Recycling Lead-acid batteries in Ghana: Regulatory Framework and Activities

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Introduction

- Regulatory Framework
- Existing Facilities & methods of Recycling
- ULAB Inventory
- Upgrading of Existing Facilities
- Collection Centres and
- Take-back Scheme
What is in the normal Pb-acid Battery?

A modern Pb-acid battery basically consists of
1. Polypropylene (PP) casing,
2. Plates (grids and paste,
3. Connectors/poles, bridges,
4. Sulphuric acid \([\text{H}_2\text{SO}_4]\) and
5. PP-separators as insulators between plates.
6. Abnormal separators- glass for weight – solar

An average battery weighs between 13-24kg and for heavy duty; 50kg.
- The metal from the grids, terminals and bridges contain about 44% Pb and antimony
- The paste comprises of about 56% Pb oxide and lead SO4.
ULAB and its recycling activities are classified hazardous and before 2016, the applicable laws used to regulate them were

- Environmental Protection Agency Act, 1994 (Act 490)
- Environmental Assessment Regulations 1999, (LI 1652)
- Basel and Bamako Conventions
- Interpol Pollution Crime Sub-Directorate (PCWG)


1. Hazardous and other wastes (including Biomedical wastes)
2. Electrical and Electronic Waste
• Import & export prohibition and controls
• Notification procedure for transboundary movement, Transits
• Liabilities of Contraventions & exclusion of diplomatic immunity
• Control and management of PCBs
• Hazardous and EE Waste Fund
  • Eco-levy
  • External service provider to collect levy (Manufacturer or importer)
• Bank Account
• Fund Administrator
Hazardous and E-waste Management and Control Regulations, 2016 (LI 2250)

- Section 9 on Take-back scheme (also 5th Schedule)
- Section 11 specifically for Batteries
- Section 10 on Financing of Waste Management activities
- Sections 13-19 on requirements, application & permitting recycling facilities
- Section 21-22 on import export controls and
- Section 23 on Consent for Transit
Process Options adopted by Facilities in Ghana

1. Waste battery collection
2. Acid drainage
3. Battery breaking & lead scrap extraction
4. Smelting of raw lead ingots

Export options:
- Export option 1: Export of wet lead-acid batteries
- Export option 2: Export of drained lead-acid batteries
- Export option 3: Export of lead scrap
- Export option 4: Export of raw lead ingots
Facilities in Ghana and methods adopted

<table>
<thead>
<tr>
<th>Name of Facility</th>
<th>Process Stage</th>
<th>Installed Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravita Ghana</td>
<td>Smelting to Pb ingots</td>
<td>1,200MT/Month</td>
</tr>
<tr>
<td>Goldline</td>
<td>Smelting to Pb ingots</td>
<td>1,200MT/Month</td>
</tr>
<tr>
<td>Success Africa</td>
<td>Smelting to Pb ingots</td>
<td>1,200MT/Month</td>
</tr>
<tr>
<td>Blancomet (Boliden)</td>
<td>Partial Processing - no smelting</td>
<td>1,200MT/month</td>
</tr>
<tr>
<td>Non-Ferrous Metals</td>
<td>Partial Processing - No Smelting</td>
<td>600MT/Month</td>
</tr>
<tr>
<td>Fidev Recycling</td>
<td>Partial processing - no smelting</td>
<td>200MT/Month</td>
</tr>
<tr>
<td>City Waste Management Company Limited</td>
<td>Collection Center - No processing but supply to recycling facilities</td>
<td>80MT/Year (2013, 2014, 2015, 2016)</td>
</tr>
</tbody>
</table>
Reactions in Furnace

\[ 2\text{PbO} + \text{C} \rightarrow 2\text{Pb} + \text{CO}_2 \]
\[ \text{PbSO}_4 + 2\text{C} \rightarrow \text{PbS} + 2\text{CO}_2 \]
\[ \text{PbS} + \text{Fe} \rightarrow \text{Pb} + \text{FeS} \quad \text{or} \quad \text{PbS} + \text{PbO}_2 \rightarrow 2\text{Pb} + \text{SO}_2 \]

Cyclone Side) and Baghouse (down)
Looped wet scrubber to remove gaseous pollutants
Sources & Inventory of ULAB

• In-country
  Transport sector: Garages, Solar Installations, Telecommunication Transmission towers, Desktop PCs and UPSs

• External imports:
  ECOWAS member countries (Burkina Faso, Mali, Niger, Nigeria and Cote D'Ivoire, EU, USA, Madagascar,
## Estimated generation of ULAB in Ghana

<table>
<thead>
<tr>
<th>Type of appliance</th>
<th>Devices in use</th>
<th>Mean weight of LAB</th>
<th>Mean life-time of LAB</th>
<th>ULAB generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger vehicles</td>
<td>0.82 million</td>
<td>20 kg</td>
<td>2 years</td>
<td>8,200 t/yr</td>
</tr>
<tr>
<td>Solar &amp; Power generators</td>
<td>1.2 million</td>
<td>20kg, 50kg</td>
<td>5 years</td>
<td>XXX</td>
</tr>
<tr>
<td>Agricultural &amp; Industrial Machinery</td>
<td>0.32 million</td>
<td>20kg</td>
<td>50kg</td>
<td>XXX</td>
</tr>
<tr>
<td>Telecommunication</td>
<td>0.15 million</td>
<td>20kg</td>
<td></td>
<td>XXX</td>
</tr>
<tr>
<td>Mining &amp; Construction Equipment</td>
<td>0.07 million</td>
<td></td>
<td>50kg</td>
<td>XXX</td>
</tr>
<tr>
<td>BRVs &amp; trucks</td>
<td>0.54 million</td>
<td>2 x 50 kg</td>
<td>2 years</td>
<td>27,000 t/yr</td>
</tr>
<tr>
<td>Desktop PCs + UPS</td>
<td>2.51 million</td>
<td>3 kg</td>
<td>5 years</td>
<td>1,506 t/yr</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Compliance Enforcement

- Profiling, monitoring inspections to sites on persistent violations or non-compliance; compressive documentations
- Consistent feedback to violators stating problems, severity and demand a timetable for solving problems
- Negotiated positions for compliance enforcement
- Issuance of notices and directives with timeliness
- Issuance of closure notices and effecting closures for corrections to be effected before resumption
- Prosecution: Big problem? One case currently ongoing
Steps to overcome challenges

1) Postive Government setting up Fund, appointment of External service provider to collect eco-levy and appointment of the Fund administrator

2) Eco levy finance collectors, buy-back centers and formal recycling facilities

3) Facilitating private and informal sectors to set up buy-back centres for E-waste & ULAB throughout the country

4) Facilitating Private sector establishment of a state-of-the-art electronic waste facility at Agbogbloshie

5) Setting up of buy-back centres throughout the country by the private sector

6) Inventories of PCBs, ULAB, E-waste, Used Tyres
• Facility audits ongoing in Ghana with the aim of pushing facilities to the best practices or be limited to a level of their efficiency (Brian Wilson)

• Comprehensive communication strategy under development for public education on the laws, the processes in the industry, detailed guidelines for best practices in industries
THANK YOU