IN0502408ASM
2 http://www.electronics.ca/reports/industrial/data_india.html

MUMBAI: INDIA'S LARGEST WEEE GENERATOR

Mumbai's attraction for banks, investors and financial institutions, and a large population, make this global megapolis a great consumer and disposer of electronic products. But translating this into figures, which is necessary for making any policy suggestions, has been a challenge, as the issue of WEEE still remains an evolving concern with very little data on its scale.

Purpose of the study

The purpose of this study is to explore the current handling of WEEE in the city of Mumbai for contributing to the call for an efficient policy approach for WEEE management in the country.

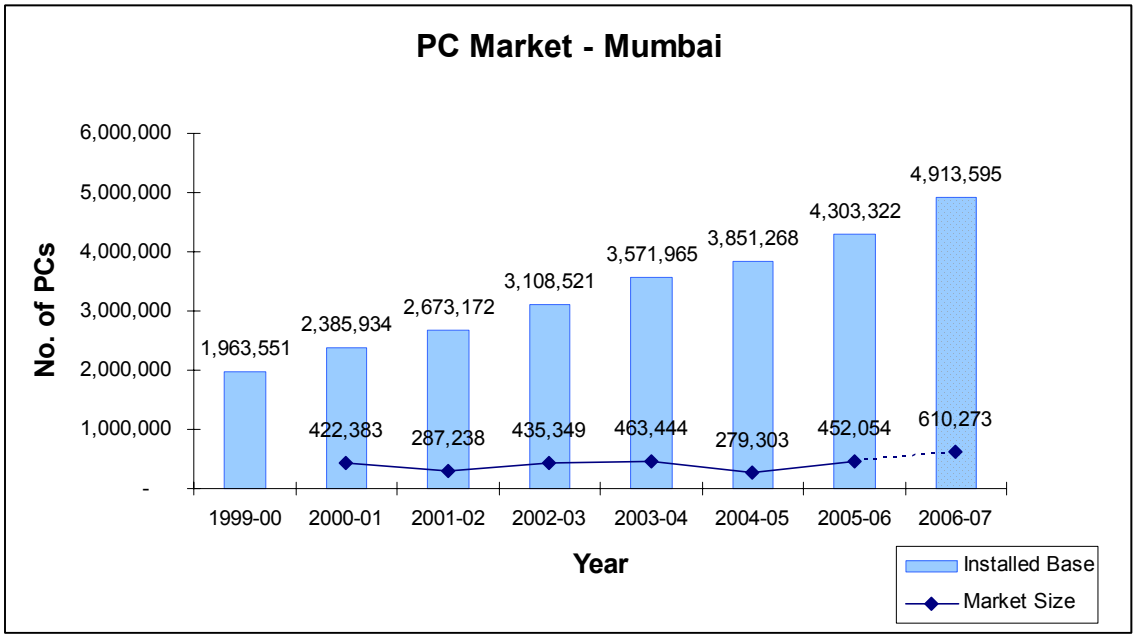
The research focused on understanding the following aspects:

- To provide the most realistic estimate of the quantum of WEEE generation as there can be no policy without scientific approximation of the problem.
- To identify the sources of WEEE generation in Mumbai.
- To identify hotspots for WEEE recycling and trading.
- To assess and document the hazards WEEE recycling practices those are being used.

The city of Mumbai was chosen for the study for the following reasons:

- Mumbai is among the largest metropolises in the country and provides a useful example of growth driven urban centres and the way they deal with environmental and health hazards.
- Mumbai, the business and financial capital of India, is also a large port city. All the major financial institutions, banks and stock exchanges are based here. The headquarters or administrative offices of major business houses operate from here making it a very large corporate user base.
- The Greater Mumbai Region is one of the most industrialised pockets of the country with a large number of electronic and electrical good manufacturers as well as their ancillaries located in the industrial areas in an around Mumbai.
- Similar studies in Delhi, Chennai and Kolkata have established Mumbai as the major source of WEEE for recycling activities in these cities. In other words, Mumbai is critical to the future WEEE situation in the country.

The most comprehensive data that is available on Mumbai's PC market is the one given by Indian Market Research Bureau (IMRB). The market research firm had used the supply estimation model for the calculation of the total PC sales using data from top vendors and leading channel players. The PC penetration in Mumbai has risen from under 2 million to 4.3 million in the past seven years. Fluctuations in the market size, especially the dip in PC sales in the years 2001-2002 and 2004- 2005, reflect global slowdown in PC sales.



Source: MAIT-IMRB IT Industry Performance

Estimates from retailers and wholesalers indicate that on an average 35,000 PC units are sold every month in the city. They expect the annual growth of about 35 per cent, suggesting an addition of approximately 600,000 PCs by 2007. This adds up to Manufacturers' Association for Information Technology's (MAIT's) projection of 420,000 PCs being added in 2006. s

How much WEEE does Mumbai produce?

Methodology

A multi-pronged approach was employed for the study, as accurate figures on WEEE are hard to come by. In simple terms, a blend of qualitative and quantitative methods was used. The methodology broadly involved:

1. Review of existing literature to understand the electronics industry in India and Mumbai;
2. Extensive field surveys to explore existing practices used for handling WEEE and existing choices for disposing electronics and computer waste;
3. Interviews with stakeholders to obtain viewpoints on the problems vis-à-vis WEEE recycling;
4. Analysis of secondary data to establish the generation and sources of WEEE.

To arrive at a realistic figure of WEEE generation for PCs we used two methods for calculation. The first one is called the 'Market Supply Method', which was used first in Germany for an investigation of WEEE investigation 1991[3] and is based on the assumption that 100 per cent of the units sold in a particular year will become obsolete at the end of the average life of the product.

Based on various estimates worldwide, an assumption was made that the average life of a PC is about five years. In other words, as per this method the PCs sold in 2000-2001, came to the waste stream in 2005-2006.

In the second method, titled 'Market Supply Method A', a statistical normalised distribution approach has been used to estimate the waste generated over a period and not just the five-year obsolence rate as computers could be junked even within two-years of usage or similarly they could continue being used for longer than five years. This has also been used previously to estimate e-waste quantities in Ireland[4].

Market Supply Method

The estimation of WEEE generation using the Market Supply Method, as shown in the table below, indicates that considering the average lifetime of a PC is five years, all PCs sold in a year, would be discarded and come to the waste stream five years later. By this method, using market sales data from 2000-2001, we assume that these 422,383 PCs were disposed-off in 2004-2005, generating approximately 11,489 tonnes of WEEE. As this method mirrors historical sales trends, the WEEE generated at the end-of-life also reflects these trends. Therefore, the PC WEEE estimation for 2005-2006 reflects the downturn in PC sales in the year 2001-2002, post the Internet bubble burst. Nevertheless, this simplistic method is useful in providing a rough estimate of the quantities of WEEE that can be expected, based on readily available market sales data.

Table 1: Estimation of PC WEEE in Mumbai using Market Supply Method

Year	Sales	Average Lifetime (years)	No. of obsolete PCs (5 years)	Weight (in tonnes) @ 27.2 kg/PC for 5 year obsolescence
2000-2001	422,383			
2001-2002	287,238			
2002-2003	435,349			
2003-2004	463,444			
2004-2005	279,303		422,383	11,489
2005-2006	452,054	5 years	287,238	7,813
2006-2007	610,273		435,349	11,841
2007-2008			463,444	12,606
2008-2009			279,303	7,597
2009-2010			452,054	12,296
2010-2011			610,273	16,599

Market Supply Method 'A'

The second method, the Market Supply Method A, is similar to previous method of estimation, to

[3] Oekopol Report. Collection Targets for Waste from Electrical and Electronic Equipment. May 1998.
[4] EPA Topic Report. Waste from Electrical & Electronic Equipment in Ireland: A Status Report. May 2001.

the extent that they both use market sales data as the basis for the estimation. However, the second method distributes the obsolescence of the PCs over the average lifetime. This ensures that the estimate captures more accurately the disposal pattern that the PCs are not made obsolete all together, but in fact are disposed in varying quantities over successive years.

The distributed disposal pattern is more realistic because on the one hand some PCs, especially in commercial establishments, are made obsolete due to technological, rather than functional obsolescence, even before their average lifetime and on the other hand, some are reused and stored beyond their average lifetime. This method also evens out the market fluctuations that are reflected in the Market Supply Method.

We assume that all PCs are used for at least 2 years, and then the disposal starts in the 3rd year, in which 10 per cent of PCs are made obsolete, increasing to 20 per cent in the 4th, and reaches its peak in the fifth year, with 40 per cent of PCs reaching the WEEE stream. At this point, the largest parts, 70 per cent of the PCs, have already been disposed, and the balance 30 per cent is disposed over the last two years.

For example, as shown in the table below, the first lot of 42,238 PCs of the 422,383 PCs sold in 2000-2001 come into the waste stream in their 3rd year in 2003-2004. In their 4th year 84,447 PCs, comprising 20 per cent of the PC sales of 2000-2001 come to the waste stream, and further increasing to 168,953 PCs in their fifth year, which has the highest disposal rate at 40 per cent. The 6th and 7th year see disposals of 84,447 and 42,238 PCs, thereby completing the disposal of all the PCs sold in 2000-2001.

The number of obsolete PCs in a year is calculated by summing up the PCs disposed across the distribution. In Table 2, rows shaded in grey have PC disposal data from all previous seven years, giving a full picture of the number of obsolete PCs annually. Thus, in the year 2007-2008, Mumbai is estimated to have 10,729 tonnes of PC WEEE.

Table 2: Estimation of PC WEEE in Mumbai using Market Supply Method 'A'

Year	Sales	Average Lifetime					No. of obsolete PCs	Weight (in tonnes) @ 27.2 kg/PC
		3rd yr (10%)	4th yr (20%)	5th yr (40%)	6th yr (20%)	7th yr (10%)		
2000-2001	422,383							
2001-2002	287,238							
2002-2003	435,349							
2003-2004	463,444	42,238					42,238	1,149
2004-2005	279,303	28,724	84,477				113,200	3,079
2005-2006	452,054	43,535	57,448	168,953			269,936	7,342
2006-2007	610,273	46,344	87,070	114,895	84,477		332,786	9,052
2007-2008		27,930	92,689	174,140	57,448	42,238	394,445	10,729
2008-2009		45,205	55,861	185,378	87,070	28,724	402,237	10,941
2009-2010		61,027	90,411	111,721	92,689	43,535	399,383	10,863
2010-2011			122,055	180,822	55,861	46,344	405,081	11,018

Looking at the estimates from both the methods as shown in Table 3 below, we find that they are in a similar band. The average estimate of the e-waste generation through both the methods ranges from 9,269 to 13,809 tonnes per annum for years 2007 to 2011. The mean value from both estimates gives a figure of approximately 11,580 tonnes of PC WEEE per annum, which we believe to be a realistic estimate.

Table 3: Mumbai PC estimates using Market Supply and Market Supply Method A

	Weight (in tonnes) Market Supply Method	Weight (in tonnes) Market Supply Method A	Average
2007-2008	**12,606**	**10,729**	**11,668**
2008-2009	**7,597**	**10,941**	**9,269**
2009-2010	**12,296**	**10,863**	**11,580**
2010-2011	**16,599**	**11,018**	**13,809**

An important finding that emerged from the study is that a substantially higher quantity of PC WEEE is being generated in the city than estimated previously. Considering that the projections are based on the actual market figures, we expect them to be on the conservative side. They do not include PCs sold in the years before (as there is no data on them) and are now joining the waste stream. An example of this was recently observed when a large public sector bank, as part of their IT modernisation exercise, was disposing old PCs, including those bought over seven years back.

We would also like to reiterate that the estimate of 11,500 tonnes per year is only for WEEE generated by obsolete PCs, which form only a part of the entire spectrum of products that are classified as electronic and electrical equipments. Thus, the total quantity of WEEE generated from other IT equipments (such as printers, copiers, fax machines), consumer electronics (such as TVs, radios, music systems), as well as household appliances (such as refrigerators and washing machines) would also have to be added.

WEEE from other household appliances

To estimate this category of WEEE, we used three main products – TVs, Refrigerators and Washing Machines – as representatives of their categories, namely consumer electronics, cooling appliances and large household appliances. Based on household ownership data that from IMRB's Market Pulse Study, we used the 'estimate method' also known as the 'Consumption and Use Method' that has been previously used in WEEE estimation in the Netherlands and UK.

Table 4: WEEE from household electronic and electrical equipments

	ownership in households	% ownership level	disposal rate	average appliance weight (kg)	e-waste quantity per year (tonnes)
No. of Households	2,000,824				
TVs	2,629,654	92%	1/15 years	24	4,207
Refrigerators	1,114,745	39%	1/15 years	30	2,229
Washing Machines	600,247	21%	1/15 years	27	1,080
				TOTAL	**7,517**

If we combine both figures of PCs and other household electronic and electrical items, the total waste generated in the city would be around 19,000 tonnes per annum.

The WEEE generated in the coming years would be even greater in view of increasing penetration of electronic and electrical appliances in urban households, while at the same time, the number of such appliances is increasing and appliances becoming obsolete earlier.

MAJOR SOURCES OF WEEE GENERATION

WEEE from banking and financial institutions

The banking and financial services sector is among the largest buyers of IT products, both software and hardware. The study focused on their WEEE disposal practices.

Almost all large national and multinational banks and other financial institutions, insurance companies, investment banks, stock exchanges and brokers, as well as industry regulators like the Reserve Bank of India (RBI) and Securities and Exchange Board of India (SEBI) have their corporate headquarters in the city.

In addition to this, there are 1,549 branches of scheduled commercial banks in the greater Mumbai region, not including the co-operative banks. The adoption of core banking solutions and other computing technologies in this sector has grown exponentially in the last couple of years. An indicator of this growth can be seen in the number of fully computerised branches in the country, which grew from 5,514 in March 2000 to 11,578 in March 2002, with the number of PC nodes at the branch level being 165,986, giving an average of 14.33 PCs per branch.[5]

Investigation in the banking sector confirmed that there are substantial quantities of WEEE being generated. Bank of India, which had its first fully computerised branch in 1989 in Mumbai, recently invited tenders for the disposal of its first generation computers from the South Mumbai Zone. The tenders offer over 600 items, which include the whole range from 486s, Pentium Is, Pentium IIs and even Pentium III computers as well as old dot matrix and passbook printers and even servers and networking equipment. As the bank is migrating to a new platform, there will be a complete overhaul of all the IT equipments, which at the zonal level, for the South Mumbai zone alone, would mean upgrading all the PCs in the 52 branches.[6]

It is interesting to note that almost all the computer hardware and peripherals classified for disposal are branded PCs, monitors and other peripherals mainly from Wipro, Acer, HCL, IBM and PCL.

However, none of these vendors are keen to take back their equipment. Therefore, the bank is forced to take the auction route, even though it is time and effort consuming, and has elicited only a lukewarm response. Interestingly, none of the banks have neither any disposal policy nor green purchasing policy, which obliges vendors to take back and ensure responsible disposal of end-of-life equipments.

Foreign banks, which have much smaller operations in terms of employees and branch networks, have their IT support functions to deal with any computer related issues. ABM-AMRO & HSBC when contacted forwarded the enquiry to their IT help desk or Facility Management Services which were found to be entirely unequipped to answer questions on where WEEE is disposed.

A relatively recent development in the banking industry is the growth of the BPOs that are essentially providing various back-office services for banks in India and across the world. While some of these are captive BPOs – owned and managed by the particular bank, others are companies from the ITeS (IT enabled services) domain to whom banks can outsource their back office functions. Several large banks in India and abroad have set up their captive BPOs in Mumbai,

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5 http://www.rbi.org.in

6 http://www.bankofindia.com

including some like JP Morgan Chase which do not have retail banking operation in India but operate a large captive BPO. These operations are very technology intensive, with a high obsolescence rate, and will become a large contributor to the WEEE stream in the near future.

WEEE from government offices

There are several examples like that of Centre for Development of Advanced Computing (CDAC), Mumbai, which is a government owned institution under the Ministry of Information Technology, is also disposing WEEE by calling for tenders. The CDAC tender, which lists over 200 items ranging from PC-XTs & ATs to Pentium computers as well as various peripherals such as printers, scanners, hard disks, etc, calls for a minimum earnest money deposit of Rs. 15,000 from interested parties. The presence of XTs and ATs probably indicates that this is probably among the first instances of such an exercise.

WEEE from manufacturing units

The Mumbai metropolitan region has many manufacturing and assembling units for all types of electronic and electrical products. The SEEPZ area in Andheri (E) has a dedicated industrial area for electronics manufacturing, and is home to several electronic product manufacturers as well as intermediate ancillary industries - such as printed circuit board manufacturing units. Another industrial area with a concentration of electronics manufacturers is in Navi Mumbai, on the Thane-Belapur Road, in the MIDC Electronics Zone of Mahape.

Santacruz Electronics Export Processing Zone (SEEPZ): Situated in Andheri (East) about six kilometres from the international airport, SEEPZ came into existence in 1974. It was started as an export-processing zone for the manufacture and export of electronic items. It houses an array of 100 per cent export-oriented industries. Currently, there are about 186 working units in SEEPZ, of which 85 are hardware and software units.

SEEPZ remains attractive for hardware manufacturers as it offers in-house Customs clearance. For hardware manufacturing houses and large importers of computer equipment, Customs clearance means a continuous, hassle free supply of goods. TCS, Datamatics, Celetronix India and Patni are some of the major hardware and software companies plying in the zone.

Since it is a high security zone, concerned authorities denied permission to enter SEEPZs premises, despite of repeated requests. However, telephone conversations with a few units indicate that the components and assemblies in SEEPZ are client specific, mainly for large companies, and therefore, any defective parts or production waste is disposed off as per the client company specifications.

MIDC Electronic Park, Mahape, Navi Mumbai: This suburb of Navi Mumbai is about 35-40 kms from the city limits, on the Thane-Belapur highway. There are several units here, which manufacture Printed Circuit Boards (PCBs) and other components for various electronic companies. Investigations with several PCB manufacturers in the area showed that there is a need for recycling and disposal services.

One such PCB manufacturer has been storing its manufacturing waste for the past four-five years since it was a customer requirement that the discarded or faulty products could not be disposed through local scrap channels. Mr. Nair of that manufacturing unit mentioned that the company is currently pursuing an ISO 14001 certification and would be more than glad to receive a proposal from formal recyclers to pick up their manufacturing waste, however so far, he hadn't received any.

WEEE from service centres and repair shops

Exclusive authorised service centres of some of the large manufacturers like LG and HP claim to return the WEEE generated from spares and service functions to their central warehouses, since they receive the spares on a one-for-one basis. The central warehouses are often located in the outskirts of the city. For example, HP has its central warehouse in Bhiwandi, approximately 50 kms from Mumbai, while LG has it in Powai.

WEEE from imports

In addition to the locally generated electronic waste, the Nhava Sheva port in Navi Mumbai is an important gateway for the import of WEEE in the city. Strict disposal laws in the developed countries ensure that WEEE does not flow into the general waste stream. Private companies and authorised agencies carry out WEEE collection, handling and recycling. Given the high wages, the cost of collection, handling and disposal makes it expensive operation. Unscrupulous agents take the easy way out by exporting WEEE to developing countries in the name of trade, charity, etc.

The dumping of WEEE, especially computer waste by the United States of America and United Kingdom, on India, China and Pakistan has reached to an alarming proportion. The exporters of WEEE not only charge users in developed countries for so-called disposal, but also sell this WEEE traders in developing nations, thus making substantial profit. According to the US-based Silicon Valley Toxics Coalition's study, it is ten times cheaper to export computer scrap than to recycle it within the developed countries[7].

About 80 per cent of the world's electronic trash is exported to Asia every year. India gets a decent share of this toxic pie. The earlier study by Toxics Link, Delhi had shed light on the countries involved in this toxic trade. India has ratified the Basel Convention that strictly regulates the transboundary movement of hazardous substances, including WEEE, especially from developed to developing nations.

[7] SVTC, "Poison PCs and Toxic TVs", 2004

WEEE HOTSPOTS IN MUMBAI

Mumbai has a large scrap trade network and WEEE is one of the commodities for which there are specialised buyers and recyclers. The prime areas that handle computer waste in and around Mumbai are: **Saki Naka, Kurla, Kamthipura-Grant Road, Jogeshwari** and **Malad**.

The prevailing market conditions and dismantling methods discourage environmentally sound electronic recycling practices in the city, and this holds true for the entire country. A majority of the units engaged in WEEE dismantling and recycling are in the informal sector.

Table 5: WEEE recycling areas in Mumbai with specific functions

Location	Component recycled
Saki Naka	Disassembly of computer, CRT breaking, Recycling of computer plastics to make pellets
Kurla	Market and disassembly of every kind of electrical goods and scrap, CRT breaking
KamathiPura-Grant Road	Computer dismantling, recharging of CRTs

Saki Naka

The Saki Naka locality is fast emerging as the focal point of the electronic waste trade in Mumbai, with all kinds of waste being handled, bought and sold in shops here. The area is located on the Andheri Kurla Road close to Jari Mari Industrial Area. It is a low-income slum area with a large number of informal activities being carried out.

There are approximately 100 shops of computer waste located in Teen Number Khadi (Hill No.3). The dealers here keep a constant watch on the WEEE from auctions and tenders to source the material. These shops carry out various activities of recycling. Dismantling and plastic recycling are two important ones. Traders from Delhi, Agra and Meerut, also shop and collect the PCBs and other recyclable parts from here.

Kurla

This market is situated beside the Kurla (W) bus depot along the banks of river Mithi. It is a source of all kinds of scraps, ranging from small tools to large electrical devices. Used wooden, iron scrap, automobiles parts and spares are also refurbished and sold here. The market shops are covered with tin sheds and lined-up in dingy by-lanes.

There are about 15 big shops dealing with computer scraps, washing machines, photocopiers and other electronic and electrical scraps. The primary sources of computer scrap for dealers here are imports and waste from the city itself. Banks, large private and government offices are places of particular interest to them.

Kamathipura-Grant Road

Kamathipura, located on the Grant Road in the southern part of Mumbai, is an important WEEE handling centre, owing to its proximity to the business areas of south Mumbai and computer market of the Lamington Road.

Though the collection and storage here is done on the ground floor, the dismantling is carried out on the rooftops. Segregated WEEE from here also lands up in Kurla. There are about 10-15 shops/units that currently handle WEEE in this area.

Although the individual units are operated and managed independently, they are identical in terms of technology, processing methods, raw material usage and products being manufactured.

Proximity to the source of supply is very essential for these units as the ability to respond quickly to the market demand is a key factor for survival of this vocation.

Poor management of WEEE has two broad impacts

Downstream impacts: Hazardous waste trade is fundamentally unjust and environmentally damaging since it victimises the poor, burdening them with toxic exposure and environmental degradation. This is especially egregious when victims get little benefit from the industrialisation that created the waste in the first place.

Upstream impacts: Hazardous waste trade allows waste generators to externalise their costs, creating a major disincentive to find true solutions for the problems they create upstream. As long as one can cheaply dump their waste problems on poorer economies, there will never be incentives to minimise hazardous waste at the source.

Table 6: Environmental and health hazards

Cathode Ray Tubes (CRTs) 	Lead	The glass in computer screens and TVs contains lead and other heavy metals. When broken, the glass releases hazardous dust which can harm the nervous and circulatory systems, and damage children's cognitive development.
Liquid Crystal Displays (LCDs)	Mercury	The elements that illuminate these increasingly popular devices found in MP3 players, cell phones and TVs can

		cause damage to the brain, nervous and reproductive systems, the lungs, kidneys and other organs, and are harmful to a developing foetus.
Computers		Copper is found not only in computers but also in the circuit boards of nearly every electronic device. Mining and smelting copper generates waste that can cause acid rain and release sulphur dioxide, nitrogen oxide, lead, arsenic, mercury and cadmium into the environment.
	Copper	
Semiconductors		The production of the microprocessors at the core of all high-tech electronics is a chemical intensive process, and involves many acutely toxic compounds, including those known to damage the nervous, respiratory, kidney, endocrine, reproductive and liver systems.
	Hundreds of chemicals used for microchip manufacture	
Flame Retardant Plastic		The chemicals added to plastics used in consumer electronics can cause thyroid hormone disruption, neurological development deficits and cancer.
	Polybrominated diphenyl ethers (PBDEs)	

CONCLUSION

Despite the presence of large quantities of WEEE in Mumbai there is neither a specific regulation to manage this waste stream nor any scientifically designed WEEE facility for the collection, treatment, recycling, reuse and final disposal of WEEE from various sources. WEEE collection methods, handling and recycling are some of the challenge areas that need to be addressed.

The Maharashtra Pollution Control Board (MPCB) has taken note of the problem, and together with UNEP, have commissioned an in-depth assessment of the WEEE scenario for the Mumbai and Pune region.

However, without the participation of stakeholders like the electronic product manufactures and bulk users, there can be little progress towards a sustainable solution. The multinational companies, which have taken a lead in finding a solution to the WEEE problem in their native countries, are shying away from initiating similar steps in India. Bulk users in developed countries have also been driving the agenda of effective WEEE management by forcing their suppliers to provide take-back and other green end-of-life solutions for their equipment.

An important concern on this issue today is that of outsourcing of WEEE to developing countries that have lax environmental and labour standards. Some companies use 'recycling' as a euphemism to obscure their practice of shipping hazardous wastes to third world countries.

Local communities are dealing with the leaching of toxic wastes from landfills, while workers and civilians who salvage parts from WEEE are exposed to dangerous chemicals and poisons.

KEY RECOMMENDATIONS

- There is an urgent need to bring together all stakeholders and engage them to implement a sustainable solution to the problem of WEEE.

- The foremost requirement is of a strong and comprehensive and enabling legislation that addresses the issue of illegal imports as well as the domestic generation of WEEE. The broader context of sustainable development, the basic principle of the environmental justice such as 'precautionary principle' and 'polluter pays' will have to be made the overriding concerns while facilitating the legislation.

- To promote sustainable production, there is a need for focusing on reduction and subsequent phasing out of toxic materials and use alternate materials.

- Extended Producers Responsibility is being seen as the most appropriate framework that seeks to amalgamate all the enlisted principles of environmental justice. This shifts the responsibility of safe disposal on to the producers. It not only looks at downstream solutions, but also at upstream technology. It promotes sound environment management technology and also aims at better raw material, cleaner production technology and designing for longevity (see www.toxicslink.org for 'e waste model').

- The WEEE management models being practiced in developed countries must be altered to suit the conditions prevailing in this country, particularly with regard to its linkage and participation of the existing recyclers who are mostly the urban poor. This will also ensure the utilisation of the extensive knowledge they have gathered in identifying materials and the markets where these are utilised.

- It is also recommended that the process of legislation should be transparent, participatory and most democratic. This will allow all the stakeholders to participate and contribute to the process which is key to the success of the system.

- There must be a push to ensure toxics free materials in the making of electric and electronic goods and to implement clean production systems.

- There must be a large-scale awareness programme of all stakeholders including consumers, both household and business, to ensure participation in the collection and recycling systems.

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