Formalizing the Recycling Sector
To make CMR supplies more sustainable
Examined 49 non-fuel minerals across 16 manufacturing sectors

Criticality evaluated against: economic importance and supply risk

Timeline: 2015 and 2030
A snapshot of critical minerals for India in 2030
Renewed focus on domestic value creation and self reliance

Industrial expansion and integration with global value chains

- Recovery support to Micro Small and Medium Enterprises (MSME) for revival and expansion
- Production Linked Incentive scheme to aid 10 critical sectors

Adopting a low-carbon approach

- Squaring between sustainability and energy security
- Decarbonising power and mobility sector

Supporting indigenization of low-carbon solutions

- Solar PV module manufacturing
- National Mission on Transformative Mobility and Battery Storage, 2019

Between 2019 and 2022, India would need about 178 GWh of storage for RE integration, stationary and mobile applications¹

Metal requirements/GWh²:

- 4600 tonnes Li
- 5200 tonnes Mn
- 7300 tonnes Co
- 25000 tonnes Ni
India’s import dependency

Major metals commonly recycled

<table>
<thead>
<tr>
<th>Metal</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>6%</td>
</tr>
<tr>
<td>Copper</td>
<td>31%</td>
</tr>
<tr>
<td>Iron</td>
<td>7%</td>
</tr>
<tr>
<td>Cobalt</td>
<td>100%</td>
</tr>
<tr>
<td>Lithium</td>
<td>100%</td>
</tr>
<tr>
<td>Selenium</td>
<td>100%</td>
</tr>
<tr>
<td>Gold</td>
<td>1%</td>
</tr>
<tr>
<td>Silver</td>
<td>8%</td>
</tr>
<tr>
<td>Rare Earth (L)</td>
<td>100%</td>
</tr>
<tr>
<td>Niobium</td>
<td>100%</td>
</tr>
<tr>
<td>Palladium</td>
<td>100%</td>
</tr>
<tr>
<td>Platinum</td>
<td>100%</td>
</tr>
</tbody>
</table>

India’s import of metals - 2019

- Aluminum: 6%
- Copper: 31%
- Iron: 7%
- Cobalt: 100%
- Lithium: 100%
- Selenium: 100%
- Gold: 1%
- Silver: 8%
- Rare Earth (L): 100%
- Niobium: 100%
- Palladium: 100%
- Platinum: 100%

India’s import dependency

1.02 million ton (2019-2020)
India’s e-waste value chain
FY 2019-2020

Total e-waste produced in 2019
1.02 million ton

5% by authorized recyclers
(formal sector)

95% by un-authorized recyclers
(informal sector)

12% of Global e-waste!

UNECE

Large Appliances & Medical equipment

Computer & Telecom

Small household EEE

15%

82%

3%

1.02 million ton

Only 2.5% is recycled

55% by authorized recyclers
(formal sector)

95% by un-authorized recyclers
(informal sector)
## Embedded CMRs and Dependency

### Metals we are 100% import dependent on

<table>
<thead>
<tr>
<th>Minerals</th>
<th>Current Imports</th>
<th>Metals embedded in e-waste flows (ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value ($)</td>
<td>Weight (ton)</td>
</tr>
<tr>
<td>Cobalt</td>
<td>41.6m</td>
<td>1000</td>
</tr>
<tr>
<td>Indium</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Lithium</td>
<td>11.7m</td>
<td>718</td>
</tr>
<tr>
<td>Tantalum</td>
<td>1.7m</td>
<td>18</td>
</tr>
<tr>
<td>Tungsten</td>
<td>17.4m</td>
<td>1400</td>
</tr>
<tr>
<td>Beryllium</td>
<td>1500</td>
<td>0.036</td>
</tr>
<tr>
<td>Gallium</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Germanium</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Palladium</td>
<td>66.5m</td>
<td>1</td>
</tr>
<tr>
<td>Ruthenium</td>
<td>3.9m</td>
<td>0.3037</td>
</tr>
</tbody>
</table>

In 2019, India imported **$324m** of CMR metals. Total Metals in e-waste **44%** of total CMR import basket.6
India’s reliance on recycled CMR

Example: Belgium and Korea Republic

Selenium is extracted majorly as by-product from Copper Smelters.
- Korean smelters are dependent on 100% imported ores
- Korea Republic is the 5th largest exporter of Selenium
- Two Indian smelters rank 5 and 6th amongst world largest refineries
- India stopped producing selenium since 2015.

**BELGIUM**

**CMR: Palladium**

Global Imports & Exports (2019)

- **Imports** $209m (7t)
- **Exports** $1.5bn (114t)

**KOREA REPUBLIC**

**CMR: Selenium**

Global Imports & Exports (2019)

- **Imports** $1.1m (25t)
- **Exports** $9.5m (581t)

India

- Imports total $66.5m of Palladium
- ~ 20.5% of CMR import basket

United Kingdom

- $221m (86t)

India

- Imports total $8.7m of Selenium
- ~ 2.5% of CMR import basket
Key policy recommendations

Strengthening national policies

Moving away from collection based targets to recycling targets
- Anecdotal evidence indicates e-waste recycling sector in India is mainly handling mechanical separation of e-waste and chemical separation is exceptionally less.
- Between 2015 and 2019, electronics waste imports increased by 390%, while refining capacities remained marginally constant

Extending the scope of EPR
- Mandating take back of products, from the consumers, after their useful life. The supplier of the new appliances is legally obliged to take in used/old appliances for free.
- Such rules help authorized recyclers meet their collection and recycling targets and also pre-empts e-waste from reaching the informal sector flows.
No estimates on value and quantity of e-waste minerals across the value chain
• Anecdotal evidences suggests, recyclers are only recovering visible gold (0.18 gms), silver (0.02 kgs) and copper (0.018 tonne) per tonne of e-waste processed

Strengthening existing reporting infrastructure
• Act mandates recyclers, dismantlers to maintain records of e-waste for the state and central pollution control boards
• However the reporting processes are infrequent with no standardized reporting structures

Map e-waste flows by triangulating information
• As of March 2021, a total of 51 producers responsibility organizations (PROs) are in operation
• PROs are financed collectively or individually by producers, who can take the responsibility for collection and channelization of e-waste generated from the 'end-of-life'
• PROs can aid in mapping flows between collection centres and recyclers or dismantlers
Leverage complementing strengths and opportunities - informal sector have deep collection supply chains; formal sector have access to advanced recycling technologies

Formalizing the informal sector doesn’t have to mean loss of jobs
- Retain the informal sector strength - by giving them incentives to work in better environmental conditions, less health risks and job security
- Creation of formal jobs can lead to safe recycling practices, higher income generation and possible higher levels of employment

Strengthening e-waste collection supply chains
- Broadcasting information about the usefulness of waste separation, easy access and information about collection points can lead to behavioral changes about inherent waste separation.
- Countries with advanced e-waste regulations have streamlined easy access to collection points which has made majority of the population to inherently separate the waste.
2. CEEW Analysis
3. CEEW Analysis
5. E-Waste Management in India: A study of current scenarios; Dr Neha Garg, Deepak Kumar
6. CEEW Analysis
7. Critical Metals in Discarded electronics- Mapping recycling potentials from selected electronics in Nordic region
8. ResourceTrade.earth; Chatham House
Thank you!

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