BLUEGREEN ALLIANCE

HF 4550/SF 4523: THE CRITICAL MATERIALS RECOVERY ADVISORY TASK FORCE

Good Jobs Recycling a Sustainable Clean Energy Supply Chain in Minnesota

Critical materials are essential to a clean energy future, particularly for energy storage batteries, electric vehicle (EV) batteries, and wind and solar components. Elements such as lithium, cobalt, manganese, and carbon are essential for batteries. Other critical elements such as nickel, uranium, zinc, silicon, and aluminum are also essential for clean energy parts and products.

DEMAND IS GROWING BUT DOMESTIC SUPPLY CHAINS ARE SCARCE

In terms of mineral demand:

- It is expected to double by 2040 under current climate policy commitments;
- It could quadruple if the global deployment of EVs and renewable energy technologies ramps up in line with international commitments; and[1]
- EVs and battery storage alone are projected to account for half of global mineral demand in coming decades.[2]

The U.S. has a long way to go until sustainable sourcing of these critical minerals. Currently, key minerals sourced from other nations that the U.S. does not have adequate production capacity of include:

- **Lithium:** 58% Australian sources. The U.S. is increasing production.
- **Cobalt:** 61% mined in the Democratic Republic of Congo mostly by Chinese companies. The U.S. only has byproduct Cobalt.
- **Manganese:** 31% South African production, 16% Australian. No U.S. production.
- **Carbon:** 30% Turkey, 24% China, 24% Brazil. No U.S. production.

CRITICAL MINERAL RECYCLING CAN HELP MEET THE DEMAND AND CREATE JOBS

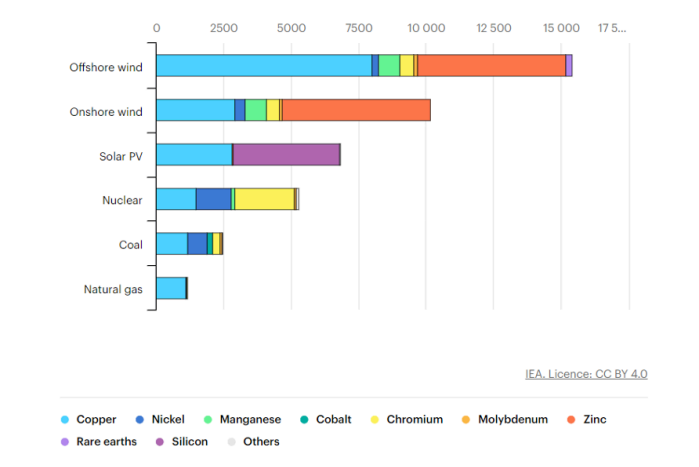
- Over 266 million pounds of e-waste is available for recycling in Minnesota every year; but
- Only 23.7% of e-waste is captured annually.[3]

If 100% of the e-waste in the state was captured it would create:

- 1,738 direct jobs; and
- 3,345 new jobs in total.

This won't reduce the need for the mining industry, but it will bring a diversified economic landscape and create high-road jobs and opportunities for workers around the state. This is why the Critical Materials Recovery Task Force is a key piece in actualizing recycling infrastructure in Minnesota.

Minerals used in clean energy technologies compared to other power generation sources



SOURCE: International Energy Agency, The Role of Critical Minerals in Clean Energy Transitions[4]

THE RECYCLING INDUSTRY IN THE REST OF THE COUNTRY AND WORLD ISN'T WAITING

Typical methods of recovering metals release varying levels of toxic elements, which run the risk of contaminating soil and groundwater. There are emerging greener, cutting-edge methods that utilize plants to extract metal from waste.[5] In addition, lithium battery recycling has taken off internationally and domestically, where companies have developed recycling technology that improves traditional methods. Additional research shows that the electrochemical process is found to use less solvent (minimal reagent) and shows convenient and precise control, reduced energy consumption, and low environmental impact, but requires further research to address challenges and operational feasibility.[6]

A few examples of pilot-scale and newly announced facilities:

- Aqua Metals piloted a low-emissions, closed-loop technology that replaces polluting furnaces and hazardous chemicals from the process.[7]
- Li-Cycle has received a loan from the U.S. Department of Energy for $375 million to finance its lithium-ion battery recycling plant in Rochester, NY. They have committed to hiring local labor from surrounding NY counties.[8] They currently have plants in Germany and are expanding to Italy.
- Fortum Battery Recycling in Germany claims their low-CO2 battery recycling solution can recycle over 80% of the battery and that 95% of the valuable metals contained in the battery's "black mass" can be put back into circulation.[9]
- The Idaho National Laboratory developed technology known as E-RECOV that removes metals from electronic devices without the energy-intensive smelting process.[10] It started a pilot-scale demonstration in 2022.[11]

ENDNOTES

1 International Energy Agency, The Role of Critical Miners in Clean Energy Transitions. May 2021. https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive-summary
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