Promoting sustainable e-waste management systems in developing countries

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Background to e-waste (1)

- Current regulatory loopholes that allow exports of “used” EEE & WEEE from developed to developing countries

- At the same time, e-waste is growing in developing countries: by 2030, they will discard 400-700 million obsolete PCs/year compared to 200-300 million in developed countries

Sources: Khaliq et al. (2014); Global E-waste Management Market (2011-2016)
Background to e-waste (2)

- **Urban mining**: 40-800 times more gold in 1t of Printed Wiring Boards (PWB) than in 1t of ore
- But it also yields *hazardous substances*: POPs, Ba, Cd, Pb, Hg, Cr, Pd, etc.
- **Products of main concern**: Cathode Ray Tubes, flat screens, batteries, CFCs in refrigerators, Hg in lamps
Background to e-waste (3)

- Poor / illegal “recycling” of e-waste and “cherry-picking” of valuable fraction

- Few recycling options for critical fractions
  - Only 5 smelters globally can treat PWB according to international standards
  - Treatment of CRT glass, Hg-lamps, contaminated plastics,...

Sources: Khaliq et al. (2014); Global E-waste Management Market (2011-2016)
General UNIDO E-Waste concept

Help build and consolidate local capacities to promote sustainable e-waste recycling industries, to efficiently recover marketable resources, while generating quality jobs and caring about the environment and health.

- Support green industries that safeguard the environment and create quality jobs
- Promote partnerships for knowledge exchange and technology transfer
- Help countries develop their e-waste management systems and strategies based on the whole recycling chains and life-cycle
- Enhance North-South, South-South, and triangular cooperation and knowledge sharing
Process of E-Waste Flows

**INPUT**

- **COLLECTION**
  - Individuals (via Collection Points)
  - B2B (Companies/Organizations)
  - Informal Sector (Scavengers,...)

  - Transport

**OUTPUT**

- **DOWNSTREAM OPTIONS**
  - Local
  - Regional/Cross-national
  - International/Oversea

**TREATMENT**

- **RECEIVING**
  - Weighing Sorting Pre-Processing Storing

- **MANUAL DISMANTLING**
  - Screens (TV, CRTs, LCDs..)
  - Lamps
  - White Goods (Fridges,...)
  - Small WEEE
  - Batteries

- **FURTHER TREATMENT**
  - Hot Wire – Separation (Lead glass screen)
  - Decontamination Hg-Lamps
  - Degasification (CFCs)
  - Cable-Stripper
  - Plastic Shredder
  - Pb, Acids,...

**Legend:**

- **WEEE**
- **Fractions (non-hazardous)**
- **Hazardous fractions/ waste**

**Facility**

- **Transport:**
  - Degasification (CFCs)
Key elements of UNIDO’s approach

1. Detailed inventory of existing volumes and ongoing initiatives
2. Design of collection and processing schemes
3. Set-up / scale-up of national e-waste treatment options, including the establishment of sustainable business models
4. Connection to downstream markets at national, regional or international level, in accordance with international conventions, e.g. Basel Convention
5. Policy and legislation development or enhancement, including collection strategies and financing mechanisms
6. Capacity building, training and awareness-raising
Inventory

Initial inventories to get an overview of:

- Existing policies and ongoing initiatives
- Financing mechanisms and stakeholder networks
- Collection, treatment and downmarket schemes
- Units in stock, current and future e-waste flows - e.g. volumes:

<table>
<thead>
<tr>
<th></th>
<th>Personal Computers</th>
<th>TVs</th>
<th>Mobile Phones</th>
<th>Refrigerators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahir Dar</td>
<td>147 000 kg</td>
<td>15 800 kg</td>
<td>90 kg</td>
<td>6 800 kg</td>
</tr>
<tr>
<td>Dire Dawa</td>
<td>196 000 kg</td>
<td>41 600 kg</td>
<td>300 kg</td>
<td>62 000 kg</td>
</tr>
<tr>
<td>Hawassa</td>
<td>85 200 kg</td>
<td>11 500 kg</td>
<td>60 kg</td>
<td>10 600 kg</td>
</tr>
</tbody>
</table>
Collection

How to reduce stock and ensure future input?

• Permanent drop-off facility
• Special drop-off events
• Door-to-door pick-up

Stakeholder responsibility:

– Government
– Retailer
– Original Equipment Manufacturers (OEM)
– Commercial entity: electronic recyclers or generic waste collectors
Dismantling Facilities (DMFs)

- Review of existing and planning of new DMFs
- Optimize work processes and product/waste flows
- Provide technical assistance/staff training
- Reduce waste and ensure security and health standards
- Take into account input (collected material) and output streams (valuable materials, hazardous waste,...) for facility design
Example: Ethiopia
Project Site: Akaki/Addis Ababa

Dismantling workshop

- CRT Cutting
- Cable Shredding
- Plastic Shredding
- Intermediate Storage
- Dismantling workstation
Downstream Markets

- Identify environmentally and socially sound potential local, regional and international buyers
  - Non-hazardous outputs: national/regional markets
  - Hazardous outputs: international smelters
- Analyze the purchasing conditions and business models of potential buyers and their branches
- Take into account:
  - Quality and contamination of material outputs
  - International conventions on hazardous waste transport
  - Administrative and legal restrictions
  - Local and world market prices
Business & Finance

• Ensure proper treatment of all fractions
  (i.e. valuable / non-valuable and hazardous / non-hazardous)

• Establish adequate financing schemes
  (e.g. Expanded Producer Responsibility - EPR)

• Incentivize DMFs

Develop sustainable business models
• Help countries develop their e-waste management policies and strategies based on the whole recycling chains and life-cycle
• Establish monitoring/auditing/ policy enforcement processes
• Cooperate with international stakeholders and e-waste networks:
UNIDO E-Waste management portfolio

**Completed/Ongoing:**
- Uganda: Establishment of a manual dismantling facility for WEEE
- Tanzania: Component on E-waste management (One UN Programme)
- Ethiopia: E-waste Management Project
- Cambodia: Creating job opportunities & effective e-waste management

**Pipeline:**
- Regional e-waste project for Latin America
- Regional e-waste project for ECOWAS
- Regional e-waste project for SADC
Thank you for your attention!

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