# *SMaRT Center Weekly Digest*
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# News

## Push to shorten U.S. mine permit review process gains steam

U.S. mining companies, automakers and a bipartisan group of congressional members are recommending that the federal government cut the time needed to permit a new mine in order to boost domestic production of electric vehicle minerals. The requests, submitted this week to a committee that will propose changes to the General Mining Law of 1872, comes amid rising pressure on the EV industry to procure lithium, copper and other minerals from domestic or ally sources.

## Massive US rare earths project is larger than previously expected

Globally, very few rare earths projects exceed either one billion tonnes of mineralized rock or one million tonnes of total rare earth oxide content. The Halleck Creek Project may be in very rare company. Furthermore, low penalty elements, access to infrastructure and location in a mining friendly jurisdiction set this project apart. The Company's strengthened balance sheet, from the recent successful capital raise allows for accelerated efforts to define a high tonnage maiden Resource, advance metallurgy test work and fast track evaluation studies in the near term.

## China-linked bots attacking rare earths producer 'every day'

Fake social media accounts linked to the Chinese Communist Party are posting daily attacks on Lynas Rare Earths Ltd., according to the Australian company. Cyber-protection experts say the campaign is targeting US and Australian collaboration on critical mineral supply chains. First made public in June, the attacks are focusing on Lynas' environmental record in Malaysia in an attempt to turn public opinion against a new plant it's building in Texas with US government funding.

## Stakeholders brainstorm Powder River Basin business, energy solutions at conference in Gillette

Participants in the Carbon Ore, Rare Earth Element, and Critical Mineral, or CORE-CM, project, are working together to promote business development around energy resources in the Powder River Basin. Stakeholders met Aug. 30 and Sept. 1 at Gillette College Technical Education Center to support economic development around these resources. Through networking and discussion sessions, participants shared the successes and challenges they have encountered. They talked about common concerns like how to use wastes from CORE-CM extraction, address supply chain challenges and compete with other countries such as China.

## Graphite One prefeasibility outlines $1.2bn capex for Alaska mine and Washington state plant

Graphite One has released a prefeasibility study on developing a mine at its Graphite Creek property in Alaska and building a battery anode materials manufacturing plant in Washington state. he company estimates it will take three years to permit and build the graphite manufacturing facility and on average, the plant would produce about 49,615 tonnes of anode material per year (coated, spherical natural graphite [CPN]; blended natural and artificial graphite [BAN]; secondary particle natural graphite [SPN];

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and secondary particle composite [SPC]); along with 7,354 tonnes of purified graphite product and 18,057 tonnes of unpurified graphite product annually.

### Honda and LG to build $4.4bn EV battery plant in US

Japan's Honda Motor and South Korean battery maker LG Energy Solution said on Monday they plan to invest $4.4 billion to build a new battery production plant for electric vehicles in the U.S. The news comes on the heels of a string of recent announcements that aim at cutting China out of supply chains for EVs. It also marks the latest plans by automakers to invest in US production of battery cells for EVs, as the industry works to meet stricter regulations and accelerate production of such zero-emissions cars and trucks.

## Column of the Week

### Japan needs $24 billion investment to boost battery competitiveness

Japan needs over $24 billion in investment from both the public and private sectors to develop a competitive manufacturing base for batteries used in areas such as electric vehicles (EVs) and energy storage, the industry ministry said on Wednesday. A specialist panel tasked with formulating battery strategy also set a target of securing 30,000 trained workers for battery manufacturing and supply chains by 2030, the Ministry of Economy, Trade and Industry said.

## Technical Papers

### Digital twin key technology on rare earth process

Digital twin can be defined as a digital equivalent of an object of which it can mirror its behavior and status or virtual replicas of real physical entities in Cyberspace. This paper proposes the techniques to build the rare earth digital twin such as soft measurement of component content, component content process simulation, control optimization strategy, and virtual workshop, etc. At the end, the validity of the model is verified, and a case study is conducted to verify the feasibility of the whole Digital twin framework.

### Selective recovery of high-grade rare earth, Al, and Co-Mn from acid mine drainage treatment sludge material

A novel purification process based on a previously developed 3-stage AMD treatment process was designed to recover high-grade Al, REE, Co, and Mn products from the sludge materials through aqueous processing with multiple cleaner steps and precise control of the process parameters. The final products of the three stages of this purification process are boehmite and dawsonite in Stage I, adamsite-(REE) in Stage II, and cobalt oxide and ramsdellite in Stage III.

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### Rare-earth separations enhanced by magnetic field

The intrinsic properties of REs are basic for separation mechanisms. Due to the large difference in magnetic moment, a new method of selected crystallization enhanced by magnetic field was developed to separate REs efficiently, at room temperature and pressure without complex equipment. This magnetic separation process increases the separation factors of Gd(III)/Lu(III) from their mixture by 39% in kinetics, but similar in or near thermodynamic equilibrium without magnetic field.

### Enrichment and sources of REY in phosphate fractions: Constraints from the leaching of REY-rich deep-sea sediments

Herein, we performed a series of chemical leaching experiments on a group of REY-rich samples (up to 5,983 ppm) from two sediment cores obtained from the Pigafetta Basin in the western Pacific to investigate the phosphate and non-phosphate fractions. We found that phosphate components in deep-sea sediments, termed REY-rich phosphates, contain a mean ΣREY of 27,635 ppm and ΣREY/P2O5 of >0.75, which are 1–2 orders of magnitude higher than that of marine phosphorites.

### Characterization of rare earth elements (REE) from industrial REE waste resources

Water Leach Purification (WLP) residue is a Naturally Occurring Radioactive Material (NORM) that is composed of iron phosphate. The Malaysian government has classified WLP residue as a radioactive material since the thorium (Th) concentration surpassed the 1000 Bq/kg standard. […] Based on XRF result, the sample is made up of Fe2O3 (32 %) and P2O5 (20.8 %). The rare earth analysis using the ICP-MS technique revealed a total quantity of rare earth (ΣRE) of 88367 ppm with gadolinium (Gd) as the most abundant element.

## Funding Opportunities

### DE-FOA-0002833 Request for Information on Collection, Transportation, Sorting, Processing, and Second Life Applications for End of Life Lithium Ion Batteries

The purpose of this RFI is to solicit feedback from industry, manufacturers, minority-owned businesses, academia, research laboratories, institutes, government agencies, State and local officials, labor unions, Tribes, 10 community-based organizations (CBOs), environmental justice organizations, retailers and other stakeholders on issues related to design and implementation of the Battery Recycling Provisions. DOE is requesting input on the following categories and questions:

- **Category A: Collection of Lithium-Ion Batteries (LIBs) and Manufacturing Scrap: Tracking, Methods, and Company Perspective**
- **Category B: Transportation of Lithium-Ion Batteries (LIBs) and Manufacturing Scrap**
- **Category C: Sorting of Lithium-Ion Batteries (LIBs) in the Recycling Stream**

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- **Category D: Processing of Lithium-Ion Batteries (LIBs) and Manufacturing Scrap: Company Information, Methods, and Products**

*Company Information*

1. For your company, rank the topics in order of what is preventing you from increasing the amount of material being sent to back into the battery supply chain:
a. Collection
b. Transportation
c. Sorting
d. Processing
e. Please include why you ranked them in that order.
2. What considerations are taken to site your facility? What role does proximity to collection points and customers play in this decision? What role does state and local regulations have in this decision?
3. As more and more batteries become available for recycling, is it better to add new plants that can accommodate different chemistries, or design and build plants that are optimized for a certain chemistry? Are some processes more flexible to chemistry changes? What are the factors that influence process flexibility?

4. How does a recycling facility adapt to new battery chemistries (like varying cathode composition or totally new systems like Li-S) or form factors? What are the time and cost requirements to do this?

5. What arrangements does your company have with other companies to resupply the front end of their processes? Does this depend on the feedstock you use (i.e., scrap vs. EOL batteries?)

*Methods*

6. How do you treat manufacturing scrap vs. consumer electronics vs. vehicle batteries, in terms of recycling processes? What is their relative economic value to each other? What is the processing yields of these materials? What mass percent of the total material is recovered in a re-usable form? What is the amount of material that goes to waste and what material is that?

7. How much of different types of recycling (hydro, pyro, direct, etc.) are currently being done?

8. What best practices or technical requirements are needed to adequately “design

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for recycling"?

*Products*

9. When processing various materials collected (consumer electronics, manufacturing scrap, vehicle batteries) does the recovered/ recycled materials enter the supply chain at different points? If so, what are the products you are producing and where are they being introduced back into the supply chain?

10. As LIBs are being recycled, are the materials that you are recovering being supplied back into the LIB supply chain or are there other applications that these materials are being sold into?
11. What products do you sell of the recycled materials? Are there other markets that could utilize the materials coming out of the various recycling processes, either due to lack of purity or cost or demand?

12. What is the form of materials that come out of different recycling processes (e.g., metallics, sulfates, carbonates, hydroxides)?

13. What is the role recyclers play in the requalification process with materials producers?

14. What are your biggest cost drivers for the waste treatment in the recycling process you use?

15. What plans do manufactures have to utilizing recycled materials? Will they be used "as is" or will they be blended with virgin material and processed together? If they are to be blended, what percent of recycled/recovered content (in mass percent) is targeted?

16. What types of incentives, grants, prizes, vouchers, technical assistance, tools or training could be offered by the Department of Energy to aid in the research, development and deployment of technologies developed under this topic? Please be specific in your answer as to the type of program and what exactly it would be used for.

1. What would you do different in the permitting processes to site your next facility?

2. Prior to submitting your permits, did your company proactively interact with the local communities surrounding the facility? What activities did you do? How were

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- **Category E: Permitting for Manufacturing/ Processing Facilities**
- **Category F: Second Life Applications of Lithium-Ion Batteries (LIBs)**
- **Category G: State and Local Collection Programs for Lithium-Ion Batteries**
- **Category H: Retail Collection Programs for Lithium-Ion Batteries**
- **Category I: Expanding Union Jobs**
- **Category J: Equity, Environmental, and Energy Justice (EEEJ) Priorities**