

**REGIONAL ROUNDTABLE:
CREATING A CIRCULAR ECONOMY FOR CRITICAL MATERIALS IN OHIO
TAKEAWAYS**

Note: Takeaways represent statements made in the roundtable discussion and do not necessarily reflect C2ES positions or opinion.

Overall Key Takeaways

- Ohio is central to the U.S. automotive and battery production market, with multi-modal transportation corridors throughout the state. This geographic advantage makes the state an attractive location for new recycling and electric vehicle (EV) supply chain facilities and creates an economic opportunity for Ohio to lead on the development of this industry in the United States.
- Workforce development is crucial to the long-term success of the vehicle electrification transition and battery recycling industry. Development opportunities should include recruitment and training of new entrants to the field; safety training for workers in adjacent industries to be prepared to safely service, remove, and dismantle EV batteries; and diversity, equity, and inclusion efforts to support workers of all backgrounds.
- The costs of recycling critical materials are currently higher than mining virgin materials, reducing the economic viability of recycling. This is due to a combination of limited capacity, high transportation costs, low present volumes, and lack of a regulatory structure internalizing the external costs of mining.
- Currently, most critical materials mining, processing, and recycling capacity is outside of the United States. The United States should support the onshoring of critical materials recycling and processing infrastructure to capitalize on the economic, environmental, and national security benefits of developing a domestic supply of critical materials such as lithium, cobalt, copper, and nickel.
- Funding for recycling capacity and processing infrastructure in the United States is crucial to improving the economic viability of this nascent industry. Policy can help actualize the environmental and climate benefits of recycling by incentivizing carbon intensity and waste reduction.
- Companies across the automotive value chain must proactively collaborate to support design for recycling, development of infrastructure and capacity, and utilization of recycled content.
- Education for businesses, policymakers, and consumers is essential to building a culture of recycling across all kinds of products, including clean energy products and electric vehicles. Both business actors and consumers must be aware of how to properly separate and dispose of products at the end of their useful life, including damaged and/or previously submerged batteries.
- Legislation—like extended producer responsibility or safety and recyclability standards—must be enacted at the federal level, rather than across a patchwork of variable state policies, to make compliance less burdensome and promote market efficiency.

Improving recyclability

- Materials can best be reclaimed from products when they are designed with recyclability and reuse in mind at the outset. For EV batteries, this includes ease of removal from the vehicle as well as simplicity for dismantling into components.
- The EV industry has not coalesced around a specific battery chemistry, although lithium-ion, lithium-iron-phosphate (LFP), and nickel-cobalt-manganese (NCM) are currently the most common. Uncertainty over which chemistries will commercialize in the long term limits the development of the recycling industry as it is difficult to predict whether the value of the materials within the batteries will be worth the cost of recycling in the long run. Resolving this question will be key to fully realizing the potential for circularity in the EV industry.
- A lack of transparent information challenges the industry's ability to recycle and reuse products. While companies are understandably reticent to share proprietary information, there is a clear need for information about the design and composition of batteries that can enable recyclers and second life companies to optimize processing of batteries at end of life.

Expanding infrastructure and growing capacity

- Presently, collection infrastructure is neither accessible nor convenient enough to capture most waste at end of life. Further development of this infrastructure and education of consumers on how to properly sort and dispose of products is crucial.
- Many large companies looking to build new facilities in Ohio have internal sustainability targets requiring them to have access to clean power and recycling infrastructure. To maintain competitiveness in the long term, the state must make achieving these requirements accessible to companies by facilitating access to clean power and a robust recycling industry.
- Brownfields are abundant in the Appalachian region, offering opportunities to redevelop new industrial facilities and reclaim critical minerals from waste streams, such as coal ash ponds.
- The permitting process, which can include years of delay that prevent a project from getting off the ground, often presents significant headwinds to rapidly building new facilities. Earlier, direct engagement between developers and communities to address concerns, build buy-in, and promote responsible development on a reasonable timeline can mitigate some community opposition.
- Policymakers or local economic development organizations should facilitate partnerships between companies to enable economical end-of life collection, transportation, dismantling, and recycling of EV batteries.
- Battery dismantling and recycling could be done more efficiently if integrated safely with existing scrap yards. Companies should look for opportunities to co-locate recycling, scrap processing, and new production to maximize efficiency.
- The Highway Trust Fund (HTF) will be insolvent in 2027, as revenues diminish each year from the federal gas tax. Long-term viability of an EV market, and subsequent development of a battery recycling industry, are contingent upon a fully funded HTF. Federal policymakers could enact a weight-based vehicle-miles traveled (VMT) tax or other method that fully recovers cost allocations for both private and commercial vehicles.

Supporting communities

- Communities are most receptive to information about how to recycle when it comes from a trusted messenger. In many communities this is a private-sector or civil-society actor, rather than a government one. Efforts to provide educational resources on recycling and the proper handling of products like lithium-ion batteries should utilize credible and broadly accessible channels to educate consumers, including both direct mail and social media. Municipal actors are generally best positioned to identify and utilize these channels but require funding and guidance from state and federal government to support outreach and messaging development.
- There is a coordination gap between state and local government on zoning. Project opponents can leverage local zoning changes to prevent projects that have been approved by state regulators. This is a headwind for the siting and construction of recycling and processing facilities. More coordination between the two levels of government is needed, which should help facilitate more opportunities for communities to provide input and feedback directly to companies.
- Municipalities are best positioned to facilitate high-quality engagement between communities and developers by surfacing and prioritizing communities' needs before a project begins. However, city and county governments are often understaffed, and smaller villages may have neither staff nor budget to facilitate community engagement. For this reason, state and federal funding to support local-level community engagement efforts is crucial.

Policy solutions

- Cities and counties should set sustainability targets, including emissions reduction and recycling goals. These goals help guide companies and communities toward sustainability improvements and make federal grant applications more competitive—especially under the Inflation Reduction Act and Bipartisan Infrastructure Law. Having sustainability targets can inform a city's economic development plans and support alignment with local businesses. Additionally, a sustainable purchasing policy can demonstrate leadership and kickstart emissions reductions.
- The state can and should facilitate greater knowledge-sharing and coordination across municipalities on best practices for reducing waste and growing the circular economy.
- The state should provide funding to support startups crucial to developing a circular economy, and market development grants to help the industry prepare for the coming influx of batteries in the next decade.
- The state should provide incentives for return of EV batteries and other products containing critical materials for recycling.
- The state should work with the private sector to identify second use applications for end-of-life EV batteries. Especially to support energy storage from renewables to reduce emissions from the power sector, and to provide funding support that could help the sector grow.
- Consistent, transparent battery labeling is necessary to facilitate recycling by identifying which materials are within a battery and the best practices for dismantling the battery with the greatest resource recoverability. These standards will likely remain voluntary in the near term in the United States, while the European Union will make them mandatory.
- Incentives for recycling and using recycled materials in new products are necessary to bring the cost of recycled materials closer to the cost of virgin materials.

- Definitions of “recycled content” and other related terms must be standardized across the industry, with enforcement mechanisms to ensure the standards are met. This is essential to both building consumer trust in recycled products and supporting the added sustainability value of utilizing recycled content.
- Federal regulators should set minimum safety standards for battery collection, transport, dismantling, disposal, repair, and processing. These should be consistent for workers across the industry, and trainings for certifications in these standards should be widely accessible.
- The federal government should support the development of critical materials recycling hubs, similar to other models like hydrogen hubs and tech hubs. These could provide targeted financial support to develop the industry in tandem with the battery production industry, reducing costs and spurring development.
- The federal government should support all states in developing materials marketplace programs like the one that currently exists in Ohio. These state programs should coordinate among one another, facilitated at the federal level.