



Battery Materials & Technology Coalition Response to DOE Request for Information on Risks in the High-Capacity Batteries Supply Chain

The Battery Materials & Technology Coalition (BMTc) applauds the Biden Administration's focus on battery supply chains in Executive Order 14017 and the Energy Department (DOE) for inviting comments and policy recommendations on high-capacity battery supply chains. BMTc appreciates the opportunity to respond to this request for information (RFI). Please contact Ben Steinberg at bsteinberg@vennstrategies.com or (240)-899-7447, or 1341 G St NW, 6th Floor, Washington DC, 20005, if you have any questions about the RFI response.

I. Introduction to BMTc

The Battery Materials & Technology Coalition represents private sector entities in the upstream and midstream battery supply sectors, and our member companies are united behind a shared interest in growing a sustainable North American supply chain. Comprised of companies that mine, extract, process, and recycle battery materials as well as develop cathode, anode, and battery technologies, BMTc members are committed to ensuring that the U.S. does not bypass the present opportunity to lead the growing global battery market and electrified economy.

To ensure the U.S. is competitive in global markets and national security vulnerabilities are addressed, the coalition is urging Congress to provide DOE significant grant funding over the next five years to build and expand battery material processing, manufacturing, and recycling capabilities. The U.S. is at a pivotal juncture with the upstream and midstream segments of the battery supply chain largely underdeveloped or nonexistent, standing in stark contrast to our allies and adversaries who are growing their mineral and manufacturing capabilities to supply battery industries. A strategic and bold federal investment in the minerals, materials, and technologies that sustain our way of life, and build a foundation for the future of more battery power in society, is needed desperately. The U.S. must secure this critical supply chain, create high value jobs in the process, and address climate change at a time when it is most needed.

To learn more about BMTc, the coalition's priorities, and the coalition's Congressional funding request for DOE to bolster battery material processing, manufacturing, and recycling, please reference the coalition primer and coalition Congressional funding overview in the appendix.

II. Manufacturing and Other Capabilities Necessary to Produce High-Capacity Batteries

Battery minerals, materials, technologies, and components are the new engines of the global economy. As demand for energy, consumer, industrial, and defense applications grows, so too will demand for the materials that enable high-capacity battery technologies. The federal government must develop a holistic and coordinated approach to scaling material mining, extraction, processing, manufacturing, and recycling capabilities at an expedited pace, or risk a prolonged reliance on foreign sources. This includes:

- *Mining and extraction:* The U.S. sits on deposits of lithium, nickel, cobalt, and graphite, among other critical minerals needed to produce batteries, but has only a few operational mines supporting a domestic battery minerals industry. Other nations, notably China, are

aggressively pursuing critical mineral supplies across the globe to secure ownership of the world's raw material resources. To ensure the U.S. has access to the raw materials needed to supply a domestic battery industry, the federal government must strategically assess domestic opportunities and work with allies to expand our access to mineral resources. For example, the U.S. mines less than two percent of lithium globally, yet has at least 17 percent of the world's deposits.¹ The federal government has an opportunity to convene industry, states, academia, and interest groups to promote safe and sustainable mining and extraction of domestic resources for critical applications like batteries. Doing so will secure critical mineral supplies while reducing reliance on supply chains that do not meet our environmental and labor standards. In addition, working with allies such as Canada – which has strategic resource deposits and sustainability standards – is of the utmost importance to building a resilient supply chain.

- *Material processing*: The U.S. has almost no commercial-scale battery material processing capabilities. This means even if lithium ore or brine was mined or extracted in the U.S., it would still need to be sent abroad for processing into lithium hydroxide, which is used in the battery cathode. The lack of a processing industry is not just a logistical difficulty, but a significant vulnerability given China's stranglehold on the capability. In 2019 China controlled 59% of lithium processing, 65% of nickel processing, 93% of manganese processing, and 100% of natural graphite processing.² The U.S. has the opportunity to develop domestic capabilities by working with and incentivizing our established industries to develop the supply chain. This is the largest risk in U.S. battery capabilities, but it could be remedied with smart investments and signaling from government.
- *Anodes and cathodes*: The U.S. has little to no anode and cathode production at commercial scale. Similar to the previously described processing vulnerabilities, China also dominates this midstream stage of the supply chain, with over 60% of global cathode production and over 80% of global anode production.³ The U.S. needs these capabilities at home to have a vibrant battery cell market domestically, to ensure battery components are being produced with U.S. technologies and safety standards, and to reduce transportation costs and emissions. The possibility of having a vibrant battery cell manufacturing industry in the U.S. will not happen without this intermediate build out of cathodes, anodes and other relevant battery components that make up battery cells.
- *Battery cells*: The U.S. only has 4 battery gigafactories in production today, with plans to have 10 by 2030. This is a minor share of global gigafactory numbers, which currently sit at 199 factories built or planned, of which 140 will be in China.⁴ In addition to China, the U.S. also faces growing competition in battery markets from Europe. To reduce its own reliance

¹ Utility Dive, "Beating China at the lithium game — can the US secure supplies to meet its renewables targets?" February 18, 2020.

² Benchmark Minerals Intelligence, "Benchmark Summit 2020." October 20, 2020.

³ Ibid.

⁴ Washington Post, "Biden wants to create millions of clean-energy jobs. China and Europe are ways ahead of him." February 2021.

on Chinese-dominated battery supply chains, the European Commission is funneling investments to the whole of the battery supply chain and has plans for 17 battery gigafactories by the end of the decade.⁵

- *Recycling*: The U.S. must recycle battery materials for re-processing and reuse in batteries to reduce critical mineral vulnerabilities and establish a circular battery supply chain. Setting standards on recycling logistics and safety, while simultaneously establishing recycled content provisions, are important steps to successfully building this industry. It is possible that with a comprehensive recycling industry in the U.S., up to 40% of mineral demand for batteries could be met by 2035 through recycling.⁶ To reach this milestone, the U.S. will need to build recycling facilities across the country to strategically and efficiently circulate materials back into the supply chain. While there is limited lithium-ion battery recycling capacity in the U.S., scaling the industry will require public-private partnerships to get large scale funds out the door and on the ground.

If these particular areas are not addressed, the U.S. battery supply chain will likely face crises similar to those in the semiconductor industry that have unfolded over recent months. Secretary Granholm has already made clear that under her charge DOE will focus on building domestic battery and EV industries. However, for the U.S. to be influential in global battery markets, reduce supply chain vulnerabilities, and create jobs in clean energy the government must prioritize investments that help bolster processing and manufacturing capabilities that are capital intensive and require funding upfront to scale projects.

III. Policy Recommendations to Ensure a Resilient Supply Chain for Batteries

To supercharge a domestic battery supply chain, the U.S. needs a comprehensive approach that encompasses the whole of the materials supply chain, from the mining and processing of materials, to the manufacturing and building of battery components, and finally to recycling. Already, there are important stepping stones in place including the American Minerals Security Act of 2020, several Executive Orders on critical materials and supply chains under the previous administration, President Biden's Executive Order on America's Supply Chains, and the Biden Administration's renewed commitment to working with Canada on bolstering critical minerals and EV production. DOE has also taken noteworthy steps and made strong commitments to the battery industry through the Energy Storage Grand Challenge and the Federal Consortium for Advanced Batteries. But more can and must be done. BMTC believes that the following four issues, which are also reflected in the coalition's Congressional funding request, are critical for consideration as DOE works with other agencies and the White House on developing a federal strategy for growing and securing a battery supply chain.

- *Grants*: Given the capital-intensive nature of scaling battery processing, manufacturing, and recycling capabilities on the factory floor, the Federal government needs to partner with and

⁵ Ibid. SAFE, "The Commanding Heights of Global Transportation." 2020.

⁶ Union of Concerned Scientists, "Electric Vehicle Batteries: Addressing Questions about Critical Materials and Recycling." 2021.

support domestic industry growth by making large, competitive and industry-cost shared grants accessible for the building or retooling of factories. Grants provide an immediate infusion of cash for a critically important industry. In addition, grants ensure the government's long-term commitment to scaling the industry, providing increased certainty for industry growth. These grants will support large-scale investments from the private sector to own and operate this industry for years to come. In order to create large-scale impact, the BMTC has advocated that any infrastructure legislation supporting battery manufacturing include grant allocations at a minimum of \$50 million for demonstration-scale projects and \$100 million for commercial-scale projects.

- *Content Provisions:* Provisions that incentivize the use of American minerals and materials in batteries, and minimum recycled content incentives, can bolster demand for domestic extraction, processing, manufacturing, and recycling. In addition, these efforts have the potential to benefit one another in tandem since the growth of processing capabilities will create greater demand for recycled materials to be reintroduced into the supply chain. The Federal government must commit to supporting the whole of the battery supply chain by requiring federal purchases of batteries to prioritize suppliers that use domestic materials and technologies, whether that be in EVs or other applications. It is insufficient to stop at content provisions or investments at the battery cell level. For battery production to proliferate in the U.S., focus needs to be made at the material processing level, as well as the anode and cathode level.
- *Safety and Sustainability:* The U.S. has the opportunity to provide global markets with battery materials produced under strong labor standards and workforce development practices, environmental laws, and safety requirements, in contrast to some of the industrial supply chains we currently source from. Enhanced safety and sustainability requirements, such as sustainable mining, efficient manufacturing, and material transportation safety, will ensure a competitive edge for American products and distinguish the U.S. as a global leader in responsible and sustainable battery production best practices. In addition, by investing in a domestic battery supply chain the U.S. will limit reliance on foreign minerals and materials, thereby reducing transportation and offshored emissions.
- *Coordination with Canada:* Fostering greater battery supply chain coordination and investments between the U.S. and Canada benefits both nations – as well as consumers – and ensures that North America remains a key player in the global battery industry. Building upon shared infrastructure and existing geographical, environmental, and economic benefits, the U.S. and Canada are poised to compliment one another's mineral resources as well as the technology, energy, and automotive industries. Both nations have a rich history of collaboration on these issues through efforts such as the U.S.-Mexico-Canada Agreement and the U.S.-Canada Joint Action Plan on Critical Minerals, but further public-private coordination is needed to maximize value throughout the supply chain.

IV. Capturing an Enormous Opportunity

As Secretary Granholm noted during a discussion with Securing America's Future Energy (SAFE), the U.S. needs to build over 100 battery gigafactories by 2035 to be competitive in global battery markets.⁷ To ensure those batteries are made with American materials and technologies, support American jobs, and eliminate environmental and labor malpractice from the supply chain, the U.S. must invest in battery material processing and manufacturing factories. For the U.S. to have the supply chain capacity for just 2 million EV batteries built with American materials, at least \$1.6 billion must be invested in lithium refining capabilities, \$2 billion in graphite processing (natural and synthetic), \$1 billion in anode material processing, \$1.5 billion in cathode processing, and \$7 billion in battery cell production.⁸ This is only a drop in the bucket given some estimates show the U.S. could reach 43 million electric vehicles by 2035.⁹

President Biden has already made clear his commitment to transportation electrification given his proposal of investing \$174 billion to win the EV market as part of his \$2.25 trillion infrastructure plan. Despite information from the White House noting that this will include funding to “spur domestic supply chains from raw materials to parts... and support American workers to make batteries and EVs,” it is unclear what portion of the funds are expected to go to bolstering a domestic battery supply chain.¹⁰ If the U.S. wants to win the EV market, it must also set its sights on the battery market, and prepare to bolster the industry with an investment in the tens of billions to reduce transportation sector emissions, bolster American manufacturing capabilities, expand economic and job growth, and secure its role as a leader in global battery markets.

BMTC appreciates the opportunity to submit this response and urges DOE to consider the policy suggestions outlined above to bolster and secure a domestic battery supply chain. We believe the U.S. is at a critical juncture to seize the opportunity in battery markets and reaffirm that the U.S. is committed to leading the global, electrified economy, or risk long term supply chain vulnerabilities and reliance on adversaries. As a strong and united voice of North American companies that mine, extract, process, manufacture, and recycle battery materials, technologies, and components, we welcome the opportunity to further discuss the challenges and opportunities in this sector and look forward to reading the Energy Secretary's report on the risks and policy recommendations for a high-capacity batteries supply chain.

APPENDIX

I. BMTC Primer

II. BMTC Congressional Funding Request Overview

⁷ SAFE, “Building America's Energy Future: A Conversation with Energy Secretary Jennifer Granholm.” March 2021.

⁸ Benchmark Minerals Intelligence, Internal Analysis, 2021.

⁹ Bloomberg New Energy Finance, “Electric Vehicle Outlook 2019 – Data.” 2019.

¹⁰ The White House. “FACT SHEET: The American Jobs Plan.” March 2021.

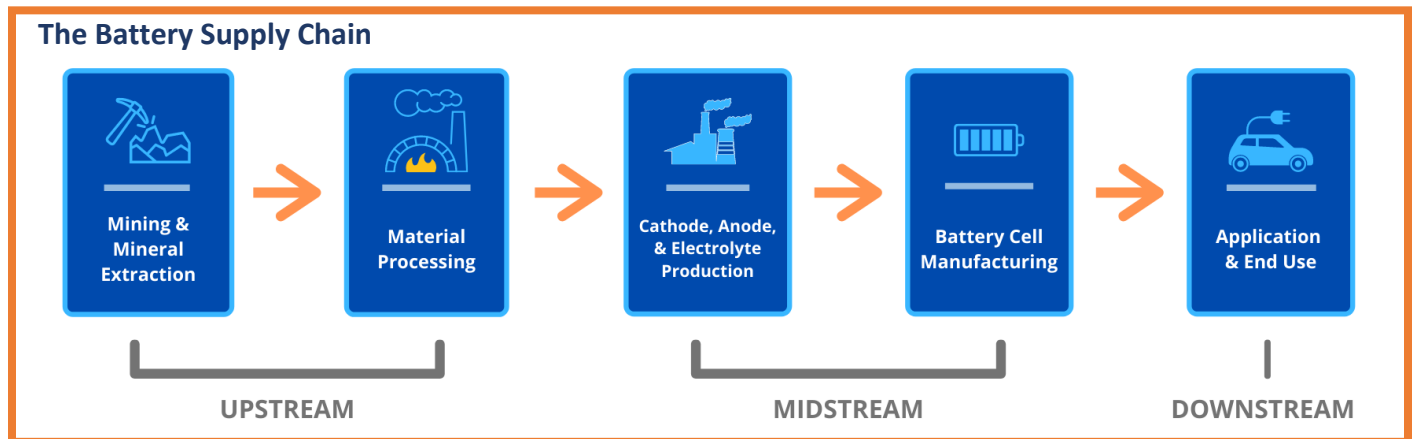
Appendix I

Battery Materials & Technology Coalition - Primer

The Battery Materials & Technology Coalition (BMTc) was launched in December 2020 as the voice of the upstream and midstream battery supply chain. Member companies are united behind a shared interest in growing a North American supply chain – complete from mine to battery cell production on the factory floor. Comprised of companies that mine, extract, process, and recycle battery materials as well as develop cathode, anode, and battery technology enhancements, BMTc members are established companies in the U.S. and Canada looking to ensure that North America does not bypass the opportunity to be a leader in a growing global battery market and electrified economy. BMTc is advocating for the U.S. to significantly scale investments in the upstream and midstream battery supply chain to ensure that batteries manufactured and used in the U.S. are made with North American materials and developed in a safe and sustainable way.

Why North America?

Fostering greater battery supply chain coordination and investments between the U.S. and Canada benefits both nations – as well as consumers - and ensures that North America remains a key player in the global battery industry. Building upon existing geographical, environmental, and economic benefits, the U.S. and Canada are poised to compliment one another’s mineral resources as well as the technology, energy, and automotive industries. Both nations have a rich history of collaboration on these issues through efforts such as the U.S.-Mexico-Canada Agreement and the U.S.-Canada Joint Action Plan on Critical Minerals, but further public-private coordination is needed to maximize value throughout the supply chain.



What is the Upstream and Midstream Battery Supply Chain?

The battery supply chain is commonly broken into upstream, midstream, and downstream sectors, as demonstrated in the figure above. The upstream battery supply chain is comprised of mining, mineral extraction, and mineral and material processing. Specific to batteries, this is most prominently the mining or extraction of lithium, graphite, nickel, manganese, and cobalt, which are then processed into their anode or cathode-grade form. The midstream supply chain is then comprised of the development of the cathode, anode, and electrolyte components and the assembly of battery components, and the downstream supply chain is the end use application of a battery, such as the instalment of a battery into an electric vehicle.

The Battery Materials & Technology Coalition: Advocating for U.S. Investments to Scale a North American Battery Supply Chain from Mine to Battery Cell

The Challenge: China and the Global Race for Batteries

The electrification of the transportation sector and integration of renewable energy sources into the electricity system is causing global demand for batteries to skyrocket. For example, 300 to 500 million electric vehicles are projected to be on the road around the world by 2040, driving lithium-ion battery demand to grow an estimated 15-fold by 2028, as compared to 2016 levels.¹¹ In response, China, Japan, South Korea, and European countries are taking massive strides to meet critical mineral and technology needs by investing in the battery supply chain. Above all others, China has a commanding lead over the market with over 100 battery megafactories built or planned, ownership of more critical mineral reserves than any other country, and a stranglehold on the world's mineral processing industry.¹² Conversely, despite acknowledging the importance of battery minerals and technologies, the U.S. has plans for only 9 battery megafactories, and is projected to control less than 10% of the global battery supply chain by the end of the decade, creating both a national security risk and a missed opportunity for job growth.¹³ As the U.S. economy grows even more dependent on batteries for transportation, energy, consumer, and defense needs, we must confront our supply chain vulnerabilities to establish ourselves as a leading participant in a global, electrified economy.

The Solution: A North American Battery Supply Chain

To ensure we seize this opportunity, the BMTCC implores the federal government to significantly invest in the upstream and midstream battery supply chain. Investing in the minerals, materials, and technologies that power our way of life provides immense benefits during a time in which economic and national security as well as climate action are of the utmost importance.

- **Strengthen National Security:** Reduce our reliance on adversaries for critical materials and strengthen defense industrial base manufacturing in North America.
- **Bolster Job & Economic Growth:** Build a new North American industry that will stimulate high-value job growth across the country.
- **Meet Climate Goals:** Develop a supply chain that is focused regionally and globally on cutting greenhouse gas emissions and promoting fair workforce development standards.
- **Lead on Technology Development:** Surpass the international community by driving performance, safety and sustainability standards within battery research, development, demonstration, and deployment.
- **Utilize Diplomacy and Trade with Allies:** Establish diplomatic and trade priorities focused on battery supply chains with key allies, which will help increase North American positions in the battery market.



¹¹ Securing America's Future Energy, "The Commanding Heights of Global Transportation." 2020. Institute for Defense Analyses, "Lithium-Ion Battery Industrial Base in the U.S. and Abroad." 2019.

¹² SAFE, "The Commanding Heights of Global Transportation." 2020.

¹³ Benchmark Minerals Intelligence, "Benchmark Summit 2020." 2020.

Appendix II

Investing in the Battery Supply Chain in North America

***Who We Are:** The Battery Materials & Technology Coalition (BMTC) was launched in December 2020 as the voice of the upstream and midstream battery supply chain. Comprised of companies that mine, extract, process, and recycle battery materials as well as develop cathode, anode, and battery technology enhancements, BMTC members are established companies in the United States and Canada looking to ensure that North America does not miss the opportunity to become a leader in a growing global battery market and electrified economy.*

Battery Supply Chain Infrastructure Funding Overview – Scaling U.S. Battery Capacity

To ensure the U.S. meets the opportunity present for economic growth and climate action, the federal government must significantly invest in the upstream and midstream battery supply chain. Investing in the minerals, materials, and technologies that can cleanly and sustainably power our way of life provides immense benefits during a time in which climate action and supply chain security are of the utmost importance. To date the U.S. has allocated minimal funds and incentives to the upstream and midstream battery supply chain, resulting in our competitors having an oversized share of the global supply chain and putting American national security and access to needed minerals and materials at risk. With a potential infrastructure package on the horizon, the U.S. is at a crossroads to course correct and reclaim leadership in battery manufacturing for electric vehicles and other energy storage applications.

To achieve the necessary scale up to make North America competitive in the global market, we propose funding in four major battery supply chain areas: **mineral and material processing, anode and cathode manufacturing, battery cell manufacturing, and recycling facilities**. Building upon its recent work, the Department of Energy (DOE) would remain the lead federal agency steward working with the private sector to build a robust battery supply chain. A significant influx of financial resources is needed, however, to meet this planned action. The private sector needs the federal government as a strong partner committed to ensuring the sustainable development of an American battery supply chain. The federal government has already demonstrated it is committed to supporting EV adoption and bolstering demand-side incentives, which are important, but it must not neglect the upstream and midstream supply chain that enables the transition to transportation electrification while creating American jobs.

Nearly every major automaker, including Ford and General Motors, has publicly announced commitments to the electrification of the transportation sector.¹⁴ Estimates show that the growth of an EV manufacturing industry in the U.S., from mining and material processing to building vehicles could create up to 100,000 new jobs annually through 2040.¹⁵ For the U.S. to have the supply chain capacity for just 2 million EV batteries to be produced in the U.S. with American materials, it will need at least \$1.6 billion invested in lithium refining capabilities, \$2 billion in graphite processing (natural and synthetic), \$1 billion in anode material processing, \$1.5 billion in cathode processing, and \$7 billion in battery cell production.¹⁶

Our proposed appropriation of **\$10 billion** funneled into American mineral, material, technology, manufacturing, and recycling companies over the next five years will ensure the U.S. begins to build out capabilities and seize the opportunity to be a key participant in a global, electrified economy, while creating jobs and driving climate goals.

¹⁴ SAFE, "The Commanding Heights of Global Transportation." 2020.

¹⁵ National Renewable Energy Laboratory, "National Economic Value Assessment of Plug-In Electric Vehicles," 2016.

¹⁶ Benchmark Minerals Intelligence, Internal Analysis, 2021.

Breakdown of Funding Request

Over the next five years (FY22-FY26), Congress should appropriate **\$10 billion** to the **Department of Energy** (DOE) to scale the supply chain for battery development. This funding will be split between the:

- *Office of Fossil Energy, Minerals Sustainability Division*: **\$3.5 billion** for battery mineral, material, and chemical processing.
- *Office of Energy Efficiency and Renewable Energy*: **\$6.5 billion** for cathode, anode, and battery cell deployment and the deployment of battery recycling facilities and technologies.

Office of Fossil Energy, Minerals Sustainability Division: The U.S. processes almost no battery minerals and materials for battery cells, despite the U.S. having the resources and technological knowhow to do so. This includes chemical processing for lithium, nickel, cobalt, manganese, silicon, graphite, and other minerals and rare earth elements. The Department of Energy recognizes these issues and recently announced the **Minerals Sustainability Division within the Office of Fossil Energy** focused on securing a U.S. critical minerals supply chain that will transform the U.S. energy and manufacturing systems to make them cleaner, more resilient, and more secure. Congress should fund this newly established office with **\$700 million** annually for **5 years** to boost the deployment and commercialization of mineral and material processing facilities and capabilities with regional variation throughout the country.

| Office of Fossil Energy, Mineral Sustainability Division | |
|---|---|
| Scope | Deployment of mineral and material processing and associated manufacturing |
| Funding | \$700 million annually |
| Years | FY2022-2026 |
| Awards | \$25 million and above for demonstration projects, \$50 million and above for commercial-scale projects |
| Cost Share | 50% private sector cost share |

Office of Energy Efficiency and Renewable Energy (EERE): With electric vehicle demand expected to skyrocket in the U.S. and around the world, the auto industry is scrambling to set up a viable supply chain in North America. Significant deployment dollars have not been dedicated to establishing a viable supply chain since 2009. To rectify this, Congress should fund EERE with **\$1.3 billion annually** for **five years** to accelerate the deployment and commercialization of anode, cathode, and battery cell manufacturing facilities and capabilities. Congress should also utilize this funding to accelerate the deployment and commercialization of recycling facilities and capabilities with regional variation throughout the country.

| Office of Energy Efficiency and Renewable Energy | |
|---|---|
| Scope | Anode, cathode, electrolyte, cell and recycling facilities and capabilities |
| Funding | \$1.3 billion annually |
| Years | FY 2022-2026 |
| Awards | \$25 million and above for demonstration projects, \$50 million and above for commercial-scale projects |
| Cost Share | 50% private sector cost share |