

Lead and Cadmium

global impacts through e waste

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Toxics Link

Global supply and disposal chain

- Components, sub assemblies manufactured at different locations globally
- Marketed globally – including in high growth new emerging markets.
- Substantial waste is recycled in developed countries
- Refurbished devices sold in the the global south.

Lead

Average Lead in computers- 1.72 kgs

- Can be upto 2-3 kg of each CRT
- In solder.
- Lead sulphate stabilizer in PVC sheathing for cables and wires.
- 0.3% by weight of lead in mobile phones (Average weight- 125gms)

Cadmium

- Batteries *81% of the total cadmium consumption in batteries (2004)*
- SMD chip resistors,
- infrared detectors
- semiconductors

Global supply chain

Components - examples:

Chips- **Singapore**

CRTs- China, Korea

PCB- **China, Taiwan**

HDD- Singapore

Ni Cd batteries - China and Japan

Mobile phones

Component	Manufacturing Location
Integrated Circuit (ICs)	Taiwan, China
PCBs	Korea, China
LCD	Korea, Taiwan, China
Speaker	China
Battery	China, Korea, Japn
Hands free Headset	Taiwan, HK, China (Bluetooth), China (wired)
Phone housing, keypad	China, Korea

Waste generation

- **E Waste**
 - Global qty- approx 20 - 50 million tonnes (UNEP)
 - Mobile phones : 700 million (2005) – 560 mt of lead (*Lincon et al., 2005*)
 - Europe- 8.3 –9.1 million tonnes annually
 - US – 2.6 mt annually (2005 – US EPA)
 - India- 0.33 million tonnes (2007, Mobiles and computers)
 - Rates of increase: - *3-5% globally, 10-12% India*

Recycling and disposal in developed countries

About 70% of the heavy metals (including lead, mercury and cadmium) found in landfills come from e-waste*.

- US-78 % of the e-waste is estimated to be exported
- Europe- 4 kg/capita collection targets...some country exceeding that - where does it go?
- Larger collection may also lead to exports to developing countries (Basel Convention violations)

(*Widmer et al., 2005)



Waste trade

Known and Suspected Routes of e-waste Dumping

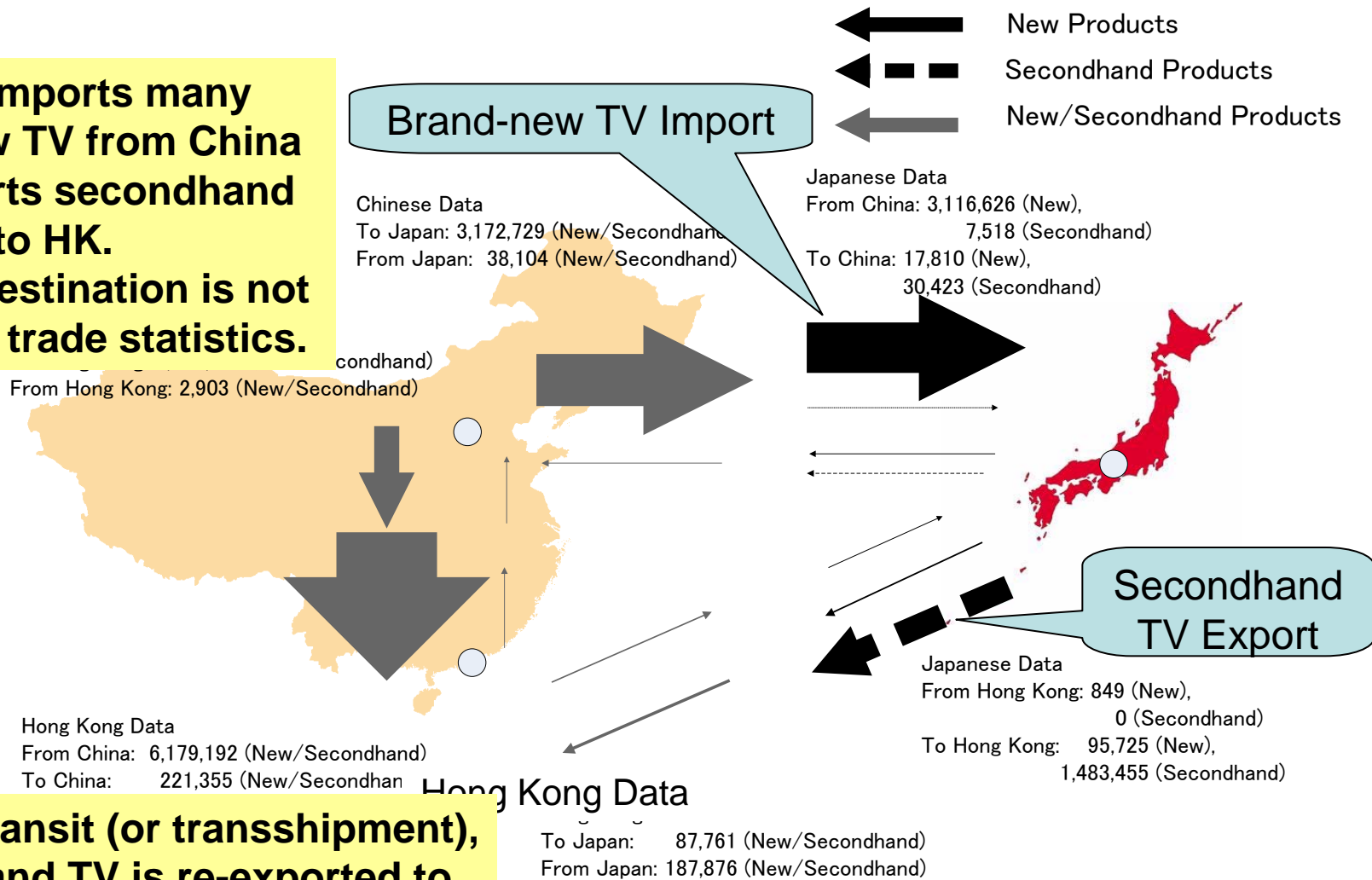


There is currently no system for tracking legal or illegal (under international law) shipments of electronic waste, and therefore, there is no quantitative data on volumes or even all of the true destinations. Some electronic waste is shipped as "working equipment" only to end-up as waste upon arrival. This map indicates information collected through investigations by organizations such as the Basel Action Network, Silicon Valley Toxics Coalition, Toxics Link India, SCOPE (in Pakistan), Greenpeace and others.

Material flow of (brand-new and secondhand) television sets among Japan, China and Hong Kong in 2001

Japan imports many brand-new TV from China and exports secondhand to HK. But final destination is not clear from trade statistics.

At HK as transit (or transshipment), secondhand TV is re-exported to China mainland, South-East Asia, Mideast and Africa

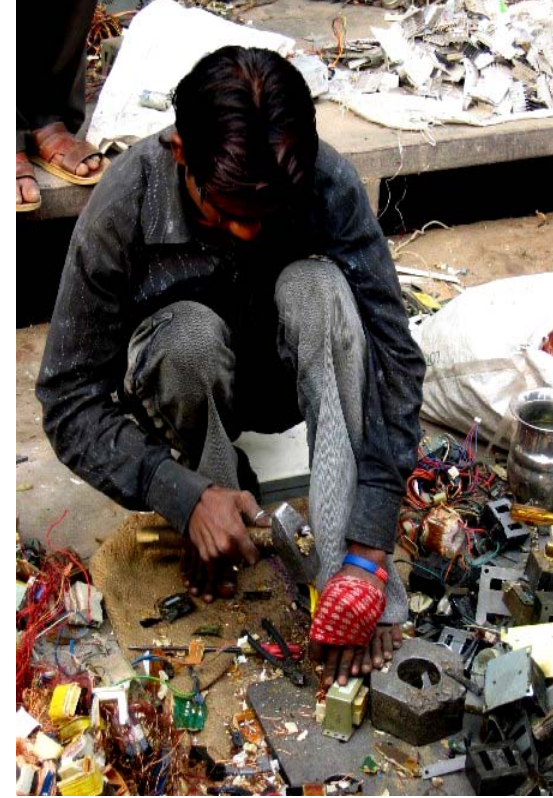


Developing Countries – high releases, dumping

- Lack of legislations or its adequate implementation
- Mostly extraction in informal sector (low recovery 15-20%)
- Inadequate or absent recycling facilities with appropriate technology.
- Import (quasi- legal and illegal)
- New investments catalyze pressure for imports.
- Reverse – export?
- Cherry picking
- High health and environmental impacts.

India

- Domestic generation as well as illegal dumping from developed countries
- Informal Sector, high-risk backyard operation
- Rudimentary- breaking, acid baths, open burning
- Women and children employed
- Risk awareness non-existent
- Occupational and Environmental hazards





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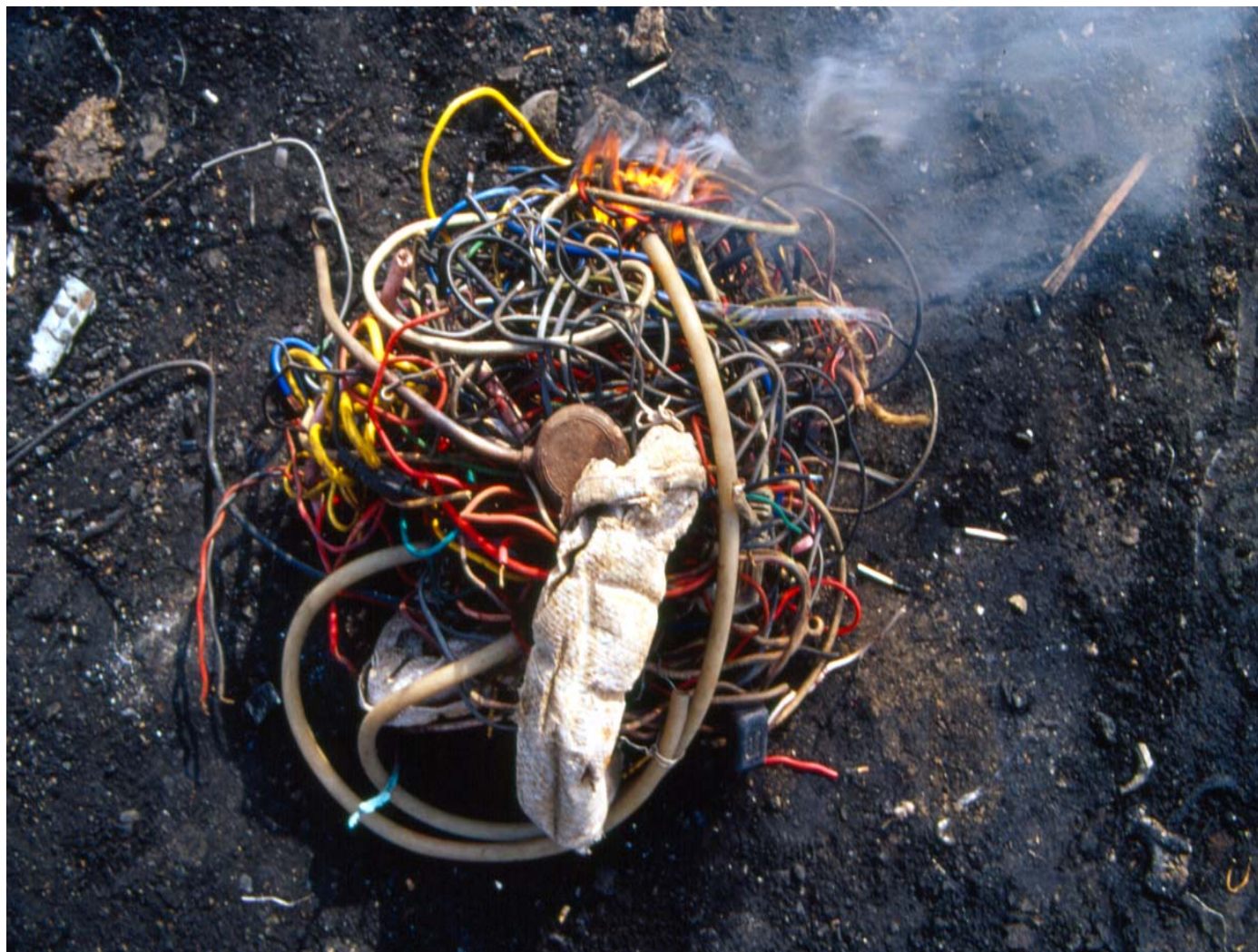


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China

- 70% of the world e-waste estimated to be dumped in China
- Informal sector





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E-waste in China

IFCS Forum VI

Africa

- Half a million PCs arrive in Lagos every month as donation, only 1 in 4 work
- Imported electronic waste thrown into unmonitored dumpsites, close to the groundwater and routinely set afire.
- Recent study by Greenpeace in Ghana found very high levels of toxic metals
- Children mostly between 11-18 found working





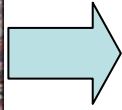
E-waste dump in Nigeria

Source: Danwatch

Source: Basel Action Network

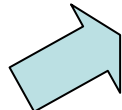


Possible main pollution of toxic compounds for E-waste



Open burning

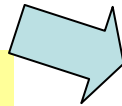
**Wires and cables
(Cu, PVC, BFR, etc)**



Heating

Pb and other metals to air and respiratory organs

**Print circuit board
(Au, Pd, Cu, Pb, BFR, etc.)**



Acid treatment

Cu, Pb, other metals and PCDD/DFs to water/sediment and soils

Impacts

- **Probably highest in developing countries**

Most vulnerable populations

- Manufacturing Workers
- Recycling workers (women and children)
- Environmental leakages through emissions and leaching (groundwater, air, surface water, soil)
- US landfills (*18.55 ppm – Townend, 1999*)

Conclusion

- Global life cycle of electronics with lead and cadmium in them.
- Differentiated impacts, mostly on vulnerable populations in developing countries.