Recycling Facilities in Asia

Michikazu KOJIMA
Institute of Developing Economies
JETRO
Objective of this Presentation

• To show various types of technology to handle e-waste
• To show both e-waste recycling with and without environmental sound technology
Dismantling

- The worker uses mask, glasses and gloves. Dust control equipment is used.

- The worker does not use mask, glasses nor gloves. No dust control, but working in open air.
TV Glass

- Funnel glass of CRT TVs contains lead. Panel glass of CRT TVs does not contain lead. It is better to separate funnel and panel glass for recycling.

- Waste funnel glass can be recycled as raw material for CRT again.
Removing IC Tip from Printed Circuit Board

- IC Tips are removed from printed circuit board. Removed IC tips are sold as secondhand IT tips, if they are good condition.

- Gold and silver are recovered from removed IC tips.

IC chips are removed from Printed Circuit Board by using heat. (Guiyu, China, Nov. 2004)
Removing IC Tip from Printed Circuit Board

A machine removing IC tips from Printed Circuit Board (December 2011, Hong Kong)

Removing IC tips from printed circuit board for mobile phone, using equipment similar to hair dryer. (December 2009, Guiyu, China)
Crusher for plastic parts and other materials. (September 2010)

Crushed printed circuit board, which is sent to Cement industry. (September 2010, Indonesia)
Coated wire: Separating Plastics and Metals

Nagget system to separate copper and plastics. (Dec. 2004)

Open burning of plastic-coated wire to extract copper. Vietnam, August 2009.

Refrigerator and Air Conditioner: CFC collection and dismantling

- CFCs and other coolant should be collected, to prevent ozone layer and to mitigate global warming.

CFC collection from Air Conditioner, Akita, Japan, September 2009.
MATERIAL RECOVERY
Gold Recovery

Recovering gold, silver and other precious metals, with water pollution control. (December 2009, Guiyu, China)

Recovering gold using acid, without pollution control. Wastewater is discharged into river directly. (November 2004, Guiyu, China)
Gold Recovery

Recovering gold from IC tips by using acid, without pollution control. (August 2009, Philippines)

Recovering gold using cyanide, with pollution control. (October 2006, Philippines)
Gold recovery using acid and heat. The workshop is small area next to kitchen. (September 2010, Indonesia)

Gold recovery using cyanide and heat, in e-waste recycling factory in Taiwan.
Copper refining process using electrolysis, December 2009, Guiyu, China

Producing copper cable from waste copper without refinery process. (August, 2002, China)
Recovering various metals by non-ferrous industry

- Combination of several types of non-ferrous smelter and refinery process can recover various metals. For example, Dowa, a non-ferrous metal manufacturer in Japan, can recover more than 20 types of metals.

Non ferrous smelter and refinery plant in Japan. September 2009
TRANSBOUNDARY MOVEMENT
A Formal e-waste recycling facility in the Philippine

Philippines
An e-waste recycling factory dismantle computer.

← Sorting out Printed circuit board

← The crusher of CRT glass.

South Korea
Refinery to extract metals from Printed Circuit Board
Making CRT glass from glass cullet

Machine to crushing CRT glass is installed. Printed Circuit Board and CRT glass are exported to South Korea.
Copy Machine collected by Fuji Xerox in Asia and Pacific

Indonesia, Malaysia, Philippines, Singapore, South Korea, Hong Kong and Thailand

Fuji Xerox is collecting discarded copy machine and toner cartridge from their customer.

Thailand

Fuji Xerox established factory dismantling copy machine for recycling and toner cartridge for reuse of parts and recycling.

Most of parts are recycled in Thailand, but some of them are sent to Japan.

Japan

Material recycling and proper disposal.

Thailand

Most of the materials such as metals, glass and printed circuit board are recycled in Thailand.

Fluorescent Lamp, LCD back light, Ni-Cd battery, Selenium Drum
CONCLUSION
Conclusion(1)

• In both dismantling process and material recovery process, facilities generating pollution (Non-ESM facilities) and facilities with environmentally sound technology (ESM facilities) coexist in Asia.

• Government should consider how to upgrade non-ESM facilities to ESM facilities, how to promote ESM facilities, and how to ensure the flow of e-waste destined for ESM facilities. 
  – Certificate is one of options.
Conclusion(2)

• It may be feasible to establish dismantling facilities in each GMS country.
• But it may be not economically feasible to have all types of material recycler in each GMS country, because of scale economy of material recycling with environmentally sound technology.
Guideline and Manuals for e-waste

- Various guidelines and manuals have been published for e-waste recycling.