



Military Power Sources Committee: Information Paper on Battery Recycling

The rapidly advancing lithium-ion battery (LiB) industry has made significant inroads to applications critical to issues of national security. The lack of domestic supply chain support for this industry from mineral deposits through to refined chemicals and engineered battery active materials puts recycling at a key strategic crossroads as it relates to domestic production of batteries for critical applications. Supporting key aspects of the North American LiB recycling ecosystem can help alleviate highly susceptible supply chain weaknesses for priority power applications.

U.S. experts in energy, economic, and defense state that it is strategically important for U.S. industry to have more of a leadership role in the development, production, and recycling of Li-ion batteries. To avoid repeating the mistakes of the past and reinstate the US as leader and not a follower, U.S. federal government needs to develop and implement, with adequate funding, a strategy by which Li-ion battery recycling technology can become and be maintained as a domestic capability from its research and development phase through mass implementation. The MPSC hosted a workshop in May 2021 (www.forgenano.com/mpsc) to identify critical roadblocks to commercialization, including the stated issues and others, of Battery Recycling as well as hear from government end users. The results of this forum served as the basis of this information paper which will be circulated within the NDIA and DoD communities.

The Problem

Virtually every hand-held device in use today, from cell phones to the military's tactical radios, contain lithium-ion cells manufactured in China. Even those few domestic cell producers are reliant on a China dominated supply chain. This reliance on a foreign source of supply, especially one that is not considered an ally, is a very real threat to both the domestic economy and the readiness of our Armed Forces. Should this chain be broken, it would result in a loss of domestic jobs during normal times and have a devastating effect on the military's ability to complete their mission during a period of national emergency. This vulnerability is only going to increase as the United States moves to a greener economy and the military's reliance on advanced battery technologies to assure dominance on the battlefield. The U.S. government has acknowledged the critical role minerals and upstream sectors play in our nation's security through Executive Orders, international agreements, and congressional action on critical minerals, but much more is required. These attempts to solve this problem have been "point solutions" that lacked either adequate funding or a long term, stable strategy to assure a "cradle to cradle" solution.

The Solution

The technologies exist to convert spent batteries from waste into valuable raw materials to support the domestic supply chain for LiBs. However, logistics shortcoming in the U.S. preventing implementation of these technologies due to high costs, accounting for up to 50% of the cost of recycling. This is largely due to the geographically distributed nature of batteries, both commercially and for the DOD, in combination with the limited number of permitted facilities to accumulate and recycle the batteries back into raw materials which can be readily integrated to the LiB supply chain. Many remedies toward reducing these logistics burdens can be readily implemented, such as:

- Providing support for equipment, particularly to scaling companies working to provide distributed capabilities
- Reclassification of lithium-ion batteries away from Class-9 Hazardous to increase commercial truck driver availability and allow for mixed-use transport with other similar waste

- Develop mobile, deployable pre-treatment options to safely and affordably repatriate end-of-life batteries overseas and end in-theatre disposal
- Incentivize the implementation of domestic recycled materials to move towards a circular U.S. LiB economy with more secure supply chain
- Apply tariffs on the export of black mass to prevent leakage of domestic critical materials via low-cost shredding of batteries sent for refining into high value materials overseas.
- Incentives for domestic recyclers to work with domestic producers, reducing burden of validation and implementation procedures

Implementing the Solution

American suppliers are at a competitive disadvantage when trying to break into the market. To create an economically robust domestic material supply chain, particularly through recycling of materials the U.S industry and U.S. DOD should focus its efforts to:

- Reclassification of lithium-ion battery scrap and waste
- Incentivize distributed lithium-ion accumulation and recycling facilities
- Increase accumulation efforts by DOD to minimize logistics burdens for processing
- Simplifying the qualification process of new material vendors into the LiB supply chain
- Write procurement specifications which require use of recycled materials

Conclusion

Raw material suppliers, cell manufacturers, and OEM must work together to capitalize on the benefits of using recycled materials. The current trend of electrifying everything from transportation to military application will only increase our Nation's demand for batteries and if the US does not invest in the next generation of Li-ion batteries we will be beholden to other countries for our supply. Domestic production and especially domestic production of next generation of technology will not only ensure our national security but has the potential for job growth, energy security, a circular economy, and overall economic prosperity is palpable. We are at the precipice of a revolutionary opportunity, and we are aware of our shortcomings and the risks before us, but we have the resources and all we need to do is apply ourselves.

About the MPSC

The mission of the Military Power Sources Committee (MPSC) is to provide a forum by which, its members can present a unified voice for critical energy storage issues. The Military Power Sources Committee (MPSC), which consists of organizations that design, develop, and manufacture power sources, for the Department of Defense, alongside such organizations as NATTBatt and the Battery Materials Technology Coalition (BMTC), believes strongly that the U.S. requires a robust, domestic energy supply chain, especially as it pertains to Lithium-ion batteries, and that the U.S. must invest in domestic materials and manufacturing technologies to ensure continued, uninterrupted prosperity.

For more information about the committee and our activities, please contact James Trevey at jtrey@forgenano.com, or Marc Gietter at sagelyconsultant@gmail.com. Whether you agree or disagree, provide us feedback so we continue to refine our goals as we pursue them since future U.S. dominance in advanced battery technologies benefits all of us.