E-scrap fundamentals

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Total feed to Rönnskär

Normal year, including e-kaldo plant

- Copper Concentrates  
  - 650,000 tonnes
- Lead Concentrates  
  - 30,000 tonnes
- Steelmill Dust (EAF)  
  - 20,000 tonnes
- Copper/Zinc Residues  
  - 60,000 tonnes
- E-materials (e-scrap+other)  
  - 120,000 tonnes
- Copper Scrap  
  - 25,000 tonnes
The value chain for electrical and electronic waste

Collection of e-waste from industry and households

Inspection/Cleaning

Partition/Fragmentation

Separation

E-scrap

BOLIDEN

Plastic

Glass

Aluminium

Iron
E-scrap smelting vs potential
Europe excl Scandinavia: 70% of volume
Scandinavia: 20% "-
North America: 5% "-
Other: 5% "-
# Main types of e-materials treated at Rönnskär

<table>
<thead>
<tr>
<th>Type</th>
<th>E-scrap</th>
<th>E-granules</th>
<th>Alloys</th>
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<tbody>
<tr>
<td><strong>E-scrap</strong></td>
<td>10 – 30% copper&lt;br&gt;50 – 500 g/t gold&lt;br&gt;200 – 2,000 g/t silver&lt;br&gt;Small amounts of palladium&lt;br&gt;10 – 30% plastic</td>
<td><strong>E-granules</strong>&lt;br&gt;&gt;30% copper&lt;br&gt;10 – 80 g/t gold&lt;br&gt;200 – 1,000 g/t silver&lt;br&gt;Small amounts of palladium&lt;br&gt;1 – 10% plastic</td>
<td><strong>Alloys</strong>&lt;br&gt;&gt;60% copper&lt;br&gt;0 – 1,000 g/t gold&lt;br&gt;0 – 5% silver&lt;br&gt;&lt;1% plastic</td>
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*Image of E-scrap, E-granules, and Alloys.*
Method for price-setting

- Similar to concentrate but terms not transparent for e-scrap
- Contracts negotiated separately
- Boliden’s revenue is based on TC/RC and free metals.
Total capacity of 120,000 tonnes of e-scrap

- **Lead kaldo plant**
  - E-scrap smelting since 1980
  - Operated in campaigns
  - E-scrap smelting, black copper further refined in main copper flow
  - Lead smelting, crude lead further refined in lead refinery

- **E-kaldo plant**
  - In operation since January 2012
  - Continuous e-scrap smelting
  - Black copper further refined in main copper flow
Expansion in short

- Increased capacity for smelting of e-scrap to 120,000 tpa – an increase of 75,000 tonnes
- 1.3 bn SEK investment in equipment for unloading/sampling and an e-kaldo plant
- Pay-back time <4 years
- Project started Q2 2010 and e-Kaldo started production in January 2012
- Increased production of gold, silver and copper
- Best available technology
Sampling
E-scrap smelting using the Kaldo process
Competitors

- **Europe**
  - Aurubis, Hamburg
  - Aurubis, Lünen
  - Umicore, Hoboken

- **Rest of the world**
  - Xstrata, Canada
  - Dowa, Japan
  - Naoshima, Japan
  - LS Nikko, South Korea

- **Biggest “competitors”**
  - Exports to China and Africa
  - Waste deposit instead of recycling
More than 30 years of experience in e-scrap smelting and recycling

E-scrap processed at Rönnskär
E-materials Feed, Total Rönnskär 2012

Q3 = Higher feed of lead concentrates than Q2
Under 2011 gjordes två revisioner en av dom I Indien.

Bilden visar en medarbetare från AVA Chemicals i Indien samtala med revisorn Camilla Ottosson. Till vänster i bilden syns den indiske tolken.

Metals for modern life