Overview of U.S. EPA's Battery EOL Initiatives

April 23, 2026

For 'Ohio Takes Charge'

Chris Newman

Region 5

Why Batteries?

Batteries are central to our lives as they:

- Power everything from cars to consumer electronics
- Are becoming a key part of the electrification of industry

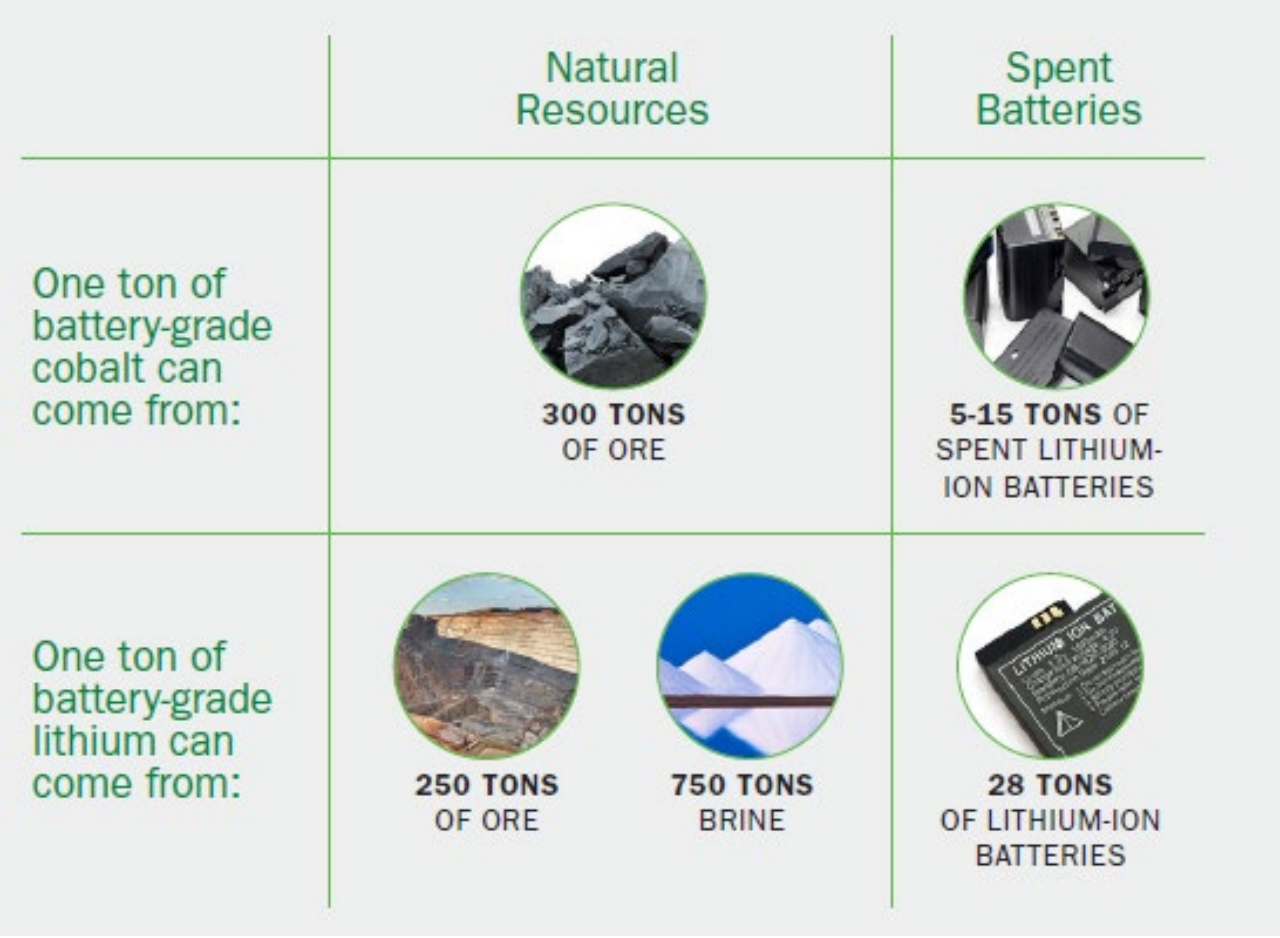
Increasing battery collection and recycling will help:

- Recover critical minerals
- Strengthen the domestic battery supply chain
- Prevent fires by keeping batteries out of municipal waste streams

Source: Estimated U.S. Market Share of LIBs for 2023-2035, in Tonnes. *Circular Energy Storage (CES).*

Why Lithium Battery Recycling?

- Safe recycling of lithium batteries conserves critical minerals and other natural resources
- Battery chemistries and designs vary, but common materials are:
  - Lithium, nickel, cobalt, manganese, iron (cathode)
  - Graphite (anode)
  - Copper and aluminum foils
  - Plastics
  - Flammable electrolyte



Source: U.S. Department of Energy Vehicle Technologies Office

Lithium Battery Recycling

- Recycling process varies and may include:
  - Collection
  - Evaluation for repair, reuse, or repurposing
  - Discharge and pre-processing: shredding and separation
    - Creation of “black mass” and “shred”
  - Metals recovery: pyrometallurgy and hydrometallurgy
  - Creation of new battery-grade materials
    - Precursor cathode active material and cathode active material (pCAM and CAM)

Source: Argonne National Laboratory

Development of Domestic Recycling Market

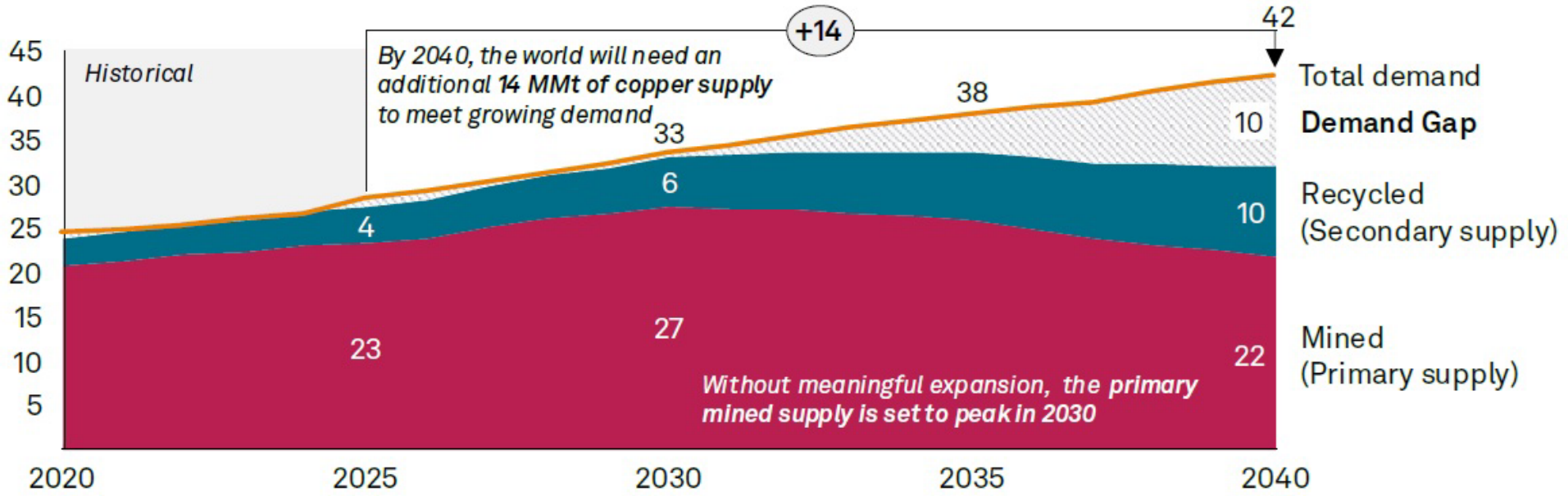
- Capacity for US- and North American-based recycling are growing
  - Collection
  - Pre-processing
  - Metals recovery
  - New battery-grade materials
- Challenges remain for all aspects of battery reuse and recycling
  - Ensuring safe accumulation and transport of end-of-life batteries
  - Managing a wide variety of lithium battery chemistries
  - Measuring battery state of health for reuse
  - Scaling metals recovery facilities
  - Meeting purity demands for new battery manufacturing

Improving Domestic Critical Mineral Supplies

Building a robust U.S. recycling collection system:

- Provides a domestic source of critical minerals to return to the supply chain
- Provides materials that require less processing than mining
- Strengthens domestic manufacturing in sectors that use critical minerals
- Recovers materials that would otherwise be a waste

Figure ES- 1. Total copper market balance (2020–2040)
MMt Cu



Note: Recycled supply represents end-of-life scrap. Mined supply includes operating production and risked production from committed, probable and possible projects. Source: S&P Global © 2026 S&P Global

Battery Fire Risk at End of Life

- Lithium batteries exhibit greater risk of fires or other thermal events compared to other common battery types
  - Greater energy density means a short circuit generates more heat
  - Prone to thermal runaway: a vicious cycle of heating -> damage -> even more heating -> propagation to other batteries
  - Fires are hot and intense, projecting flames and sparks, potentially igniting materials near by.

Source: U.S. Department of Energy

EPA's Battery-Related Projects

Separate but complementary requirements in the Infrastructure Investment and Jobs Act (IIJA):

Extended Battery Producer Responsibility Framework

Battery Collection Best Practices

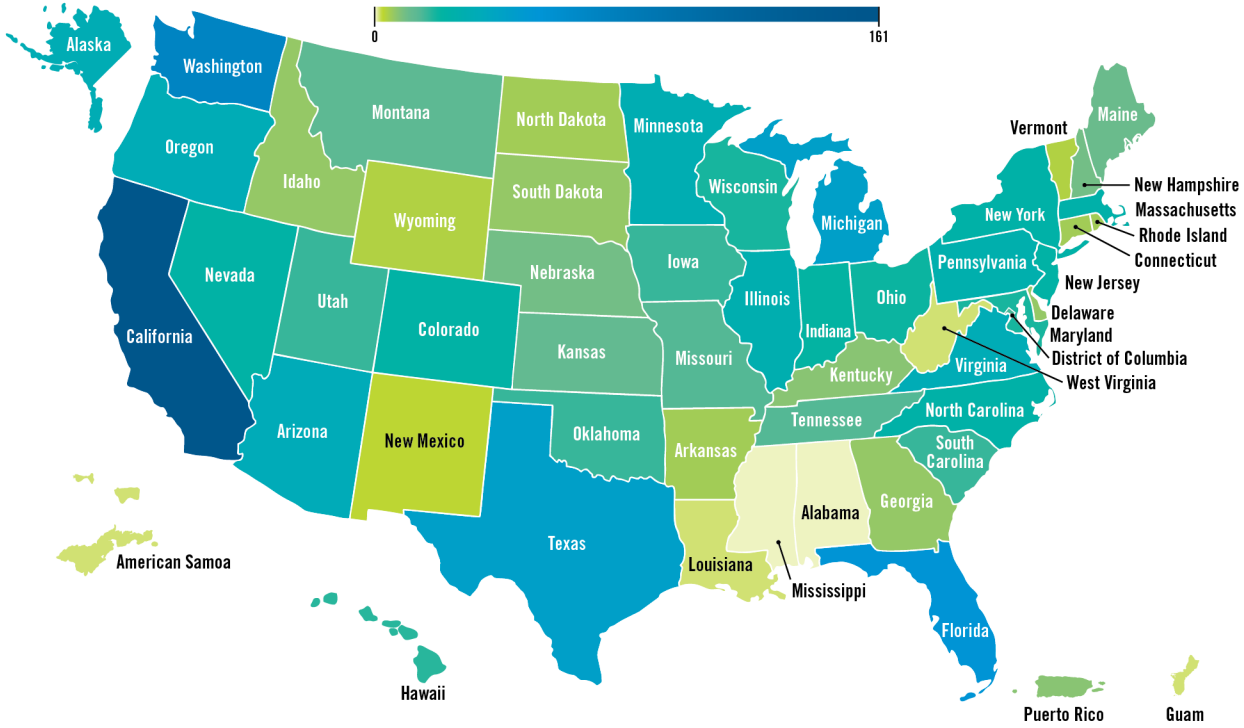
Education Materials

Voluntary Battery Labeling Guidelines

EPA's Battery Stakeholder Engagement at a Glance

Through working sessions, public feedback opportunities, and other events, EPA is working with stakeholders across industries, governments, and communities to advance battery collection, recycling, and manufacturing in the United States.

State, Territorial, Tribal, and Local Government Attendees at Working Sessions (2024-2025)



51 states/territories represented

89 state/territory agencies attended

37 Tribal government agencies attended

239 local government agencies attended

Working Sessions Focused on Collection and Labeling

4,852 working session attendees from across the battery life cycle

19 working sessions held between February 2024 and July 2025

Other Engagement Pathways

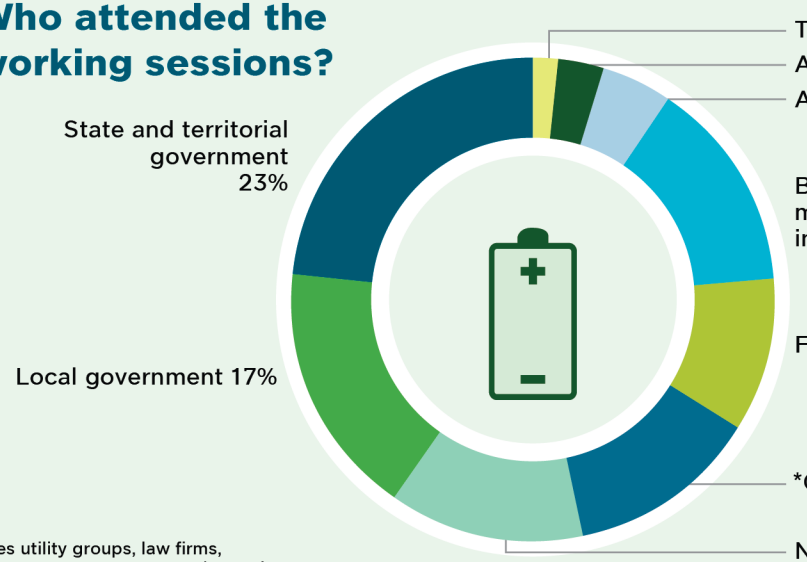
16 industry and government events attended between January 2024 and May 2025

Request for Information (RFI) Engagement

59 responses submitted to the RFI (2022)

780+ unique participants in RFI feedback sessions (2022)

Who attended the working sessions?



*Includes utility groups, law firms, waste management, consumer electronics industry, retailers, and more

Last updated: August 2025

Scope of Batteries

Category	Small format consumer electric and portable batteries		Mid-format batteries	Large format batteries
Type	Single use (Primary)	Rechargeable (Secondary)	Rechargeable	Rechargeable
Use	Removable or embedded in electronics and electric devices, such as watches, hearing aids, cameras, key fobs, toys, portable radios, flashlights.	Removable or embedded in electronics and electric devices, such as phones, computers, appliances, small uninterruptable power supplies (UPS), power tools, power banks.	E-mobility including e-bikes, e-scooters. Outdoor power equipment. Portable power stations.	All scales of automotive starting and motive vehicle batteries. Materials handling equipment (forklift, crane, etc.) Recreational (golf carts, marine equipment, recreational vehicles, etc.)

Vision for EPA's Resources and Guidelines

- **Battery Collection Best Practices**
  - EPA will develop best practices for Tribal, state, and local governments to recycle batteries in a manner that is:
    - Technically and economically feasible
    - Environmentally sound and safe
    - Optimizing value and use of materials, including critical minerals

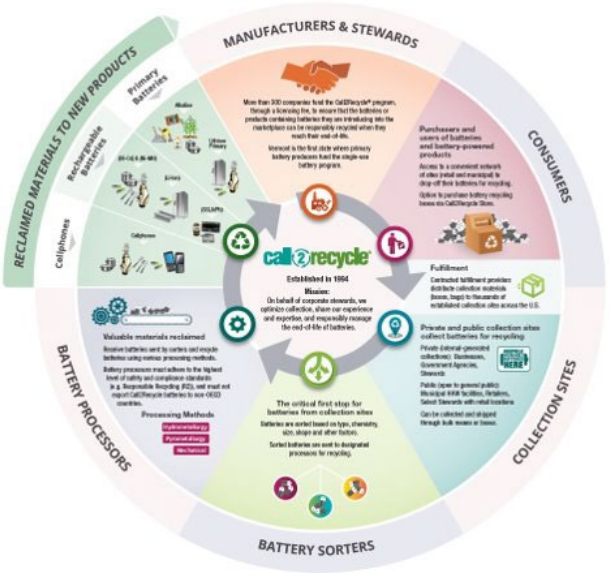
Common Themes: Collection Best Practices for Consumer Batteries

Enhance point of sale information and messaging

Convenient and well-marked collection locations; consistent and wide-spread outreach

Train employees at collection sites; ensure materials are properly packaged and labeled

Partner for program implementation; employ a hub and spoke model of collection for rural areas



Battery Collection Best Practices Tool Kit

Battery format

- [ ] Large Format (Motive)
- [ ] Large Format (Stationary Storage)
- [ ] Mid-Format
- [x] Small Format

Reset

Resource Type

- [x] Case Study
- [ ] Educational Material
- [ ] How-to Guide
- [ ] Infographic
- [ ] Report
- [ ] Standards
- [ ] Tip Sheet
- [ ] Webinar

Reset

Focus Area

- [ ] Collection Sites
- [ ] Curbside Collection
- [ ] Damaged and Defective Batteries
- [ ] E-cigarettes
- [ ] Education/Outreach
- [ ] Extended Battery Producer Responsibility
- [ ] End-of-Life Management
- [ ] Fire Management

Reset

Community Characteristics

- [ ] All
- [ ] Tribal

Reset

Show 10 entries Export to Excel Search:

Title	Description	Organization	Battery Format	Resource Type	Focus Area	Community Characteristics
Leading the Charge: Marion County's Battery Collection and Recycling Program	Case study that highlights battery collection and recycling in Marion County, focused on the challenges and successes of an established curbside collection and drop-off program, and the importance of education and outreach in fostering community awareness and support.	U.S. Environmental Protection Agency	Mid-Format; Small Format	Case Study	Collection Sites; Education/Outreach	All
Onondaga County Resource Recovery Agency's Community-Centered Battery Collection	Case study that describes an evolving community-centered battery collection program in Onondaga County, New York, highlighting strategies for public engagement, fire safety, and infrastructure over three decades.	U.S. Environmental Protection Agency	Small Format	Case Study	Collection Sites; Education/Outreach; End-of-Life Management; Fire Prevention; Hazardous Waste; Recycling; Storage	All
Seattle Bans Batteries from the Bin	Case study that highlights Seattle's battery disposal ban, which was enacted to reduce battery-caused fires and prepare customers for an upcoming statewide disposal ban.	U.S. Environmental Protection Agency	Mid-Format; Small Format	Case Study	Collection Sites; Education/Outreach; Recycling	All

https://www.epa.gov/electronics-batteries-management/battery-collection-best-practices-toolkit

Vision for EPA's Resources and Guidelines

- **Voluntary Battery Labeling Guidelines**
  - EPA is developing guidelines for labels that will:
    - Identify battery collection locations
    - Educate consumers about recycling opportunities
    - Reduce safety concerns from improper disposal

Common Themes: Labeling Guidelines

It's a battery!

Do recycle it if you can! Don't put it in your bins!

State/condition?

Chemistry

Link to more information

Color?

Vision for an Extended Battery Producer Responsibility Framework

- A voluntary EPR framework, not meant to be a model bill, that provides current practices and related options, challenges, and considerations.
- Aimed at supporting states in EPR design and implementation and promoting consistency across jurisdictions to achieve national goals.
- The framework will address, at a minimum, the key elements specified in the IIJA:
  - Battery recycling goals
  - Cost structures for mandatory recycling
  - Reporting requirements
  - Product design
  - Collection models
  - Transportation of collected materials, including safely storing and handling

Elements for an EPR Framework

Policy Development

- Definitions
- Funding & cost structures
- Implementation timeline
- Labeling
- Roles & responsibilities
- Performance measures & goals
- Alignment with other policy instruments

Program Implementation

- Education & outreach
- Collection models & transportation
- Stewardship plan

Monitoring & Evaluation

- Data collection & annual reporting
- Enforcement
- Performance measures & goals

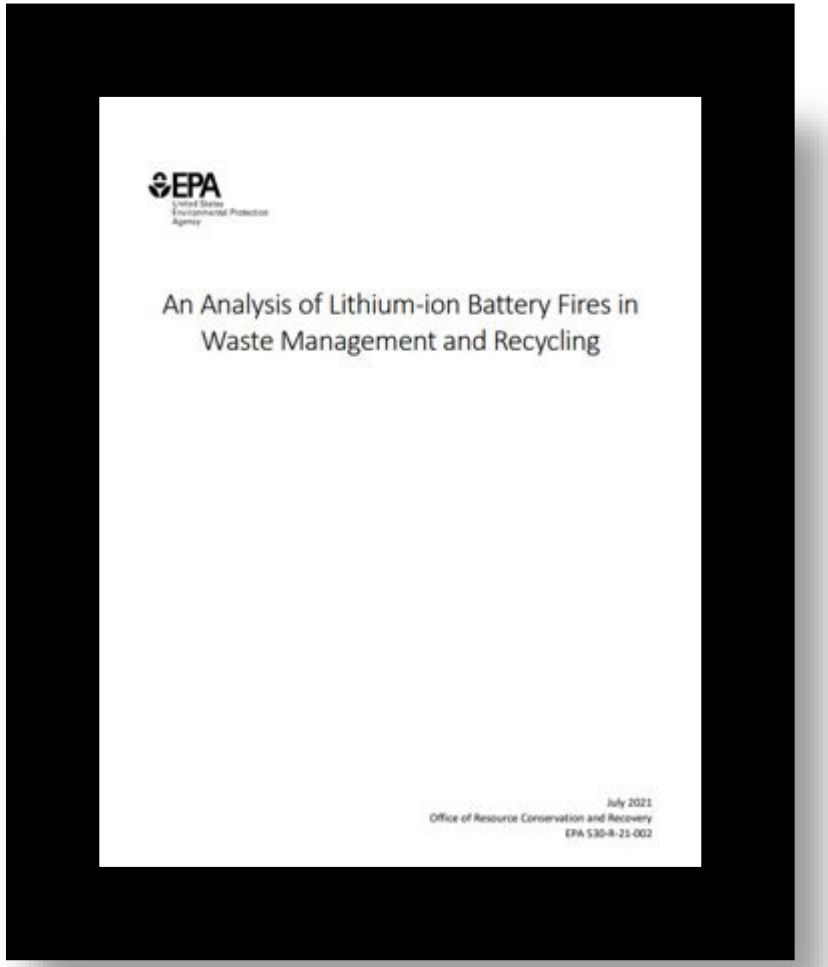
What's Next? – Rollout Timeline

Spring 2026: Additional web-based resources in Battery Collection Toolkit

Scan to access the Toolkit!

Using Data to Help Understanding

- U.S. EPA released a report analyzing the impacts of end-of-life lithium-ion batteries, generally from consumer devices going into the municipal solid waste management process.
- Consumers often don't know where to recycle batteries, or what devices have batteries.
- 240+ fires at 64 facilities were identified in seven years.
- Many waste management facilities were damaged or destroyed.
- Information like this helps EPA understand the challenges to getting batteries properly recycled.
- This data was one part of the justification for the lithium battery universal waste rule.



Adding Lithium Batteries to the Universal Waste Rule

- U.S. EPA is proposing to revise the Universal Waste Rule to include a category for lithium batteries
  - New category specific to lithium batteries, separate from the existing broad UW batteries category
  - Housed within the existing UW program
  - Handler requirements and allowed activities are subject to change relative to the existing US battery category
- Goal: To address safety concerns while still promoting recycling
- EPA intends to harmonize the new standards with existing BMPs, fire codes, and other regulations where possible

Image source: Waste Dive

Regulatory Framework for Spent and End-of-Life Batteries

- Resource Conservation and Recovery Act (1976)
  - Main federal environmental law governing waste in the United States; implemented by U.S. EPA
- Universal Waste Rule
  - Streamlined management standards for categories of hazardous wastes that are commonly generated by a wide variety of establishments, including batteries
  - Goal: To facilitate recycling and recovery of common hazardous wastes
- Batteries that meet the definition of hazardous waste can be managed as universal waste
- Spent Lead Acid Batteries (SLABs) –
  - Hazardous for toxicity (lead) and corrosivity (sulfuric acid electrolyte)
  - Managed under special management standards when recycled or as universal waste batteries
- Lithium Batteries –
  - Likely hazardous for ignitability and reactivity
  - EPA currently recommends managing lithium batteries as universal waste
- States may have additional regulations

Transboundary Movement of Spent and End-of-Life Batteries


Image Source: EPA

- Imports and exports of RCRA hazardous waste are subject to prior informed consent requirements
  - Inclusive of universal waste batteries and Spent Lead Acid Batteries (SLABs)
- The control of transboundary movements of hazardous waste involves several agencies:
  - U.S. Environmental Protection Agency
  - Customs and Border Protection
  - Department of Transportation Pipeline Hazardous Materials Safety Administration

A Whole of Government Approach

Agency	Examples of the Agency's Work
Environmental Protection Agency	Information to improve safe management of spent batteries and emergency response to lithium battery involved fires.
Pipeline and Hazardous Materials Safety Administration (PHMSA) – Department of Transportation (DOT)	Safe shipping of batteries and battery containing devices
Department of Energy (DOE)	Funding battery recycling, manufacturing, and research projects
Consumer Products Safety Commission (CPSC)	Focuses on consumer product safety, including those with batteries
Department of State	Pax Silica – building the AI ecosystem of tomorrow, including critical minerals in batteries
National Highway Traffic Safety Administration	Battery Safety Initiative for electric vehicles helps coordinate research and other activities relating to batteries in EVs
Coast Guard	Safety of lithium batteries onboard vessels
Customs and Border Protection	Import/export of batteries and materials for recycling
Federal Emergency Management Agency	Preventative education via U.S. Fire Adminstration; Coordination on disaster responses that include batteries (Maui fire)
States and local governments, within their authorities	Establishing battery EPR and collection programs, implementing e-waste programs, inspection and permitting.

Thank you!

More details are at: www.epa.gov/electronics-batteries-management

Please contact us with questions or comments at ***batteries@epa.gov***