

GUYU, CHINA - 8 MARCH 2005 - A CHINESE CHILD SITS AMONGST A PILE OF WIRES, AND E-TRASH IN GUYU IN GUANGZHOU PROVINCE.



toxic tech

PULLING THE PLUG
ON DIRTY ELECTRONICS

GREENPEACE

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GUYU, CHINA - 8 MARCH 2005 - A MIGRANT WORKER STRIPS WIRES FROM E-TRASH IN A JUNK YARD IN GUYU IN GUANGZHOU PROVINCE.

TOXIC TECH

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design & layout Tania Dunster, kī design, The Netherlands
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contact person zeina.alhajj@int.greenpeace.org
media contact matilda.bradshaw@int.greenpeace.org

A DANGEROUS, NEW WASTE STREAM IS RAPIDLY EMERGING. THE WORLD'S BOOMING CONSUMPTION OF ELECTRONIC AND ELECTRICAL GOODS HAS CREATED A CORRESPONDING EXPLOSION IN ELECTRONIC SCRAP CONTAINING TOXIC, PERSISTENT CHEMICALS AND HEAVY METALS. BECAUSE THE PRODUCTS HAVE BEEN MADE USING THESE SUBSTANCES, THEY CANNOT BE DISPOSED OF OR RECYCLED SAFELY WHEN THEY ARE THROWN AWAY.

EVERY YEAR, HUNDREDS OF THOUSANDS OF OLD COMPUTERS AND MOBILE PHONES ARE DUMPED IN LANDFILLS OR BURNED IN SMELTERS. THOUSANDS MORE ARE EXPORTED, OFTEN ILLEGALLY, FROM THE EUROPEAN UNION, UNITED STATES, JAPAN AND OTHER INDUSTRIALISED COUNTRIES, TO ASIA. THERE, WORKERS AT SCRAP YARDS, SOME OF WHOM ARE CHILDREN, ARE EXPOSED TO A COCKTAIL OF TOXIC CHEMICALS AND POISONS WHEN THEY BREAK THE PRODUCTS APART.

THE RATE AT WHICH THESE MOUNTAINS OF OBSOLETE ELECTRONIC PRODUCTS ARE GROWING WILL REACH CRISIS PROPORTIONS UNLESS ELECTRONICS CORPORATIONS THAT PROFIT FROM MAKING AND SELLING THESE DEVICES FACE UP TO THEIR RESPONSIBILITIES. IT IS POSSIBLE TO MAKE CLEAN, DURABLE PRODUCTS THAT CAN BE UPGRADED, RECYCLED, OR DISPOSED OF SAFELY AND DO NOT END UP AS HAZARDOUS WASTE IN SOMEONE'S BACKYARD.

The problem

The amount of discarded electronic products around the world has sky-rocketed over the past few years, with 20-50 million tonnes generated worldwide every year.¹ Electronic waste (e-waste) now makes up five per cent of all municipal solid waste worldwide, nearly the same amount as all plastic packaging, but much more hazardous.² And it is not only developed countries that generate e-waste; Asia discards an estimated 12 million tonnes each year.³

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.⁴ In Europe, for example, e-waste is increasing at three to five per cent a year, almost three times faster than the total waste stream.⁵ Developing countries are also expected to triple their e-waste production over the next five years.⁶

DID YOU KNOW?

- The average lifespan of computers in developed countries has dropped from six years in 1997 to just two years in 2005.⁷
- Mobile phones have a lifecycle of less than two years in developed countries.⁸
- 183 million computers were sold worldwide in 2004 - 11.6% more than in 2003.⁹
- 674 million mobile phones were sold worldwide in 2004 - 30% more than in 2003.¹⁰
- By 2010, mature markets in the United States, Europe and Asia-Pacific will have added 150 million new PCs, while emerging markets will have added 566 million new computers. By this time, there will be 178 million new computer users in China, 80 million new users in India. In Mexico, 46 percent of the people will own a PC.¹¹

GUIYU, CHINA - 8 MARCH 2005 - A MIGRANT CHILD FROM HENAN PROVINCE HOLDS UP A PIECE OF E-TRASH, ONCE A COMPUTER SCREEN BEARING A "NOKIA" LOGO IN A JUNK YARD IN GUIYU IN GUANGZHOU PROVINCE.



GUIYU, CHINA - 8 MARCH 2005 - A MIGRANT WORKER STRIPS WIRES FROM E-TRASH IN A JUNK YARD IN GUIYU IN GUANGZHOU PROVINCE.



GUYU, CHINA - 9 MARCH 2005 - A CHINESE WORKER "BAKES" MOTHERBOARDS IN AN E-WASTE WORKSHOP IN GUYU, CHINA. © GPN/ATLIE BEHRING

MUYU, CHINA - 13 FEBRUARY 2004 - A MIGRANT WORKER REMOVING COPPER FROM AN AIR-CONDITIONING UNIT, THEN RECYCLING THE REMAINING ALUMINIUM IN MUYU, TAIZHOU CITY, ZHEJIANG PROVINCE.



MUYU, CHINA - 13 FEBRUARY 2004 - A MIGRANT WORKER POURING LIQUID ALUMINIUM INTO MOULDS IN MUYU, TAIZHOU CITY, ZHEJIANG PROVINCE.

What's in electronic devices?

Electronic devices are a complex mixture of several hundred materials, many of which contain heavy metals such as lead, mercury, cadmium and beryllium and hazardous chemicals, such as brominated flame retardants - polybrominated biphenyls (PBBs), polybrominated diphenylethers (PBDEs) and tetrabromobisphenol-A (TBBPA or TBBA). PVC plastic is also frequently used. A mobile phone, for example, contains 500 to 1000 components.¹²

These dangerous substances cause serious pollution and put workers at risk of exposure when the products are produced or disposed of. Of particular concern is the exposure of children and pregnant women to lead and mercury. These metals are highly toxic and can harm children and developing foetuses even at low levels of exposure.¹³

HEALTH HAZARD

- **Some brominated flame retardants, used in circuit boards and plastic casings, do not break down easily and build up in the environment. Long-term exposure can lead to impaired learning and memory functions. They can also interfere with thyroid and oestrogen hormone systems and exposure in the womb has been linked to behavioural problems.**¹⁴
- **As much as 1,000 tonnes of a brominated flame retardant called TBBPA was used to manufacture 674 million mobile phones in 2004. This chemical has been linked to neurotoxicity.**¹⁵ (Greenpeace calculation based on an average mobile phone of 75 g weight that contains 2% TBBPA).¹⁶
- **The cathode ray tubes (CRT) in monitors sold worldwide in 2002 contain approximately 10,000 tonnes of lead. Exposure to lead can cause intellectual impairment in children and can damage the nervous, blood and reproductive systems in adults.**¹⁷ (Greenpeace calculation based on an average weight of 15kg and an average of 4% lead in a CRT monitor¹⁸ and 17.8 million units sold worldwide in 2002¹⁹)
- **Cadmium, used in rechargeable computer batteries, contacts and switches and in older CRTs, can bioaccumulate in the environment and is highly toxic, primarily affecting the kidneys and bones.**²⁰
- **Mercury, used in lighting devices for flat screen displays can damage the brain and central nervous system, particularly during early development.**²¹
- **Compounds of hexavalent chromium, used in the production of metal housings, are highly toxic and human carcinogens.**²²
- **Polyvinyl chloride (PVC) is a chlorinated plastic used in some electronics products and for insulation on wires and cables (OECD 2003). Chlorinated dioxins and furans are released when PVC is produced or disposed of by incineration (or simply burning). These chemicals are highly persistent in the environment and many are toxic even in very low concentrations.**²³



GUYU, CHINA - 9 MARCH 2005 - WORKERS UNPACK A TRUCK-LOAD OF E-WASTE WHICH HAS JUST ARRIVED FOR PROCESSING IN GUYU IN GUANGZHOU PROVINCE.

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Where does e-waste end up?

Many old electronic goods gather dust in storage waiting to be reused, recycled or disposed of. The US Environmental Protection Agency (EPA) estimates that as much as three quarters of the computers sold in the US are stockpiled in garages and closets.²⁴ When thrown away, they end up in landfills or incinerators or, more recently, are exported to Asia.

Landfill: According to the US EPA, more than 4.6 million tonnes of e-waste ended up in US landfills in 2000.²⁵ Toxic chemicals in electronics products can leach into the land over time or are released into the atmosphere, impacting nearby communities and the environment. In many European countries, regulation has been introduced to prevent electronic waste being dumped in landfills due to its hazardous content. However, the practice still continues in many countries. In Hong Kong for example, it is estimated that 10-20 percent of discarded computers go to landfill.²⁶

Incineration: Incineration of electronic products releases heavy metals such as lead, cadmium and mercury into the air and ashes.²⁷ Mercury released into the atmosphere can bioaccumulate in the food chain, particularly in fish – the major route of exposure for the general public.²⁸ If the products contain PVC plastic, chlorinated dioxins and furans are also released. Brominated flame retardants generate brominated dioxins and furans when e-waste is burned.

Reuse: Reuse is a good way to increase a product's lifespan. Many old products are exported to developing countries. Although the benefits of reusing electronics in this way are clear, the practice is causing serious problems because the old products are dumped after a short period of use in areas that are unlikely to have facilities to deal with hazardous waste.

Recycle: Although recycling can be a good way to reuse the raw materials in a product, the hazardous chemicals in e-waste mean that electronics can harm workers in the recycling yards, as well as their neighbouring communities and environment.

In developed countries, electronics recycling takes place in purpose-built recycling plants under more-or-less controlled conditions. In many EU states for example, plastics from e-waste are not recycled to avoid brominated furans and dioxins being released into the atmosphere. In developing countries however, there are no such controls. Recycling is done by hand in scrap yards, often by children.

Export: E-waste is routinely exported by developed countries to developing ones, often in violation of the Basel Convention. Inspections of 18 European seaports in 2005 found as much as 47 per cent of waste destined for export, including e-waste, was illegal.²⁹ In the UK alone, at least 23,000 metric tonnes of undeclared or 'grey' market electronic waste was illegally shipped in 2003 to the Far East, India, Africa and China.³⁰ In the US, it is estimated that 50-80 per cent of the waste collected for recycling is being exported in this way.³¹ This practice is legal because the US has not ratified the Basel Convention.

Mainland China tried to prevent this trade by banning the import of e-waste in 2000. However, Greenpeace has discovered that the laws are not working; e-waste is still arriving in Guiyu of Guangdong Province, the main centre of e-waste scrapping in China.³²

Greenpeace has also found a growing e-waste trade problem in India. 25,000 workers are employed at scrap yards in Delhi alone, where 10–20,000 tonnes of e-waste is handled each year, 25 per cent of this being computers.³³ Other e-waste scrap yards have been found in Meerut, Ferozabad, Chennai, Bangalore and Mumbai.

TONGSHAN VILLAGE, CHINA - 14 FEBRUARY 2004 - A PILE OF CIRCUIT-BOARD WASTE LAYING IN FRONT OF A LOCAL RESIDENT'S HOUSE WAITING TO BE STRIPPED FOR METAL IN TONGSHAN VILLAGE, WENLIN CITY, ZHEJIANG PROVINCE.



GUIYU, CHINA - 9 MARCH 2005 - A STACK OF OLD KEYBOARDS AND OTHER E-WASTE IN NANYANG, CHINA.



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GUIYU, CHINA - 9 MARCH 2005 - A JUNKYARD WORKER SORTS E-WASTE WORKER MAKES PLASTIC FLOWERS OUT OF RECYCLED PLASTICS IN NANYANG, CHINA.

How did the trade evolve?

In the 1990s, governments in the European Union, Japan and some US states set up e-waste 'recycling' systems. But many countries did not have the capacity to deal with the sheer quantity of e-waste they generated or with its hazardous nature.

Therefore, they began exporting the problem to developing countries where laws to protect workers and the environment are inadequate or not enforced. It is also cheaper to 'recycle' waste in developing countries; the cost of glass-to-glass recycling of computer monitors in the United States is \$0.50 per pound compared to \$0.05 in China.³⁴

Demand in Asia for electronic waste began to grow when scrap yards found they could extract valuable substances such as copper, iron, silicon, nickel and gold, during the recycling process. A mobile phone, for example, is 19 per cent copper and eight per cent iron.³⁵

Regulations

Basel Convention Under The Basel Convention on the Control of the Trans-boundary Movement of Hazardous Waste and Their Disposal, which came into force in 1992, the Basel Ban Amendment, adopted in 1995, bans all exports of hazardous waste from developed countries to developing countries that are both party to the convention. The convention considers electronic waste to be hazardous and therefore its trade is subject to the Basel Ban regulations.³⁶

New laws in Europe and Japan are shifting responsibility for e-waste away from taxpayers, local authorities and governments and on to the manufacturers of the products. The laws also ban the use of certain hazardous substances. In response, companies with EU and Japanese markets, are substituting the banned substances and redesigning their products to make them easier and safer to dismantle and recycle when they are discarded and returned to them.

Greenpeace welcomes these progressive policies but anticipates they are likely to increase exports of e-waste unless they are supported by initiatives that ensure the companies recycle, reuse or dispose of the products safely once they have taken them back.

European Directives The European Union has recognised that e-waste poses problems whether it is burnt, dumped in landfill or recycled. In 2002, it adopted two directives to tackle electronic waste, the RoHS Directive and the WEEE Directive:

1. Clean up Restriction of Hazardous Substances (RoHS) - The RoHS Directive requires that electronics manufacturers stop using toxic chemicals and heavy metals in their products. It bans the use of cadmium, mercury, lead, hexavalent chromium and two types of brominated flame retardants (PBDEs and PBBs) in products marketed after July 2006, with specific exceptions.³⁷ This will include all electronic products on the European market, whether manufactured in the EU or imported.

Greenpeace welcomes the RoHS Directive, but wants it to be extended to ban the use of all hazardous chemicals. In particular, it wants further restrictions to cover all brominated flame retardants and other halogenated materials, including PVC.

2. Take back The Waste from Electrical and Electronic Equipment (WEEE) Directive, passed in November 2002, makes producers responsible for taking their e-waste back when their products are discarded, as from August 2005.³⁸

Japanese Extended Producer Responsibility Extended Producer Responsibility regulations that came into effect in Japan in April 2001 require that manufacturers take back five types of household appliances when they are thrown away: refrigerators; washing machines, air conditioners; TVs and, more recently, personal computers.

THE SOLUTION

Greenpeace believes that manufacturers of electronic goods, who have benefited from sales of their products, should take responsibility for them from production through to the end of their lives. To prevent an e-waste crisis, manufacturers must design clean electronics with longer life-span, that are safe and easy to recycle and will not expose workers and the environment to hazardous chemicals.

Clean up: Electronics manufacturers must stop using hazardous materials. Electronics companies used to say it was impossible to stop using lead solder in products but, when the RoHS Directive forced them to find safer alternatives, they did. Some electronics companies have now also conceded that it is possible to stop using all brominated flame retardants and PVC plastic in their products and have committed to phasing them out. All other electronics companies should follow suit.

Take back: The taxpayer should not bear the cost of recycling old electrical goods. Manufacturers should take full life cycle responsibility for their products. They should make clean products which can be reused or recycled safely and set up a system to take them back when they reach the end of their useful life.

For more information check out: www.greenpeace.org/electronics

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greenpeace international
Ottho Heldringstraat 5, 1066 AZ Amsterdam, Netherlands
t +31 20 718 2000 f +31 20 514 8151
www.greenpeace.org

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