International Lead Association
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Environmentally Sound ULAB Strategies

Brian Wilson
Past Work
• Lead Production
ILA and EUROBAT previous work has improved LCA outcomes for lead batteries.
– Demonstrate significant CO$_2$ savings when used in start-stop applications.
• BUT data only for Europe, and considered outdated.

Proposed Work
• Phase One: Conduct EU and NA LCA on lead production.
• Phase Two: Expand EU lead battery LCA to include North America.
• Cover both automotive and energy storage applications.

Strategy for the ESM of ULAB Recycling

- Technical Aspects & Environmental/Health Management
- Financial Viability
- Political Framework - To support the ESM of ULAB
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Strategy for the ESM of ULAB Recycling

1. Estimate the Size and Nature of the LAB Market
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Estimate the Size and Nature of the LAB Market

<table>
<thead>
<tr>
<th>Type of ULAB</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive</td>
<td>Ministry of Transport</td>
</tr>
<tr>
<td>Standby/Back Up</td>
<td>Telecoms Companies</td>
</tr>
<tr>
<td>Solar Energy Storage</td>
<td>Ministries of Environment/Energy</td>
</tr>
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<td>Emergency Standby</td>
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Strategy for the ESM of ULAB Recycling

1. Estimate the Size and Nature of the LAB Market

2. Calculate the Amount of ULAB Generated
Past Work

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### Calculate the Amount of ULAB Generated

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<thead>
<tr>
<th>Type of ULAB</th>
<th>Tons of LAB</th>
<th>Tons of ULAB/Year</th>
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</thead>
<tbody>
<tr>
<td>Automotive</td>
<td>Auto Tons</td>
<td>(Auto Tons) x ULF*</td>
</tr>
<tr>
<td>Standby/Back Up</td>
<td>B U Tons</td>
<td>(B U Tons) x ULF</td>
</tr>
<tr>
<td>Solar Energy Storage</td>
<td>S E Tons</td>
<td>(S E Tons) x ULF</td>
</tr>
<tr>
<td>Emergency Standby</td>
<td>E S Tons</td>
<td>(E S Tons) x ULF</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>Summation</td>
<td>Summation</td>
</tr>
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* ULF = Useful Life Factor
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<tbody>
<tr>
<td>Automotive</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Standby/Back Up</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Solar Energy Storage</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Emergency Standby</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
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<tr>
<td>Automotive</td>
<td>80</td>
<td>(80 x 0.5*) = 40</td>
</tr>
<tr>
<td>Standby/Back Up</td>
<td>6</td>
<td>(6 x 0.2*) = 1.2</td>
</tr>
<tr>
<td>Solar Energy Storage</td>
<td>12</td>
<td>(12 x 0.2*) = 2.4</td>
</tr>
<tr>
<td>Emergency Standby</td>
<td>2</td>
<td>(2 x 0.1*) = 0.2</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>100</strong></td>
<td>43.8</td>
</tr>
</tbody>
</table>

* ULF = Useful Life Factor
Sustainable ULAB Recycling

<table>
<thead>
<tr>
<th>TYPE OF ULAB</th>
<th>LAB - 2015</th>
<th>ULAB - 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTOMOTIVE</td>
<td>13,506</td>
<td>5,790</td>
</tr>
<tr>
<td>STANDBY/BACK UP</td>
<td>29,196</td>
<td>9,286</td>
</tr>
<tr>
<td>SOLAR ENERGY STORAGE</td>
<td>39,718</td>
<td>7,944</td>
</tr>
<tr>
<td>EMERGENCY STANDBY</td>
<td>6,776</td>
<td>1,355</td>
</tr>
<tr>
<td><strong>TOTALS – METRIC TONS</strong></td>
<td><strong>89,196</strong></td>
<td><strong>24,374</strong></td>
</tr>
</tbody>
</table>

Case Study: Nepal 2015
• Past Work
  - Lead Production
  - ILA and EUROBAT previous work has improved LCA outcomes for lead batteries.
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• Proposed Work
  - Phase One: Conduct EU and NA LCA on lead production.
  - Phase Two: Expand EU lead battery LCA to include North America.
    - Cover both automotive and energy storage applications.

Strategy for the ESM of ULAB Recycling

1. Estimate the Size and Nature of the LAB Market
2. Calculate the Amount of ULAB Generated
3. Determine Capacity/Viability of Available Recycling Plants
Determine Capacity/Viability of Recyclers

1. Confirm ULAB Quantities
2. Confirm ULAB Recycling Capacity
3. Estimate additional investment costs for ESM
4. Confirm markets for Lead and By-Products
5. Carry out a Financial Analysis for Profitability
6. Determine Domestic or Regional Recycling Options
Past Work

• ILA and EUROBAT previous work has improved LCA outcomes for lead batteries.
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  Cover both automotive and energy storage applications.

Strategy for the ESM of ULAB Recycling

1. Estimate the Size and Nature of the LAB Market
2. Calculate the Amount of ULAB Generated
3. Determine Capacity/Viability of Available Recycling Plants
4. Undertake an ESM Assessment of Recycling Performance
Assess the ESM of Recycling Performance

1. Carry out a holistic BAT Inspection
2. Check Operating and Health Licenses and Permits
3. Check Government Emission Data
4. Check Occupational Lead in Blood Levels
5. If Appropriate: Agree an Improvement Program
6. Decide if the ULAB can be recycled in a Sound Manner
Past Work

ILA and EUROBAT previous work has improved LCA outcomes for lead batteries. Demonstrate significant CO\(_2\) savings when used in start-stop applications.

But data only for Europe, and considered outdated. Could disadvantage lead batteries in comparison to other alternative battery technologies.

Proposed Work

Phase One: Conduct EU and NA LCA on lead production.

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Cover both automotive and energy storage applications.

Strategy for the ESM of ULAB Recycling

1. Estimate the Size and Nature of the LAB Market
2. Calculate the Amount of ULAB Generated
3. Determine Capacity/Viability of Available Recycling Plants
4. Undertake an ESM Assessment of Recycling Performance
5. Set out Technical and Policy Road Maps
Set out Technical and Policy Road Maps

**Technical**
- Recycling Technology
- Closed Loop System
- Energy / Fuel
- Location and Enclosures
- By-Product Treatments
- Waste Disposal

**Policy**
- Set Operating Standards
- Set Licensing Procedures for ESM
- Review Import/Export Policies
- Establish Inspection Regime
- Determine Support Policies
- Set up Public Education Program
Strategy for the ESM of ULAB Recycling

1. Estimate the Size and Nature of the LAB Market
2. Calculate the Amount of ULAB Generated
3. Determine Capacity/Viability of Available Recycling Plants
4. Undertake an ESM Assessment of Recycling Performance
5. Set out Technical and Policy Road Maps
6. Agree Domestic or Regional Recycling with Stakeholders
Domestic or Regional Recycling?

Is there adequate domestic sound recycling capacity? YES

Would a domestic smelter be financially viable? YES

Proceed with Domestic Recycling
Domestic or Regional Recycling?

Is there adequate domestic sound recycling capacity?

No

Would a domestic smelter be financially viable?

Yes

Proceed with Regional Recycling

Is there adequate regional sound recycling capacity?

Yes

Would a regional smelter be financially viable?
Domestic or Regional Recycling?

Is there adequate domestic sound recycling capacity? No

Is there adequate regional sound recycling capacity? No

Would a regional smelter be financially viable? No

Would a domestic smelter be financially viable? No

Export ULAB to OECD Member
Domestic or Regional Recycling?

Is there adequate domestic sound recycling capacity?

YES

Would a domestic smelter be financially viable?

NO

Proceed with Domestic Recycling

YES

Would a regional smelter be financially viable?

NO

Export ULAB to OECD Member

YES

Is there adequate regional sound recycling capacity?

NO

Proceed with Regional Recycling
Domestic or Regional Recycling?

Is there adequate regional sound recycling capacity?
- Yes → Proceed with Regional Recycling
- No →...
Strategy for the ESM of ULAB Recycling

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2. Calculate the Amount of ULAB Generated
3. Determine Capacity/Viability of Available Recycling Plants
4. Undertake an ESM Assessment of Recycling Performance
5. Set out Technical and Policy Road Maps
6. Agree Domestic or Regional Recycling with Stakeholders
7. Implement the Agreed National/Regional Strategy
Implement Agreed National/Regional Strategy

1. Ensure all Stakeholders buy into the Strategy
2. Define the Roles/Responsibilities or each Stakeholder
3. Set Start Date and Agree Milestones
4. Monitor the “Roll Out” and Check Progress
5. Meet Stakeholders Regularly until Implementation is completed.
Closed Loop for ESM

ULAB are recycled & components used to produce LAB

ULAB are collected and delivered to the recycler

New batteries are sold & ULAB returned

Batteries are delivered to the retailers
Indonesian Strategy: Present Day
Indonesian Strategy: 4 Smelters
South Korean authorities accused 11 domestic recycling smelters earlier this year of illegally dumping hazardous materials.
Thank You