REQUEST FOR INFORMATION ON COLLECTION, TRANSPORTATION, SORTING, PROCESSING, AND SECOND LIFE APPLICATIONS FOR END-OF-LIFE LITHIUM-ION BATTERIES.
RFI Number DE-FOA-0002833

ISSUE DATE: AUGUST 29, 2022
RESPONSES DUE: OCTOBER 14, 2022 (47 DAYS)
SUBJECT: REQUEST FOR INFORMATION

Description

This is a Request for Information (RFI) issued by the U.S. Department of Energy's (DOE) on behalf of the Manufacturing & Energy Supply Chains Office in collaboration with the Energy Efficiency and Renewable Energy Office. This RFI seeks public input to help inform DOE's implementation of the Infrastructure Investment and Jobs Act, also commonly known as the Bipartisan Infrastructure Law (BIL).[1]

The BIL is a once-in-a-generation investment in infrastructure, designed to modernize and upgrade American infrastructure to enhance U.S. competitiveness, driving the creation of good-paying union jobs, tackling the climate crisis, and ensure stronger access to economic, environmental, and other benefits for disadvantaged communities (DACs). As relevant to this RFI, under Sections 40207 (e), 40207 (f)(2), (f)(3), (f)(4) and 40208, the BIL authorized appropriations of $335 million over the five (5) year period encompassing fiscal years (FYs) 2022 through 2026. In total, the BIL will invest more than $7 billion in batteries supply chain over the next five years. The goals of this investment are: (A) to ensure that the United States has a viable battery materials processing industry to supply the North American battery supply chain; (B) to expand the capabilities of the United States in advanced battery manufacturing; (C) to enhance national security by reducing the reliance of the United States on foreign competitors for critical materials and technologies; and (D) to enhance the domestic processing capacity of minerals necessary for battery materials and advanced batteries. This will be achieved by exploring sustainable sourcing and processing of critical minerals used in battery production, battery materials and cell production, and end-of-life battery collection and recycling.

[1] Public Law 117-58 (November 15, 2021).

To help inform DOE's implementation of the BIL provision referenced above, this RFI seeks input on:

- Program Requirements, Priorities, and Implementation Strategy
- Stakeholder Engagement
- Community Benefits
- Equity, Environmental, and Energy Justice (EEEJ) Priorities, including implementation of Justice40[2] Initiative

DOE will not publish the information collected through this RFI. The Information collected may be used to inform DOE planning related to BIL Sections 40207 (e), 40207 (f)(2), (f)(3), (f)(4) and 40208, which could include future Funding Opportunity Announcements (FOA) or programs.

Background

On November 15, 2021, President Joseph R. Biden, Jr. signed the Infrastructure Investment and Jobs Act, also commonly known as the Bipartisan Infrastructure Law (BIL). The BIL is a once-in-a-generation investment in infrastructure, designed to modernize and upgrade American infrastructure to enhance U.S. competitiveness, driving the creation of good-paying union jobs, tackling the climate crisis, and ensure stronger access to economic, environmental, and other benefits for disadvantaged communities. The BIL appropriates more than $62 billion to DOE to ensure the clean energy future delivers true economic prosperity to the American people by:

- Investing in American manufacturing and workers, by creating good-paying jobs with the free and fair chance to join a union and supporting effective workforce development that ensures access to these jobs and enables workers to advance in their careers.
- Expanding access to energy efficiency and clean energy for families, communities, and businesses.
- Delivering reliable, clean, and affordable power to more Americans.
- Building the technologies of tomorrow through clean energy demonstrations.

[2] The Justice40 initiative, created by E.O. 14008, establishes a goal that 40% of the overall benefits of certain federal investments—including investments in climate change; clean energy and energy efficiency; clean transit; affordable and sustainable housing; training and workforce development; the remediation and reduction of legacy pollution; and the development of critical clean water infrastructure—flow to disadvantaged communities. The Justice40 Interim Guidance provides a broad definition of disadvantaged communities (Page 2): https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf. The Department of Energy has identified DACs by census tract. See https://www.energy.gov/diversity/justice40-initiative. The DOE, Office of Management and Budget, and/or the Federal Council on Environmental Quality (CEQ) may issue additional and subsequent guidance regarding the designation of disadvantaged communities and recognized benefits under the Justice40 Initiative.

As part of this effort, the BIL authorizes appropriations of $200 million for the research, development, and deployment of technologies to collect, transport, sort and process (recycle) end-of-life Lithium-ion batteries (LIBs) and for the potential use of lithium-ion batteries in second use application. There is an additional $135M appropriated covering multiple battery end-of-life (EOL) areas to accelerate and increase battery recycling rates. By developing these technologies, the aim is to:

- Ensure that the United States has a viable battery materials processing industry to supply the North American battery supply chain.
- Expand the capabilities of the United States in advanced battery manufacturing.
- Enhance national security by reducing the reliance of the United States on foreign competitors for critical materials and technologies.
- Enhance the domestic processing capacity of minerals necessary for battery materials and advanced batteries.
- Ensure that the United States has a viable domestic manufacturing and recycling capability to support and sustain a North American battery supply chain.

Previous work on the U.S. *The Lithium-Ion Battery Recycling Prize Competition* focuses on identifying innovative solutions for collecting, sorting, storing, and transporting spent and discarded lithium-ion batteries — from electric vehicle (EV), stationary energy storage, consumer electronics, and industrial applications — for eventual recycling and materials recovery. This work helped form the topics covered in BIL Sections 40207 (e), 40207 (f) and all of 40208.

Section 40207(e) titled *Lithium-Ion Battery Recycling Prize* covers the continuation of the *Lithium-Ion Battery Recycling Prize Competition* for additional rounds after completion of the current round.

The U.S. The Lithium-Ion Battery Recycling Prize focuses on identifying innovative solutions for collecting, sorting, storing, and transporting spent and discarded lithium-ion batteries — from electric vehicle (EV), consumer electronics, industrial, and stationary applications — for eventual recycling and materials recovery. The final phase of the current battery recycling prize was completed in June 2022, and follow-on efforts are currently being planned.

Section 40207(f) titled *Battery and Critical Mineral Recycling: Battery Recycling Research, Development, and Demonstration Grants* covers the following efforts:

1) Recycling activities

2) The development of methods to promote the design and production of batteries that take into full account and facilitate the dismantling, reuse, recovery, and recycling of battery components and materials
3) Strategies to increase consumer acceptance of and participation in the recycling of batteries
4) The extraction or recovery of critical minerals from batteries that are recycled
5) The integration of increased quantities of recycled critical minerals in batteries and other products to develop markets for recycled battery materials and critical minerals
6) Safe disposal of waste materials and components recovered during the recycling process
7) The protection of the health and safety of all persons involved in, or in proximity to, recycling and reprocessing activities, including communities located near recycling and materials reprocessing facilities
8) Mitigation of environmental impacts that arise from recycling batteries, including disposal of toxic reagents and byproducts related to recycling processes
9) Protection of data privacy associated with collected covered battery-containing products
10) The optimization of the value of material derived from recycling batteries
11) The cost-effectiveness and benefits of the reuse and recycling of batteries and critical minerals

Section 40208 titled *Electric Drive Vehicle Battery Recycling and Second-Life Applications Program* covers the following efforts:

1) Technology to increase the efficiency of electric drive vehicle battery recycling and maximize the recovery of critical materials for use in new products
2) Expanded uses for critical materials recovered from electric drive vehicle batteries
3) Product design and construction to facilitate the disassembly and recycling of electric drive vehicle batteries
4) Product design and construction and other tools and techniques to extend the lifecycle of electric drive vehicle batteries, including methods to promote the safe second-use of electric drive vehicle batteries
5) Strategies to increase consumer acceptance of, and participation in, the recycling of electric drive vehicle batteries
6) Improvements and changes to electric drive vehicle battery chemistries that include ways to decrease processing costs for battery recycling without sacrificing front-end performance

7) Second-use of electric drive vehicle batteries, including in applications outside of the automotive industry
8) The commercialization and scale-up of electric drive vehicle battery recycling technologies

The purpose of these three efforts (40207 (e), (f), and 40208) is to ensure that the United States has viable domestic manufacturing and recycling capability to support and sustain a domestic battery supply chain. By execution of these efforts, the programs support the Biden Administration's goal of achieving a carbon-free electric grid by 2035 and a net zero emissions economy by 2050.[3]

Principles of equity and justice will guide BIL implementation, consistent with the Biden Administration's commitments to ensure that overburdened, underserved, and underrepresented individuals and communities have access to federal resources pursuant to Executive Order (EO) 13985 - *Advancing Racial Equity and Support for Underserved Communities*; EO 14020 - *Establishment of the White House Gender Policy Council*; and EO 14008 - *Tackling the Climate Crisis at Home and Abroad*. Implementation efforts shall be in furtherance of the Justice40 Initiative, which sets a goal that 40% of the overall benefits of federal clean energy and energy efficiency investments flow to disadvantaged communities[4] (the Justice40 Initiative, or Justice40). In all cases, the BIL implementation process should advance equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality.

Strengthening economic prosperity – by expanding good-paying union jobs and by supporting job growth through investments in domestic manufacturing – is a key goal set by President Biden and is discussed in depth in his Executive Orders (EOs) on *Ensuring the Future Is Made in All of America by All of America's Workers* (EO 14005), *Tackling the Climate Crisis at Home and Abroad* (EO 14008), *Worker Organizing and Empowerment* (EO 14025), and *Promoting Competition in the American Economy* (EO 14036) and *Implementing the Infrastructure Investment and Jobs Act* (EO 14052). The Battery Recycling Provisions will support the creation

[3] FACT SHEET: President Biden sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies, https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/

[4] The Justice40 initiative, established by E.O. 14008, establishes a goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities. DOE's definition of DACs, which should be used to determine benefits calculations, is available at https://www.energy.gov/diversity/office-economic-impact-and-diversity.

of good-paying jobs with the free and fair choice to join a union, the incorporation of strong labor standards, and high-road workforce development programs that ensure equitable access to jobs, especially through registered apprenticeship[5] and quality pre-apprenticeship[6] programs. These opportunities will be focused on job creation in previous energy communities– including mining, power plant, and other communities that have suffered as a result of economic shifts, rural and low-income communities, and Tribal areas.

[5] Registered Apprenticeship Program (RAPs) are a proven model of job preparation, registered by DOL or a DOL-recognized State Apprenticeship Agency (SAA), which employ workers and combine paid On-the-Job Learning (OJL) (also referred to as On-the-Job Training (OJT)) with Related Instruction (RI) to progressively increase workers' skill levels and wages. RAPs are also a business-driven model that provide an effective way for employers to recruit, train, and retain highly skilled workers. RAPs allow workforce partners, educators, and employers to develop and apply industry standards to training programs, thereby increasing the quality of the workforce and workforce productivity. RAPs offer job seekers immediate employment opportunities that pay sustainable wages and offer advancement along a career path as they complete their training. Registered Apprentice completers receive industry-recognized certificates of completion leading to long-term career opportunities. For more information on RAPs, please visit www.apprenticeship.gov.

[6] The US Department of Labor has developed a framework for Quality Pre-Apprenticeship Programs:

- Training and curriculum based on industry standards, approved by the Registered Apprenticeship sponsor with whom the pre-apprenticeship program is partnering.
  Strategies that increase Registered Apprenticeship opportunities for disadvantaged and under-represented individuals that will allow the participant to meet the entry requirements for a Registered Apprenticeship program upon completion. These involve:
  - » Strong recruitment efforts for populations under-represented in Registered Apprenticeship programs
  - » Educational and pre-vocational services that prepare participants to meet the minimum qualifications for entry into a Registered Apprenticeship program
  - » Activities introducing participants to Registered Apprenticeship programs and assistance in applying for those programs
- Access to support services that help participants remain in the program (such as childcare, transportation, counseling and ongoing career services).
- Collaboration with Registered Apprenticeship sponsors to promote apprenticeship to other employers as a quality approach to attain and retain a skilled workforce.
- Hands-on experience that simulates the work performed in the Registered Apprenticeship, while observing proper supervision and safety protocols.
- Formal agreements, wherever possible, with Registered Apprenticeship sponsors for entry into Registered Apprenticeship programs upon successful completion of the pre-apprenticeship program.

For additional information on pre-apprenticeship, please review USDOL's Training and Employment Notice 13-12.

Battery Recycling Provisions under the BIL

BIL Sections 40207 (e), 40207 (f)(2), (f)(3), (f)(4) and 40208 authorizes DOE to establish $335 M in activities and programs with the following anticipated entities:

BIL sections eligible entities	
40207 (e), (f)(2), (f)(3), (f)(4)	**40208**
an institution of higher education	Institutions of higher education
a National Laboratory	National Laboratories
a Federal research agency	Nonprofit and for-profit private entities
a State research agency	State and local governments
a nonprofit organization	Consortia of entities described above
an industrial entity	
a manufacturing entity	
a private battery-collection entity	
an entity operating 1 or more battery recycling activities	
a State or municipal government entity	
a battery producer	
a battery retailer	
a consortium of 2 or more entities described above	

The first set of RFI questions in this document will support BIL section 40207(e) titled *Lithium-Ion Battery Recycling Prize*. DOE shall continue to carry out the *Lithium-Ion Battery Recycling Prize Competition*. The next steps or phases of this program have not been determined yet but the potential total funding could be up to $10 Million from FY2022 to FY2026.

The second set of RFI questions in this document will support BIL section 40207 (f) titled *Battery and Critical Mineral Recycling: Battery Recycling Research, Development, and Demonstration Grants* (Sections (f)(2), (f)(3) and (f)(4)) and the potential total funding could be up to $125 Million from FY2022 to FY2026.

- Section (f)(2) titled **Battery Recycling Research, Development, and Demonstration Grants** will total $60M for FY2022 to FY2026. DOE shall award multiyear grants to anticipated eligible entities for research, development, and demonstration projects to create innovative and practical approaches to increase the reuse and recycling of batteries,

- Section (f)(3) titled **State and Local Programs** will total $50M for the period of FY2022 to FY2026. DOE shall establish a program under which it will award grants, on a competitive basis, to the following anticipated entities of States and units of local government to assist in the establishment or enhancement of State battery collection, recycling, and reprocessing programs

- Section (f)(4) titled **Retailers As Collection Points** will total $15M for the period of FY2022 to FY2026. DOE shall award grants, on a competitive basis. It is anticipated that these grants will be restricted to retailers that sell covered batteries or covered battery-containing products to establish and implement a system for the acceptance and collection of covered batteries and covered battery-containing products, as applicable, for reuse, recycling, or proper disposal.

The third set of RFI questions in this document will support BIL section 40208. This section's emphasis is on *Electric Drive Vehicle Battery Recycling and Second-Life Applications Program* aimed at research, development, and demonstration of these technologies. The funding total in this area will be $200M for the period of FY2022 to FY2026. The DOE shall carry out a program of research, development, and demonstration of second-life applications for electric drive vehicle batteries that have been used to power electric drive vehicles; technologies and processes for final recycling and disposal of the [electric drive vehicle batteries] In carrying out the battery recycling and second-life applications program, DOE shall award multiyear grants on a competitive, merit-reviewed basis to eligible entities to conduct research, development, testing, and evaluation of solutions to increase the rate and productivity of electric drive vehicle battery recycling; and for research, development, and demonstration projects to create innovative and practical approaches to increase the recycling and second-use of electric drive vehicle batteries

The Administration's priorities are to support projects that present greater opportunities for technological innovation and that present opportunities to scale domestic deployment of clean energy technologies. Projects that have lower levelized energy costs and greater net impact in reducing greenhouse gas emissions will also be prioritized.[7] Projects under these programs must have a reasonable expectation of commercial viability and must be completed within the proposed period of performance.[8] Additionally, the Administration encourages proposed projects that will result in higher levels of job creation in previous energy communities and will particularly favor projects that create jobs in low-income communities, Tribal areas, and for dislocated workers who were previously employed in manufacturing, coal power plants, or coal mining.[9]

[7] BIL 40207 (e), 40207 (f)(2,3,4), 40208
[8] BIL 40207 (e), 40207 (f)(2,3,4), 40208
[9] BIL 40209 (a)(2), (c)(1).

Purpose

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. This is solely a request for information and not a funding opportunity. DOE is not accepting applications for funding.

You may answer as few or as many of the questions below as you would like, but please focus on the areas that are most pertinent to your expertise. When responding, please use the bolded Category letters and sub-numbers as headings in your response to the greatest extent possible and refer to the questions (e.g., A.1., A.2., A.3.) in the body of your responses. This helps save time both for the responder and the reviewers.

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

Tracking

1. How do you track collection rates of the following lithium-based batteries?
    a. Consumer Electronics
    b. Manufacturing Scrap
    c. Vehicles Batteries (PHEV, EV, etc.)

2. Of the total material collected (in tons) in FY21 at your company, what was the breakdown of consumer electronics, manufacturing scrap, vehicle batteries material collected in tons? What is financial impact to your company if this breakdown of materials changes to your company? What was the yield for each of the feedstocks processed?

3. How is collection dependent on the battery chemistry, size, and location?

[10] Including Tribal governments, American Indian and Alaska Native communities, Tribal enterprises, Alaska Native Regional and village corporations.

4. What are the different types of scrap material (electrode scraps, mis-wound cells, defective cells, etc.) and how much of each type does your company collect?

5. What are the batteries that will be collected in urban, suburban, and rural areas and what is the current collection rate of these batteries? What factors impact this rate of collection based on locality?

6. What volume of Lithium-ion batteries from non-vehicle applications are currently being recycled? How are you projecting future supply and demand to scale your business?

7. What portion of end-of-life vehicle batteries do you landfill? What decisions lead to landfilling and is it chemistry dependent? What statutes allow or prohibit landfilling in the jurisdiction you operate in?

Methods

8. What safety issues (if any) have you encountered related to the collection of batteries that the public needs to know about?
9. What insurance costs have you incurred due to your company collecting LIBs? How has this changed over time as lithium-based batteries have become more ubiquitous?

10. What is your current cost for storing end-of-life (EOL) batteries in days and/or tonnage by battery chemistry?

11. After collection, what is your approach to ensure safe storage and/or transportation (e.g., visual inspection, taping the terminals, warehouse monitoring, etc.)?

12. How does handling Lithium-Nickel-Manganese-Cobalt oxide (NMC)/ Lithium-Nickel-Cobalt-Aluminum oxide (NCA) EOL batteries differ from lithium iron phosphate (LFP) EOL batteries?

13. For Electric Vehicles that have been in accidents and totaled by insurance,
    a. How do you collect these vehicles/batteries?
    b. How do you handle the stranded energy in these batteries?
    c. How do you handle the battery once it is removed from the vehicle?
    d. What are opportunities for optimization?

14. For Electric Vehicles that have been recalled,
    a. How do you collect these vehicles/batteries?

b. How do you handle the battery once it is removed from the vehicle?
c. For stationary energy storage batteries, what is your process for decommission and EOL handling of these systems?

Company Perspective

15. What have you done that has worked to successfully increase the collection rate of consumer electronics?

16. How do collection companies partner with recycling companies? How do you determine the best value for your collected batteries?

17. What recommendations do you have for incentives or support for the collection of lithium-ion batteries in the U.S.? What can be done to ensure that modules and packs available in the U.S. stay in the U.S and not end up overseas due to the current lack of U.S. recycling capacity at this time?

18. What is the current and expected cost to purchase used EV batteries for processing (recycling or black mass production) and what role will battery chemistry have?

19. How do collectors recover their costs?

20. How can we educate the public more about how to recycle their batteries and electronics with batteries in them?

21. What changes have you noticed in the second-generation electric vehicles? Have you noticed any implementation of Design for Recycle aspects in their pack design? Can you provide examples of battery design aspects that have helped or hindered pack disassembly and recycling?

22. 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.

Category B: Transportation of Lithium-Ion Batteries (LIBs) and Manufacturing Scrap

1. What is your current process for shipping LIBs? What is the cost and relative impact on transportation safety of each of your major activities done during the following

process steps: Packaging, Training, Shipment Preparation, Permitting and Paperwork, and Shipping Rates for LIBs?

   a. Which of your activities and processes are required by Pipeline and Hazardous Materials Safety Administration (PHMSA) Class 9 Hazardous Materials regulations? Of the activities and processes that are required by Class 9 Hazardous Materials regulations, which have the greatest and the least significant impact on LIB transportation safety and cost?

2. Of the activities and processes that are self-imposed (i.e., not undertaken because of PHMSA regulatory requirements), which have the greatest impact on increasing LIB transportation safety? How have you determined the impact of these efforts relative to each other?

3. Have you investigated PHMSA's waiver process that allows a company to be exempted from Class 9 Hazardous Material regulations if the company demonstrates their transportation activities and processes achieve better safety outcomes than those achieved by activities and processes required under Class 9 Hazardous Material regulations? If yes, what was the outcome or impact on your safety metrics and cost of battery transportation?

4. For companies that prepare LIBs for transportation or trucking companies (Please specify): What volume of batteries do you ship? Do you ship a full truck load, partial truck load or use integrators/ freight forwarder? How do your shipping rates vary between the different sized shipments?

5. How related are transportation cost to incremental distance traveled? Does traveling an additional mile increase transportation cost linearly or is most of the cost associated with safe unloading, loading, securing, insurance of the batteries?

6. For companies that prepare LIBs for transportation or trucking companies (Please specify): What are the insurance rates that your company pays for shipping LIBs? Is the rate different than other Class 9 Hazardous materials?

7. For damaged, defective, or recalled (DDR) batteries for all applications; how do you identify these batteries before offering them into transportation? How do you handle these batteries differently than normal spent batteries?

8. In terms of maximizing the efficient and cost-effective recycling of LIBs, what advantages or disadvantages do you see in breaking down a pack into modules or cells vs keeping the pack intact before transportation? If/when does it make sense

to transport a battery while it's still in its product (i.e., in e-waste, attached to the vehicle, etc.)?

9. Have you explored options (e.g., fully discharge the battery before shipping, low-temperature transportation, detection of gas and temperature, etc.) to inert a LIB therefore, exempting it from class 9 hazmat regulations for transportation? What was the metric you used to determine if the battery was inert? What techniques have you learned to be the most successful?

10. Have you gone through the special permitting process to receive an exemption for the hazardous waste classification transportation of LIBs? What parts of the process did you find useful? What parts of the process could be improved?

11. Do you ship collected used consumer electronics overseas? If so, how are these shipped and what are the requirements on them? What visibility do you have after export? Are these being shipped for reuse or second use in another country or are they being recycled? If reused, do you know if the batteries are recycled or landfilled after use? What is the value of this material to EOL/E-Scrap recyclers?

12. 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.

Category C: Sorting of Lithium-Ion Batteries (LIBs) in the Recycling Stream

1. For consumer electronics and vehicle batteries what information and format would be useful on a label to expedite sorting?

2. For devices with an embedded battery in it, what proposed labeling strategies have you been most optimistic about and why?

3. How important is battery sorting of 1) Li-ion vs other, 2) by Li-ion chemistry, 3) by cobalt containing chemistry, etc.? Does sorting these items mitigate any safety hazards that exist or is it only to make processing better/easier?

4. How valuable would it be to know exact chemistries before recycling, what would the economic benefit be to your recycling process?

5. Where is the best place (e.g., right after collection, at the disassembly location, at the recycling location, etc.) to integrate sorting into the recycling value chain?

6. For sorting to be economic and meet throughput requirements, what is the estimated material process rate need to be (tons per hour), what does the capital cost of the system need to be and what would the operating cost need to be more effective than manual sorting?

7. For sorting to have an impact on downstream processing, what does the accuracy of the sorting process need to be?

8. Are there existing characterization techniques that could be taken advantage of to determine the cathode materials in each battery? Are these techniques needed?

9. What is the EOL disposition like for e-waste? Is there an intermediate disassembly process to separate the battery from the product? If so, how does the business model for intermediate disassembly work?

10. What are the most effective methods you have seen for separating batteries from e-waste?

11. 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.

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 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.

Category E: Permitting for Manufacturing/ Processing Facilities

1. What is the current permitting process that your company went through?

2. What issues during the permitting process did your company encounter?

3. How long did it take to site your current plant? How long did you expect that process to take?

4. What permitting decisions went into your decision to locate your plant at its current location?

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

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

they received by the community? Did you continue these activities as the site permit was being processed? What was the overall outcome of these activities? After the facility was built and operational, what community activities did you continue?

7. What were your companies' pros and cons of reuse/retooling/retrofitting an existing facility vs. building on greenfields?

8. Has your company looked at the potential to repurpose idled or abandoned fossil assets like power plants, mine sites, etc.? If so, what were the pros and cons of this?

Category F: Second Life Applications of Lithium-Ion Batteries (LIBs)

1. What are the biggest hurdles in developing your second life company/industry?

2. What chemistries and first use application make the best candidates for second life?

3. What are current integration costs for second use batteries, and what are the batteries sold for in cost/kWh? What is the expected performance at these costs?

4. What steps are you taking to secure future demand and scale the second-use market?

5. How can state-of-health determination of modules/packs, and repackage to fit an energy storage system (ESS) efficiently and economically (low cost)?

6. How would the evolution of EV battery chemistry affect the viability of their second life applications?

7. In your company's current relationships, who will be liable for the performance of second life batteries to the customer?

8. What role has Utility companies have had in the adoption of second life applications? Have the Utilities companies provided any target specifications for these applications (cost/kW, unit size, charge/discharge capacity, cycle time, number of cycles, etc.)

9. 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.

Category G: State and Local Collection Programs for Lithium-Ion Batteries

1. What are used batteries classified as when they are collected and stored (waste, used material, universal waste, hazardous waste)? How is the location and time impacted by this classification?

2. What regulatory agencies have jurisdiction over used battery management at specific points in the EOL lifecycle?
    a. Environmental
    b. Fire (NFPA)
    c. Transportation
    d. Etc.

3. What are the laws for compliance at the state and local level on end-of-life battery disposition?

4. How do you keep track of regulations at the state and local level and how do you determine your compliance? Are there multi-state agreements with the handling and storage of materials (as materials travel between states)?

5. What liabilities are these programs responsible for? And how are these programs insured?

6. Is there an estimate of building requirements based on quantity of batteries stored? Is this variable depending on where the batteries are stored?

7. Do you have examples of education and outreach programs, materials, or approaches to improve recycling, source reduction, recycling, recovering, reusing, repairing, or refurbishing that are associated with demonstrated results?

8. Can you direct us to any specific examples of useful consumer educational materials or other content that states, Tribes, and units of local government can adapt and use in recycling programs? What were the associated impacts and costs (financial, staff, and/or other resources) of the effective programs?

9. Can you direct us to any specific good examples of local and state coordination and/or collaboration on laws, permitting, zoning, etc. on recycling programs?

Category H: Retail Collection Programs for Lithium-Ion Batteries

1. Will batteries be stored whole or dismantled at retail sites?

2. How have you consolidated batteries between collection locations? What scales drive the intermediate disassembly, recycling, or transportation before ultimately recycling the batteries?

3. If dismantled, what will the components be considered for storage and transport? If hazardous waste, are there approved packaging and storage techniques to store it as solid universal waste?

4. For companies that are looking to establish collection sites at a retail location, how do you guarantee safety of the collection site and guarantee that the collection site is safe to the retailer?

5. Are there any additional cost to the retailer to set up a collection site on-site, like insurance, etc.?

Category I: Expanding Union Jobs

In keeping with the Administration's goals, and as an agency whose mission is to help strengthen our country's energy prosperity, the Department intends to use the Battery Recycling Provisions to support the creation of good-paying jobs with the free and fair choice to join a union and the incorporation of strong labor standards and training and placement programs, especially registered apprenticeship. Respondents to this RFI are encouraged to include information about how this program can best support these goals.

1. What tools/outreach would you suggest to DOE to utilize that could help projects meet the goals of creating good union jobs and work opportunities for local residents in the construction phase of the project and in the long-term operations phase of the project?

2. What unions are currently participating in your company's battery recycling efforts? What additional unions do you think should be included?

3. Are there other labor partners/organizations could aid in the implementation of battery recycling projects?

4. Do you anticipate the creation of ongoing/permanent operations jobs? If so, can you consider neutrality agreements and labor-management partnerships?

5. How are you incorporating industry-recognized credentials, licenses, or certifications and/or performance and safety standards for the technologies your project will deploy?

6. What tools/outreach should battery recycling projects utilize to meet the goals of providing opportunities for workers in the targeted communities prioritized in the statute, specifically low- and moderate income, rural, Tribal areas and former fossil energy communities?

7. Which regional and site-specific metrics should DOE track to estimate the impact related to this BIL provision(s) 40207 (e), 40207 (f)(2), (f)(3), (f)(4) and 40208?

Category J: Equity, Environmental, and Energy Justice (EEEJ) Priorities

EEEJ principles and priorities will be central to the successful implementation of the BIL. Equity requires the consideration of existing barriers that underserved and underrepresented individuals and communities face when accessing Federal resources. Environmental and energy justice principles include procedural justice, distributive justice, recognition justice, and restorative justice.

For the purposes of this RFI, DOE has identified the following non-exhaustive list of policy priorities as examples to guide DOE's implementation of Justice40[11] in DACs: (1) decrease energy burden; (2) decrease environmental exposure and burdens; (3) increase access to low-cost capital; (4) increase the clean energy job pipeline and job training for individuals; (5) increase clean energy enterprise creation (e.g., minority-owned or disadvantaged business enterprises); (6) increase energy democracy, including community ownership and other economic benefits associated with the energy transition; (7) increase parity in clean energy technology access and adoption; and (8) increase energy resilience.

[11] The Justice40 initiative, created by E.O. 14008, establishes a goal that 40% of the overall benefits of certain federal investments—including investments in climate change; clean energy and energy efficiency; clean transit; affordable and sustainable housing; training and workforce development; the remediation and reduction of legacy pollution; and the development of critical clean water infrastructure—flow to disadvantaged communities (DACs). The Justice40 Interim Guidance provides a broad definition of DACs (Page 2): https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf. The Department of Energy has identified DACs by census tract. Seehttps://www.energy.gov/diversity/justice40-initiative. The DOE, OMB, and/or the Federal Council for Environmental Quality (CEQ) may issue additional and subsequent guidance regarding the designation of DACs and recognized benefits under the Justice40 Initiative.

Equity:

Ensuring that traditionally underserved populations, including Black, Latino, Indigenous and Native American people, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural or remote areas; persons otherwise adversely affected by persistent poverty or inequality; and Historically Black Colleges and Universities (HBCUs), MSIs, and Tribal colleges and universities (TCUs), have access to Departmental programs and opportunities.

Environmental Justice:

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. This goal will be achieved when everyone enjoys: (1) the same degree of protection from environmental and health hazards, and (2) equal access to the decision-making process to have a healthy environment in which to live, learn, and work. Environmental Protection Agency (www.epa.gov/environmentaljustice).

Energy Justice:

Energy justice refers to the goal of achieving equity in both the social and economic participation in the energy system, while also remediating social, economic, and health burdens on those disproportionately harmed by the energy system. Initiative for Energy Justice (2019).

1. Please give input on how the Battery Recycling Provisions help achieve the Justice40 policy priorities that could benefit disadvantaged communities and to maximize implementation co-benefits.

2. What program requirements or review criteria should DOE consider ensuring that regional economic growth flowing from funded projects will be shared with disadvantaged communities?

3. How are adverse impacts of manufacturing and recycling facilities currently measured or monitored? Which materials, processes, and/or components result in the largest environmental impacts? What opportunities exist to minimize such impacts?

4. Describe possible human health, environmental, or ecological considerations, both positive and negative (e.g., are there any air quality impacts, sensitive ecosystems, National Environmental Policy Act (NEPA) issues, environmental justice communities, other considerations) that the DOE should consider in connection with design and implementation of the Battery Recycling Provisions.

5. How will Tribal communities or lands potentially be impacted by design and implementation of the Battery Recycling Provisions?

6. What are key equity-aligned review criteria that DOE should use to evaluate and select projects in the Battery Recycling Provisions?

7. In what ways, if any, do you anticipate battery manufacturing, recycling and associated activities could impact the workforce? For example:
   a. To what extent do you anticipate job creation, loss, or changes in job quality?
   b. To what extent do you anticipate the creation of jobs? Ongoing operations and maintenance jobs? Other jobs across the supply chain?
   c. What is needed to train, secure and maintain a qualified workforce for these activities?

Disclaimer and Important Notes

This RFI is not a Funding Opportunity Announcement (FOA); therefore, DOE is not accepting funding applications at this time. DOE may issue a FOA in the future based on or related to the content and responses to this RFI; however, DOE may also elect not to issue a FOA. There is no guarantee that a FOA will be issued as a result of this RFI. Responding to this RFI does not provide any advantage or disadvantage to potential applicants if DOE chooses to issue a FOA regarding the subject matter. Final details, including the anticipated award size, quantity, and timing of DOE-funded awards, will be subject to Congressional appropriations and direction.

Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for planning and strategy development; this RFI does not constitute a formal solicitation for proposals or abstracts. Your response to this notice will be treated as information only. DOE will review and consider all responses in its formulation of program strategies for the identified materials of interest that are the subject of this request. DOE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that DOE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI. Responses to this RFI do not bind DOE to any further actions related to this topic.

Proprietary Information

Because information received in response to this RFI may be used to structure future programs and FOAs and/or otherwise be made available to the public, **respondents are strongly advised to NOT include any information in their responses that might be considered business sensitive, proprietary, or otherwise confidential**. If, however, a respondent chooses to submit business sensitive, proprietary, or otherwise confidential information, it must be clearly and conspicuously marked as such in the response.

Responses containing confidential, proprietary, or privileged information must be conspicuously marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Federal Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

If your response contains confidential, proprietary, or privileged information, you must include a cover sheet marked as follows identifying the specific pages containing confidential, proprietary, or privileged information:

> Notice of Restriction on Disclosure and Use of Data:
>
> Pages [List Applicable Pages] of this response may contain confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for the purposes described in this RFI [DE-FOA-0001937]. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.

In addition, (1) the header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: “Contains Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure” and (2) every line and paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets or highlighting.

Confidential Business Information

Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery two well-marked copies: one copy of the document marked “confidential” including all the information believed to be confidential, and one copy of the document marked “non-confidential” with the information believed to be confidential deleted. Submit these

documents via email. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Evaluation and Administration by Federal and Non-Federal Personnel

Federal employees are subject to the non-disclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The Government may seek the advice of qualified non-Federal personnel. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The respondents, by submitting their response, consent to DOE providing their response to non-Federal parties. Non-Federal parties given access to responses must be subject to an appropriate obligation of confidentiality prior to being given the access. Submissions may be reviewed by support contractors and private consultants.

Request for Information Response Guidelines

Responses to this RFI must be submitted electronically to *bil-batterymanufacturing@hq.doe.gov* and include "BIL-Battery Recycling RFI" in the subject line no later than 5:00pm (ET) on October 14, 2022. **Please copy and paste the RFI questions, including the question numbering, and use them as a template for your response.** Respondents may answer as many or as few questions as they wish. Responses must be provided as attachments to an email. It is recommended that attachments with file sizes exceeding 25MB be compressed (i.e., zipped) to ensure message delivery. Responses must be provided as a Microsoft Word (.docx) or PDF attachment to the email. Only electronic responses will be accepted.

DOE will not respond to individual submissions or publish publicly a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

Respondents are requested to provide the following information at the start of their response to this RFI:

- Company / institution name
- Company / institution contact
- Contact's address, phone number, and e-mail address.