MAKING CLEAN ENERGY CLEAN, JUST & EQUITABLE

Jennifer Krill
Executive Director, Earthworks
President, Plug In America

Protecting communities and the environment from the adverse impacts of mineral & energy development while promoting sustainable solutions
www.earthworks.org
Earthworks has over 30 years experience supporting communities on the frontlines of extractive industries in the US, and around the world.

In recent years we have seen an uptick in copper, nickel, lithium, cobalt and other mining projects described as “critical” for the energy transition.

EV and renewable demand is used as justification to expand mining from Alaska to the salt flats of Argentina and Chile, the coastal and rainforests regions of Indonesia and PNG, and even the depths of the ocean.

Bristol Bay watershed, Alaska – threatened by the proposed Pebble copper/gold mine
WHY MINING IS A THREAT TO CLIMATE AND BIODIVERSITY

• Carbon-intensive - metals mining is responsible for 10% of global energy-related emissions

• Threatens biodiversity through habitat destruction and ecosystem fragmentation

• Threats to ocean health: marine mine waste dumping and deep-sea mining

---


Protecting communities and the environment from the adverse impacts of mineral & energy development while promoting sustainable solutions

www.earthworks.org
WHY MINING IS A THREAT TO COMMUNITIES AND ECOSYSTEMS

• Potential impacts of increased minerals demand on frontline communities and ecosystems:
  • Human rights abuses: forced displacement, conflict, and pollution for workers and communities
  • Disproportionate threats to indigenous rights and livelihoods
  • Toxic waste and deadly tailings disasters
  • Freshwater pollution & use reduces water access and quality for ecosystems and communities
  • Increased economic dependence due to lack of sustainable benefits to communities and host states, while limiting economic diversification

Brumadinho mine waste disaster, Brazil, January 2019: an estimated 250 people killed
OPPORTUNITY FOR A JUST TRANSITION

• Earthworks supports the transition to a renewables-powered future – one that is just and equitable, and doesn’t harm communities and the environment through increased mining impacts.

• This must be a(n) **opportunity moment** – to not only transition to a low-carbon economy but also reduce our dependence on dirty mining.

• Can’t replicate the mistakes of the dirty fossil fuel based energy system we’re seeking to replace.

• To better understand the data, we commissioned research from Institute for Sustainable Futures at the University of Technology, Sydney.

Families protesting impacts of Ramu nickel mine, Papua New Guinea
**KEY METALS FOR CLEAN ENERGY TECHNOLOGIES**

### Batteries & electric vehicles (EVs)
- Lithium-ion (Li-ion) – current tech
- Lithium-Sulfur (Li-S) – new tech
- Lifetime: 10 years (battery) 15 years (vehicle)

### Solar PV
- Silicon (c-Si) – 95% of market
- Copper Indium Gallium Selenium (CIGS)
- Cadmium Telluride (CdTe)
- Lifetime: 30 years

### Wind Power
- Permanent magnet (PMG) – 20% of market
- Without permanent magnet (non-PMG)
- Lifetime: 30 years

<table>
<thead>
<tr>
<th></th>
<th>Li-Ion</th>
<th>Li-S</th>
<th>EV</th>
<th>c-Si</th>
<th>CIGS</th>
<th>CdTe</th>
<th>PMG</th>
<th>Non-PMG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cadmium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Cobalt</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Dysprosium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Gallium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Indium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithium</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manganese</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neodymium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Nickel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Selenium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Tellurium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Cumulative Demand

<table>
<thead>
<tr>
<th></th>
<th>Cumulative demand in 2050 compared to reserves</th>
<th>Cumulative demand in 2050 compared to resources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum scenario</td>
<td>Minimum scenario</td>
</tr>
<tr>
<td>Aluminium</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Cadmium</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Cobalt</td>
<td>423%</td>
<td>135%</td>
</tr>
<tr>
<td>Copper</td>
<td>18%</td>
<td>13%</td>
</tr>
<tr>
<td>Dysprosium</td>
<td>19%</td>
<td>12%</td>
</tr>
<tr>
<td>Gallium</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Indium</td>
<td>51%</td>
<td>28%</td>
</tr>
<tr>
<td>Lithium</td>
<td>280%</td>
<td>86%</td>
</tr>
<tr>
<td>Manganese</td>
<td>14%</td>
<td>5%</td>
</tr>
<tr>
<td>Neodymium</td>
<td>13%</td>
<td>8%</td>
</tr>
<tr>
<td>Nickel</td>
<td>136%</td>
<td>43%</td>
</tr>
<tr>
<td>Selenium</td>
<td>11%</td>
<td>7%</td>
</tr>
<tr>
<td>Silver</td>
<td>52%</td>
<td>29%</td>
</tr>
<tr>
<td>Tellurium</td>
<td>75%</td>
<td>42%</td>
</tr>
</tbody>
</table>
Key findings: reduce demand and increase reuse

- **Electric vehicles** are the main driver of demand for key metals

- A combination of recycling and increased efficiency has the most potential to reduce demand, but cannot meet all demand

- Need to **design transport and energy systems to minimise batteries**, through promoting public/active transport and car-sharing and using storage only when needed.

- **Batteries and EVs:**
  - Recycling of batteries happening to a degree because of economic value in the materials.
  - Not all types of metals are being recovered in recycling process (e.g. only highest value metals Co & Ni but not Li & Mn)

- Policy interventions will be needed to encourage recycling to recover all metals
WHY THE FOCUS ON BATTERY METALS?

• Demand/supply concerns
• Rate of growth
• Nascent point in this sector’s growth – opportunity to make substantial improvements
• Importance of EVs in climate policy
• Lithium and nickel impacts are not well understood or communicated
• Impact of private EVs vs. public transit – opportunity for a shift in transportation
Nickel used in electric vehicle battery cathodes is of a higher quality than the nickel pig iron used in the stainless steel industry. To produce high-quality nickel products from the laterite ores found in Indonesia, PNG, the Philippines and other countries, a process known as High-Pressure Acid Leaching is being increasingly adopted.

This process is highly toxic, polluting, energy-intensive, and leaves a massive amount of waste material to be disposed of. Devastating cases of damage to freshwater and marine ecosystems (through ocean mine waste dumping) have been documented in Canada, Russia, Australia, Philippines, Indonesia, Papua New Guinea and New Caledonia due to nickel mining and refining practices.
The majority of global cobalt production is concentrated in the southern Democratic Republic of Congo (DRC), where decades of water and air pollution from industrial-scale copper-cobalt mines is responsible for serious health impacts and the loss of vegetation and farmland.

Cases of corruption, tax evasion and other improprieties by large mining companies have reduced what little economic benefits the sector offers the country and affected communities.

While only producing an estimated 20 percent of Congolese cobalt, the artisanal cobalt mining sector has attracted the greatest international scrutiny—primarily over child labor. Meanwhile, artisanal miners cooperatives are developing solutions and calling for the formalization of the sector.
LITHIUM

• The vast majority of lithium deposits are found underneath the salt flats of Chile, Bolivia and Argentina. Current operations, and a massive wave of exploratory work, are a source of disputes throughout this region.

• Water impacts on the fragile desert ecosystem of evaporative brine extraction and a lack of respect for indigenous rights are the primary drivers of these disputes.
THE LANDSCAPE OF INITIATIVES

- Groundswell of relevant civil society initiatives, including:
  - The Ethical Battery Initiative (Amnesty International and Greenpeace)
  - Benchmarking of Renewable Energy Companies and Transitional Minerals Tracker at the Business and Human Rights Resource Centre
  - Deep Sea Conservation Coalition – deep sea mining campaign

- Numerous local and regional campaigns around the world concerned with the impacts of battery metal extraction led by frontline communities and NGOs.

- On the opposite end of the spectrum: industry-led initiatives, such as the Global Battery Alliance, and those led by International Finance Institutions, such as the World Bank’s Climate Smart Mining Facility
MAKING CLEAN ENERGY
CLEAN, JUST & EQUITABLE:
PLATFORM FOR CHANGE

• **Boost Recycling and Minimize Toxicity – at the design stage**
  • Scale up use of recycled minerals – corporate + policy shift
  • Product take-back requirements, design batteries and RE technologies for disassembly and efficient recycling
  • Prioritize health and safety for workers and communities.

• **Ensure Responsible Minerals Sourcing**
  • Where sourcing from new mining is absolutely necessary, operations must adhere to stringent environmental and human rights standards, such as those developed by the multi-stakeholder Initiative for Responsible Mining Assurance, with independent, third-party assurance of compliance.

• **Shift Consumption and Transportation:**
  • Rethink how we consume products and transport goods and people
  • Prioritize investments in electric-powered public transit
  • Promote Equity in access to benefits of clean energy and transit
  • Recognize impacts and act to avoid or minimize them
One of the greatest obstacles to achieving responsible sourcing is the lack of transparency in battery metal supply chains.

These supply chains are complex, involving many steps, and the likelihood that sources of metals may be mixed together during refining, processing and manufacturing stages.

Downstream users must begin the path to responsible sourcing by doing everything they can to establish transparency in their supply chains.
TOWARDS MORE RESPONSIBLE MINERALS SOURCING

Where sourcing from new mining is necessary, operations must meet the highest standards for environmental and social responsibility.

Initiative for Responsible Mining Assurance, www.responsiblemining.net

- Multi-sector governance (labor, communities, NGOs, mining companies, downstream buyers). Members include BMW, Microsoft, Anglo American, United Steelworkers, IndustriALL Global Union, First Nations Women Advocating for Responsible Mining.
- Rigorous standard covering wide range of environmental, social, transparency and accountability issues
- For industrial-scale mines globally
- Multi-commodity, non-fuel minerals
- Mines evaluated by independent, third-party auditors
Alaskan wild salmon imperiled by proposed Pebble mine