Battery Collection Best Practices

Report to Congress

Requested in Section 70401 of the Infrastructure Investment and Jobs Act (Public Law 117-58), 2021

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Office of Resource Conservation and Recovery
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Abbreviations

CFR	Code of Federal Regulations
DDR	damaged, defective or recalled
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EOL	end-of-life
EPA	U.S. Environmental Protection Agency
EPR	extended producer responsibility
EU	European Union
EV	electric vehicle
IIJA	Infrastructure Investment and Jobs Act
HHW	household hazardous waste
MRF	materials recovery facility
NiCd	nickel-cadmium
NiMH	nickel metal hydride
NiZn	nickel-zinc
PHMSA	Pipeline and Hazardous Materials Safety Administration
RCRA	Resource Conservation and Recovery Act
SLABs	Spent Lead-Acid Batteries
SSLA	Small Sealed Lead-Acid
SPU	Seattle Public Utilities
SWIFR	Solid Waste Infrastructure for Recycling
Wh	watt-hour

1 Introduction: The Need for Safe Battery Collection for Recycling in the United States

Batteries containing critical minerals power an increasing number of products that make modern life possible. Improving battery collection at the end of their use can lead to increased battery recycling rates and reduced fires at waste management facilities. Batteries power consumer products, including cars, lawn equipment and toothbrushes. They also are used in many industrial applications, including construction and agricultural equipment, as well as in energy storage and backup power for infrastructure and artificial intelligence data centers. Safely collecting and recycling batteries can increase the recovery of critical minerals in the U.S. and create jobs. However, challenges associated with battery collection have led to low battery recycling rates, and batteries in the waste stream have caused fires at waste management facilities. Challenges include a lack of awareness among consumers and businesses about which products contain batteries and how to properly collect, store and transport them for recycling. Battery collection locations are often not convenient for many battery types. State, Tribal and local governments; businesses; and nongovernmental organizations have developed best practices to overcome collection challenges and create effective recycling programs.

This report fulfills the mandate from Congress in Section 70401(b) of the 2021 Infrastructure Investment and Jobs Act[1] for the U.S. Environmental Protection Agency to "develop best practices that may be implemented by state, Tribal and local governments with respect to the collection of batteries to be recycled in a manner that, to the maximum extent practicable, is technically and economically feasible for state, Tribal and local governments; is environmentally sound and safe for waste management workers; and optimizes the value and use of material derived from recycling of batteries." Congress mandated that EPA develop best practices for collection in coordination with state, Tribal and local governments and relevant nongovernmental and private sector entities. EPA developed the report using feedback gathered from organizations in virtual feedback sessions,[2] a request for information,[3] a virtual workshop on lithium batteries in the waste stream[4] and working sessions on battery collection.[5] This information builds upon EPA's decades of experience to support state and local governments' efforts to soundly manage solid waste under the Resource Conservation and Recovery Act.

Box 1. Key Barriers Affecting Battery Collection

For consumers:

- Lack of consumer awareness and knowledge
- Lack of collection infrastructure or access
- Exacerbated challenges in communities facing logistical challenges

For management facilities:

- Fire hazards and safety concerns for workers
- Inability to remove embedded batteries
- High maintenance costs
- Complex shipping and transportation requirements
- DDR batteries

1.1 Challenges to Safe and Effective Battery Collection

Box 1 summarizes key barriers to battery collection. Improperly managed loose lithium batteries may catch fire or explode during transportation, in landfills, and at materials recovery facilities that process curbside recyclables, posing significant risks to both infrastructure and worker safety. Embedded lithium batteries also pose fire and safety hazards. Consumers may not know that many electric or electronic devices (e.g., children's toys, personal care devices, e-cigarettes) have embedded lithium batteries, and may dispose of these products in municipal trash or recycling bins. Damaged, defective or recalled batteries of all chemistries present an even higher risk of catching fire and can present more pronounced safety concerns when they are handled, transported, stored or disposed of incorrectly.[6]

MRFs are particularly vulnerable, as fires at these facilities can destroy valuable equipment and critical community infrastructure, creating challenges for recycling other materials such as aluminum, steel, paper and plastic. Nearly every MRF in the U.S. reported a fire between 2014 and 2020, with many of these fires caused by improper placement of lithium batteries in mixed curbside recyclables.[7]

Many state, Tribal and local governments struggle to collect and recycle batteries in a safe and cost-effective way. Respondents from 39 states reported that batteries were the most difficult-to-manage material out of a list of 21 waste materials, according to a 2024 survey by the Association of State and Territorial Solid Waste Management Officials.[8] Respondents cited risk of fires, high operational costs, lack of collection and transportation infrastructure and limited availability of recyclers as key barriers to battery recycling.[8] Fires significantly affect the economic viability of MRFs by causing operational downtime during shutdowns and reducing available insurance options. Additionally, many MRFs are near communities and fires can contribute to local air pollution (Figure 1).

Figure 1. Fires at recycling facilities pose threats to public health and safety. Source: EPA

1.2 What's in This Report?

This report contributes to EPA's work to fulfill the IIJA mandate in Section 70401(b) as follows:

- Section 2 provides information about battery recycling in the U.S., including information on battery types, projected demand for batteries and current rates of battery recycling.
- Section 3 describes current best practices for battery collection.
- Section 4 presents conclusions and next steps.

2 Battery Recycling in the U.S.

Planning for sound battery management and recycling requires governments to understand the landscape of these materials in the U.S. now and in the future. Battery size, chemistry and use have changed dramatically over the past few decades. To facilitate engagement with interested organizations, EPA developed a framework for categorizing the most common types of batteries in the U.S. EPA also investigated current recycling rates and recycling methods across the country.

2.1 Battery Types and Categories

EPA classified batteries into four categories based on format, type, use and chemistry (Table 1). These categories draw from existing definitions and industry categories from various regulatory bodies, including Section 40207(f)(1) of the IIJA,[1] Washington State Senate Bill 5144,[9] the California Responsible Battery Recycling Act of 2022[10] and the 2023 European Union Batteries Regulation.[11] While some batteries may fall outside of the ranges provided in Table 1, these categories are consistent with most batteries currently on the market. Appendix A offers more information on battery chemistries.

Table 1. Battery Categories Identified by EPA

Format	Small Format Consumer Electric and Portable Batteries		Mid-Format Batteries	Large Format Batteries
Type	Single-use	Rechargeable	Rechargeable	Rechargeable
Uses	Removable or embedded in electronics and electric devices, such as watches, hearing aids, cameras, key fobs, toys, portable radios and flashlights	Removable or embedded in electronics and electric devices, such as phones, computers, appliances, small uninterruptable power supplies, power tools and power banks	• E-mobility devices, including e-bikes and e-scooters • Outdoor power equipment • Portable power stations	• Automotive starting and motive vehicle batteries, except lead-acid batteries • Materials handling equipment (e.g., forklift, crane) • Grid, off-grid and microgrid • Commercial, including building systems, data centers, server rooms, medical and hospital equipment and retail backup power
Chemistries	• Alkaline • Zinc-carbon • Silver oxide • Lithium metal	• Lithium-ion (including lithium polymer) • Nickel-cadmium, nickel metal hydride, nickel-zinc • Small sealed lead-acid	• Lithium-ion • SSLA • Lead-acid vehicle batteries	• Lithium-ion • NiMH • Various lithium chemistries • NiCd
Weight range	Up to 4.4 pounds	Up to 11 pounds	11 to 25 pounds	More than 25 pounds
Watt-hour rating	Up to 300 Wh	Up to 300 Wh	300 Wh to 2,000 Wh	More than 2,000 Wh

2.2 Recycling Rates

Research shows that lead-acid batteries have the highest recycling rate currently, but the market for used lithium-ion batteries is likely to grow. Recycling rates are not nationally tracked for all batteries. However, various sources provide information about battery recycling. The global battery recycling market—which includes the collection, reuse and processing of batteries—was $2 billion in 2023, with a projected 750% increase to $17 billion by 2030.[12] The same source estimated the U.S. battery recycling market at $379 million in 2022, with the vast majority of the market comprised of lead-acid battery recycling.[13] Lead-acid batteries have the highest industry-reported recycling rate (99.3%) in the U.S., largely due to federal and state solid waste disposal regulations.[14,15] Alkaline batteries have an estimated recycling rate of 4%.[16] There is no widely accepted U.S. lithium-ion battery recycling rate, but the current rate is assumed to be low.[17] The literature often refers to a lithium-ion battery recycling statistic of 5%, which originated in Europe and is close to a decade old. However, one organization estimated that material recovery capacity for lithium-ion batteries in the U.S. and Canada will grow from 5,150 metric tons in 2021 to 1,175,300 metric tons in 2030. [15] For other battery chemistries (such as NiCd, NiMH and zinc-carbon batteries), reliable recycling data remain sparse or difficult to verify.

2.3 Processing Batteries for Recycling

Battery recycling is complex and involves a number of entities and stages such as collection, sorting, and various types of processing. Municipalities, retail locations or other management facilities manage battery collection sites. After collection, batteries go to one or several management facilities, where workers sort and evaluate the batteries, store them and prepare them for transport to a recycler. Recyclers typically use two stages of processing: mechanical separation and metal extraction.[18] During mechanical separation, battery components are dismantled or shredded and then processed for further separation and preparation for metal extraction. Metal extraction, which may be done at specialized downstream processors, focuses on recovering valuable metals (i.e., cobalt, lithium and nickel) from the cathode material. As shown in Figure 2, the two most common types of metal extraction are pyrometallurgy, which is a high-temperature smelting process, and hydrometallurgy, an acid-leaching process.[19] Direct recycling is an emerging technology that could support a higher recycling efficiency by not breaking down the chemical structure of battery materials.

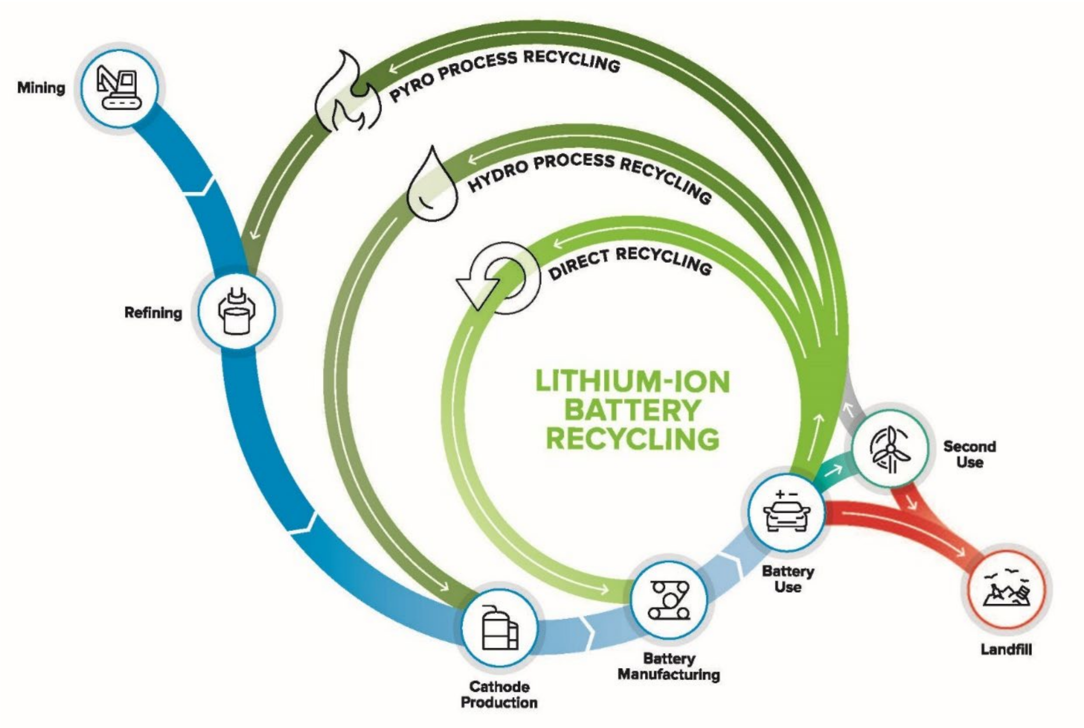

Figure 2. Lithium-ion battery life cycle and recycling processes. Source: ReCell Center

Safety concerns, especially with lithium batteries, can affect any of the facilities that manage batteries. Lithium batteries can explode or catch fire when they are collected, stored, transported or processed. They also can be damaged if they are disposed of in the trash or in municipal recycling bins, as they can be crushed or punctured during collection or by sorting and processing equipment (e.g., by perforators used to prepare plastics for recycling).[20] DDR batteries require special handling as hazardous waste under RCRA in many cases, and damaged lithium batteries pose a heightened risk of fire.

3 Best Practices for Collecting Batteries

EPA conducted several outreach workshops and virtual feedback sessions between March 2024 and July 2025 to learn about existing best practices for battery collection, recycling, labeling and education in the U.S. and internationally. Many state, Tribal and local governments; nonprofits; and businesses have developed policies and programs varying in scope and maturity to facilitate sound battery collection and recycling. Through case studies; virtual working sessions; and a review of publicly available information from all 50 states; five territories; Washington, D.C.; and many municipalities; EPA identified the policies and programs that make battery collection possible at state and local levels (Table 2). These best practices are technically feasible for state, Tribal and local governments to replicate; are environmentally sound and safe for waste management workers; and optimize the value and use of material derived from recycling batteries.[1]

Table 2. Summary of Existing Battery Collection Policies and Programs

	Policy/Program	Description	Who Funds Collection	Batteries Collected			
				Small Format Consumer	Mid-Format	Large Format Vehicle/ Equipment	Large Format Stationary Storage
Legislative	Advanced recovery fee	A fee, added to the price consumers pay for electronics, later used to reimburse those involved in collecting and recycling the devices.	Consumers	✓			
	Disposal ban	Prohibits consumers from disposing of batteries and electronics as municipal trash.	Consumers and manufacturers	✓	✓	✓	
	Extended producer responsibility	Holds manufacturers or retailers responsible for their products at the end of the products' useful lives.	Manufacturers	✓	✓	✓	
Non-Legislative	Collection sites and events	Designated locations or events where consumers can bring batteries to be recycled.	Governments	✓	✓	✓	
	Curbside collection	A collection process in which batteries and/or electronics get picked up at a consumer's home, often alongside municipal trash and recycling.	Governments	✓			
	Mail-in collection	A collection process in which consumers can purchase kits to send end-of-life batteries to organizations that recycle them.	Consumers	✓			
	Retail takeback and collection	A collection process in which retailers offer battery/electronics collection bins in their stores. Electric vehicle dealerships and manufacturers take back EV batteries under warranty.	Manufacturers	✓	✓	✓	
	Voluntary EPR	A framework in which manufacturers or retailers volunteer to be responsible for their products at the end of the products' useful lives.	Manufacturers	✓	✓		✓

3.1 Best Practices for State, Territory and Local Governments

State, territory and local governments use different techniques to recover small format batteries depending on their geographical context. These programs have involved messaging campaigns to educate consumers on how to properly recycle their batteries. Some state and territory governments have enacted legislative measures, including disposal bans and EPR laws (Figure 3), while others focus on voluntary programs such as establishing statewide battery collection sites and hosting household hazardous waste collection events. Many local governments have worked to make collection accessible by launching their own collection events, directing residents to battery collection locations at big-box retailers or offering the convenience of curbside collection for certain types of batteries.

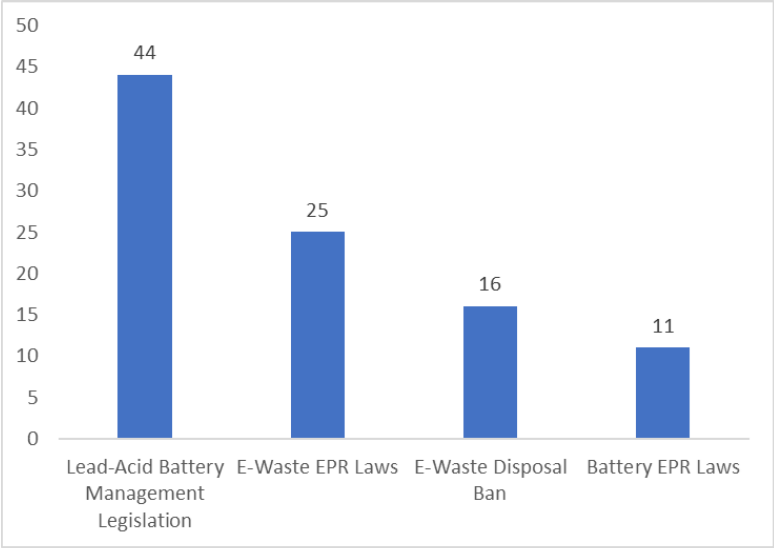

Figure 3. Number of states with battery-related legislation as of July 24, 2025.

3.1.1 Small Format Consumer Electric and Portable Batteries

Consumers frequently use small format batteries, which include many different battery types, such as alkaline and lithium batteries. Consumers frequently cannot identify different battery chemistries, or which products contain batteries. State, Tribal and local governments; businesses; and nonprofit organizations have worked to ensure that consumers know how to identify batteries and where and how they can recycle their batteries. They have also worked to provide adequate accessible collection locations for recycling.

Messaging to Consumers

Many state and local governments have developed informational materials, such as fact sheets, flyers, videos and social media posts, to inform consumers about proper battery disposal (Box 2). Common messages include the following:

- **Do not put batteries in curbside recycling bins or household trash.** Most programs recommend bringing batteries to a collection location. Some also recommend taping the terminals of these batteries, or placing alkaline and single-use zinc-carbon batteries[22] in the trash because of the costs associated with recycling alkaline batteries.[23] Other programs accept alkaline batteries along with other battery types because consumers often cannot determine the chemistry of their batteries.

Box 2. Engaging Messaging in Montgomery County, Maryland

The Montgomery County Department of Environmental Protection developed an informational video for the public on the importance of proper battery disposal as a way of reducing the risk of fires. The video includes information on different battery chemistries, warning signs of damaged batteries and instructions on storing household batteries. It points residents to the Shady Grove Processing Facility as a local drop-off location.[21]

- **Properly store batteries at home.** An important first step in preventing fires is storing batteries correctly at home. For example, California recommends storing old batteries in a safe, dry place, out of children's reach and away from flammable items.[24]
- **Look for warning signs of damage.** All lithium batteries pose a fire risk and should be handled carefully. However, batteries that are DDR have a higher risk of catching fire, especially during transport.[25] Disposing of DDR batteries requires special care and handling. Consumers can identify DDR batteries through visual cues like swelling, corrosion and damaged wires.[25]

Collection Policies and Approaches

States and territories use different policies and approaches to collect small format batteries. About half of U.S. states have laws that address e-waste (which often contains batteries). A few states are implementing or exploring policies specifically for small format rechargeable batteries. The laws addressing e-waste are older and states have established best practices for their implementation, while many states are still learning about how to successfully implement laws specific to batteries.

Advanced recovery fees are added to the price that consumers pay for electronics or batteries under some policies. The state collects this fee and uses it to reimburse recyclers for collecting and recycling the devices.[26] California is the only state to implement an advanced recovery fee for some electronic wastes. In 2022, California amended the Electronic Waste Recycling Act of 2003 to add covered battery-embedded products. Prior to the amendment, the act only covered electronics with video displays, such as laptops, cell phones, televisions, desktops and computer monitors. Once California implements the regulations, covered products will include battery-embedded devices specified by the amendment, and consumers will pay an advanced recovery fee at purchase to fund recycling and disposal of those covered products.[27]

Disposal bans prohibit the disposal of batteries or electronics in trash cans. More than 15 states have disposal bans on e-waste, rechargeable batteries, or both. New York State's rechargeable battery disposal ban, which is part of the Rechargeable Battery Law of 2010, requires consumers to take batteries out of specific products and properly dispose of them at a HHW collection site or a business collection box.[28] Connecticut law bans rechargeable batteries from disposal and tasks municipalities with providing proper collection and recycling programs for residents.[29] Some localities have used disposal bans as part of a larger approach to address battery fires. For example, Seattle Public Utilities banned the disposal of alkaline, lithium-ion and small button batteries, in addition to some e-waste, in carts or dumpsters. Their website provides information on how to properly discard batteries at transfer stations, local HHW facilities, The Battery Network (formerly Call2Recycle) partner retail locations or curbside pickup. In cases of improper disposal, SPU puts a tag on the resident's cart or dumpster asking for the e-waste or batteries to be removed.[30]

EPR is a policy approach that gives producers financial or physical responsibility for a product's entire life cycle, including the management or disposal of post-consumer products.[31] This mechanism moves the financial burden of managing the waste from the government to the business(es) that designed and produced the product. Ten states and D.C. have passed EPR laws specifically for collecting and recycling portable and rechargeable batteries (not including e-waste; Figure 4).[35] Twenty-four states and D.C. have EPR laws for e-waste, most of which were passed in the mid- to late 2000s before the exponential rise in battery-embedded consumer products.

The scope of products covered by state EPR laws varies in terms of battery chemistries and formats, as shown in Figure 4—likely due to products on the market when these laws were passed. In New York and Minnesota, battery EPR laws cover small format rechargeable batteries only. Battery EPR laws in California and D.C. cover small format single-use and rechargeable batteries. More recently adopted battery EPR laws in Colorado, Connecticut, Illinois, Nebraska, Vermont and Washington cover both small and mid-format single-use and rechargeable batteries. New Jersey also passed the Electric and Hybrid Vehicle Battery Management Act, a separate EPR law pertaining to large format EV batteries. Washington's battery EPR law instructs the Department of Ecology to conduct an assessment analyzing EOL management opportunities and challenges to incorporating large format batteries, battery-containing products, batteries in medical devices and products with embedded batteries participate in a stewardship program.[36] Box 3 provides snapshots of three battery EPR programs.

In addition to the state battery EPR laws listed above and depicted in Figure 4, several states (e.g., Florida, Iowa, Maryland) enacted laws governing EOL management of SSLA and NiCd batteries in the 1990s in response to RCRA regulations about metals of concern. However, the map in Figure 4 excludes these laws because they do not include the major elements of more recent battery EPR laws (e.g., stewardship plans, performance measures, producer responsibility organizations), they typically covered only NiCd and SSLA batteries and do not cover lithium-ion batteries. The 1996 Battery Act facilitated the collection and recycling of NiCd and certain SSLA batteries. At the time of the 1996 Battery Act, about 80% of rechargeable batteries were NiCd batteries.

Box 3. Snapshot of State-Led Battery EPR Programs

California: The 2006 California Rechargeable Battery Recycling Act requires all retailers of rechargeable batteries to have a system in place for collection, recycling and proper disposal.[32] California passed the Responsible Battery Recycling Act of 2022 to establish an EPR model for covered rechargeable and single-use small format batteries. The law requires manufacturers who sell or distribute these batteries to register with CalRecycle and submit a stewardship plan detailing the collection, transportation, recycling and management of their products. This plan must include a convenient battery collection system that is free to consumers and achieves the collection rate determined by CalRecycle.[10] California's 2022 battery EPR law does not cover embedded batteries; however, a 2022 amendment to the state's Electronic Waste Recycling Act will require the program to include embedded batteries.

Vermont: The 2014 Vermont Primary Battery Law was the nation's first single-use battery EPR law. The law requires producers to fund a stewardship plan that establishes two year-round collection sites in each Vermont county. While collection services at these sites are free for consumers, battery producers fund the program by paying fees to The Battery Network based on their battery sales within Vermont. To ensure accountability, program participants must perform supplementary outreach or enhance program accessibility if they do not meet yearly collection and recycling goals. In 2026, the law will expand to include rechargeable batteries.

Washington, D.C.: The Zero Waste Omnibus Act of 2020 required D.C. to establish at least one collection site for every 10,000 people across all eight wards, consider public transportation accessibility for these sites and accept most types and chemistries of small format consumer electric and portable batteries under 11 pounds.[33] The city worked with The Battery Network to develop a producer-funded system through which consumers can drop off their batteries free of charge. Although there is no cost to retailers and other businesses or institutions to participate as a battery collection site, they are not required to do so. As of November 1, 2023, 194 producers (representing 478 brands) were participating in the program.[34]

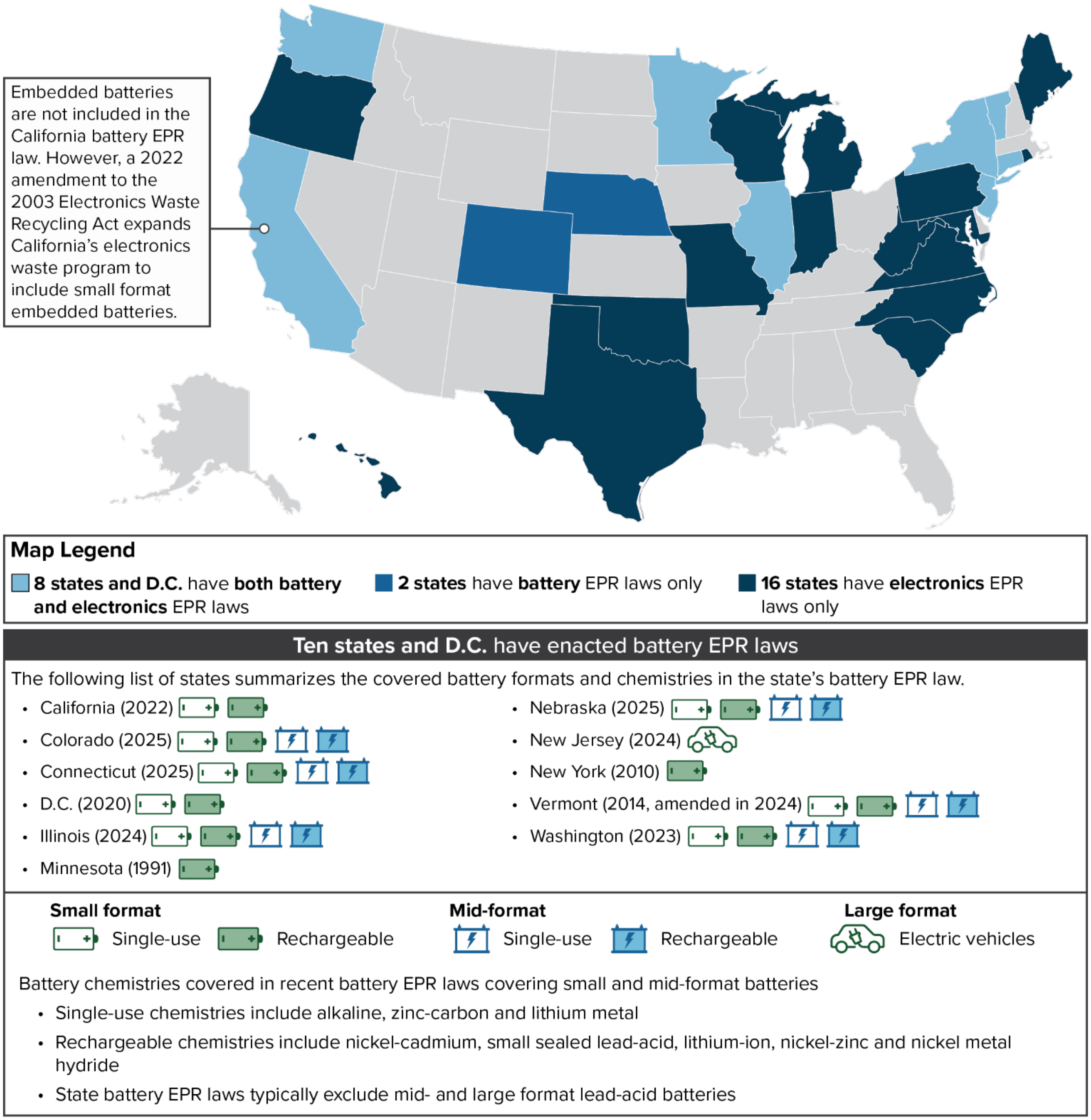

Figure 4. U.S. battery and electronics EPR laws.

In **voluntary systems**, producers voluntarily fund collection and/or recycling programs.[31] For example, in partnership with battery manufacturers and The Battery Network, Vermont has operated a voluntary rechargeable battery EPR program that covers NiCd, NiMH, lithium-ion, NiZn and SSLA batteries since 1997 (until 2026, when Act 152 will formally expand the state's mandatory EPR program to include rechargeable batteries). Vermont offers 274 collection sites, including town and state offices, libraries, hardware stores, pharmacies, solid waste district offices and HHW facilities. As a result of this program, 98% of Vermont residents and businesses have access to a collection site within a 10-mile radius.[37] In 2022, Vermont achieved a 25% collection rate for batteries, exceeding its own goal by two percentage points.[38]

Several states and local governments offer their own **battery collection sites and events** for residents, either in lieu of or in conjunction with a more formal battery collection policy. For example, Illinois funds five permanent HHW collection sites and coordinates a one-day HHW collection event twice each year.[39] Rhode Island has statewide HHW collection sites called "Eco Depots," which are operated by the Rhode Island Resource Recovery Corporation. Rhode Island also organizes 19 collection events each year across the state. In Los Angeles County in California, all libraries serve as battery collection sites, in addition to the county's HHW collection sites and temporary collection event sites.[40]

Some localities provide **curbside battery collection**, allowing residents to place used household batteries in a designated bag or bin separate from their household trash and recycling bins. The municipal government, the contracted recycling hauler or another service then picks up the batteries for recycling. This collection strategy involves coordination between municipalities and their waste management service to ensure trucks are suited to handle the demands of battery collection.[41] Recology and SPU in King County, Washington, partner to give residents the option of curbside collection for household batteries at the cost of $5 per collection occurrence. Residents schedule a special item collection, place their batteries in a separate bag and put the bag out on collection day for pickup. Several Oregon cities and counties also offer curbside battery collection (Box 4).

Box 4. The Convenience of Curbside Collection in an Oregon County

Since 2000, the 20 municipalities in Marion County, Oregon, have offered curbside collection for most small format consumer batteries, including 9-volt batteries, large "lantern" batteries and rechargeable batteries and battery packs.[41] Residents put batteries in zip-sealed bags and place them on top of their recycling baskets. The county also educates the public on battery recycling practices through multiple media sources. Other localities in Oregon, such as Clackamas County, Washington County, and the city of Gresham, also have established curbside battery collection for recycling.[42]

Some businesses provide battery collection services in certain regions. The following examples highlight companies that have developed partnerships with a combination of states, communities, organizations and individuals to provide paid battery collection services:

- **WM** provides waste removal services to consumers and commercial businesses in 47 states. WM offers pickup and mail-in services for the following battery chemistries: alkaline (9-volt and smaller), zinc-carbon, NiCd, NiMH, silver oxide and mercury. It does not collect lithium or lead-acid batteries.[43] WM's pickup service is only available to residents in localities that have contracted with WM to service their area.[44]
- **Recology** collects, recovers and processes waste that is not traditionally collected. Battery chemistries collected through their programs include alkaline, lithium-ion, NiCd, NiMH, zinc-air and silver oxide.[47] Recology serves more than 100,000 commercial customers in California, Oregon and Washington, and the company also provides curbside battery collection to residential households by partnering with municipal garbage services.[48]
- **Ridwell** provides pickup services for batteries and other "hard-to-recycle" items for households in Atlanta, Austin, the San Francisco Bay Area, Denver, Los Angeles, Minneapolis, Portland and Seattle.[49] Ridwell

collects single-use and rechargeable batteries and works with a network of partners to ensure that as many batteries as possible go to recycling facilities.[49]

The Battery Network (Box 5) and TerraCycle are two examples of **mail-in programs**, through which consumers can mail in certain household batteries for recycling. Through The Battery Network website, consumers can purchase kits for shipping used rechargeable batteries, DDR batteries and cell phones.[50] TerraCycle offers paid mail-in battery collection to residents in all 50 states through a sign-up program.[51]

Some **retailers** also provide consumers with access to battery collection sites. Retailers, businesses, warehouses and government offices place collection boxes at their building locations, where consumers can easily drop off their batteries. In rural locations, retailers often use a hub-and-spoke model and reverse logistics to collect batteries.

Box 5. The Battery Network and Battery Recycling

The Battery Network is a nonprofit that offers the nation's largest battery recycling program and currently serves as the producer responsibility organization for all mandatory state battery EPR programs. The Battery Network is governed by a board that includes six representatives from battery manufacturers and five outside directors. The nonprofit partners with battery manufacturers, retailers, and state and local governments to provide consumers with access to battery collection in all 50 states.[45] The Battery Network also manages a voluntary industry stewardship program. Participating battery retailers and manufacturers fund the program; in return, The Battery Network provides them with third-party strategy, reporting and information to support compliance with federal and state regulations.[46]

3.1.2 Mid-Format Batteries

Residential consumers are major users of mid-format batteries (in e-bikes, outdoor power equipment, power tools and portable power stations). As a result, these batteries may show up in municipal solid waste recycling or disposal streams. Mid-format batteries also are used by construction and landscaping businesses in outdoor power equipment and power tools. As products with mid-format batteries tend to be newer and have a longer life than products with small format batteries, many mid-format batteries are still in use and have not yet entered the waste stream. State and local collection programs and policies for mid-format batteries are emerging.

Collection Policies and Approaches

Consumers looking to recycle e-bike and power tool batteries can often do so through **retail collection sites**. Producers have partnered with retailers to provide collection points for consumers in response to increased demand for mid-format battery products. The nonprofit People for Bikes worked with The Battery Network to develop Hungry for Batteries, a program to safely collect and recycle e-bike batteries.[52] Major e-bike manufacturers—such as Bianchi, Cannondale, Specialized, Trek and Yamaha—also are partners in this effort, and jointly help cover the costs of collecting and transporting the batteries.[52] Consumers can use a location-based search tool on the Hungry for Batteries website to find drop-off locations for EOL e-bike batteries, such as local bike shops, outdoor recreation stores or other retail operations. Hungry for Batteries provides participating retail collection sites with signage, in-store safety materials, training and other resources to learn how to handle used and DDR batteries, as well as U.S. Department of Transportation-compliant recycling kits with prepaid shipping labels.[52] The Battery Network also partnered with home improvement retailers to collect EOL power tool and equipment batteries.[53]

Six state-level **EPR laws** (in Colorado, Connecticut, Illinois, Nebraska, Vermont and Washington) include mid-format batteries as covered batteries in addition to small format consumer electric and portable batteries (refer to Figure 4 in the previous section). In 2023, Washington passed Senate Bill 5144, which requires battery producers to develop a collection system by January 1, 2029, for mid-format batteries, including those used in power tools and e-bikes.[54] In 2024, Illinois passed Senate Bill 3686, which takes effect on January 1, 2026, and establishes a statewide EPR program for portable and mid-format batteries.[55]

Messaging to Consumers

To minimize fire risk from mid-format lithium batteries at home, key messaging for consumers includes the following points:

- **Properly store devices at home.** Many home fires involving mid-format batteries are caused by improper storage, such as storing or charging micromobility devices near an exit or a heat source. It is a best practice to keep these batteries attended while charging and to charge them during the day.[52]
- **Choose certified devices.** When purchasing new or replacement e-bikes or outdoor power equipment, consumers can choose a product that is certified. Certification indicates that an e-bike's combination of electrical drive train, battery and charger systems has been inspected for fire safety.[56] Uncertified products may have safety issues, such as charger incompatibility.
- **Follow manufacturer instructions.** New manufacturers and retailers for products containing mid-format lithium batteries continually enter the market, and products are evolving. For up-to-date information, consumers can check directly with manufacturers to ensure they are following correct practices for lithium battery use, maintenance and disposal.
- **Return products to a retailer or a reputable battery takeback program.** When an e-bike or power tool has reached the end of its useful life, consumers may bring the product to a participating retail collection location or a reputable battery takeback program for recycling. The retailer is then responsible for checking the battery for damage, packaging it in a sound recycling kit and shipping the battery for processing.[52] Mid-format battery collection locations can be found online through The Battery Network's High-Energy Battery program or E-Bike Battery Recycling program.

3.1.3 Lead-Acid Batteries

Lead-acid battery recycling could serve as a model for recycling other battery chemistries (Box 6). With an industry-reported 99% recycling rate, lead-acid batteries are the most-recycled battery type in the U.S.[58] Federal and state regulations governing multiple types of spent lead-acid batteries have led to a well-established, industry-driven national infrastructure for collecting and managing SLABs. Most vehicle batteries are handled by auto repair shops, making the collection and return of large amounts of batteries easier than when batteries are replaced by consumers themselves. Consumers that replace their own batteries are responsible for bringing their used batteries to a location equipped to handle the batteries, and many auto supply stores will take back used batteries.

Box 6. Lead-Acid Batteries: A Model for Collection

The high rate of collection for lead-acid batteries may serve as a model for other battery types. Factors that contribute to the high collection rate include:

- A well-established network of manufacturing, collection and recycling facilities that ensure a reliable supply chain and reduce dependence on international suppliers.
- Financial incentives, such as the refundable core charge, that encourage consumers to return EOL batteries for recycling.
- A standard battery design with few components, which are relatively simple to recover.
- A near-nationwide, uniform regulatory framework that provides handling standards and encourages battery collection for recycling.[57]

Collection Approaches and Policies

One of the most common state-level policies is a requirement for retailers to **take back** SLABs from consumers and post clearly visible signs that the retailer accepts SLABs.[59] Many states also require retailers to **collect a deposit** from consumers upon purchase—often called a battery core charge—that is given back when the battery is returned.[59,60] California's Lithium-Ion Car Battery Recycling Advisory Group, a panel created to advise the legislature on battery recycling policies, expressed support for implementing deposit and takeback policies for EV batteries in California, with a requirement that car manufacturers cover the cost of recycling batteries from any abandoned vehicles.[61]

Messaging to Consumers

States, municipalities and retailers frequently direct consumers to bring their SLABs to automotive retailers, HHW collection sites, events or recycling facilities that accept lead-acid batteries. SLABs should only be recycled by trained professionals. SLABs should never be placed in the curbside trash or recycling.

3.1.4 Large Format Vehicle and Motive Equipment Batteries

Used EV batteries are just beginning to enter the waste stream and, unlike lead-acid batteries, do not yet have their own collection system in place. These EV battery packs, which can power a fully electric or hybrid vehicle, are much heavier than lead-acid starting batteries, have much higher voltages and include data and cooling connections between the vehicle and battery that require special equipment and training to handle them. Federal regulations ensure that businesses such as auto repair shops handle these batteries appropriately (Appendix B), but the systems and infrastructure necessary to recycle these batteries are still developing. While consumers are generally not involved in the repair or replacement of EV batteries, "do-it-yourself" consumers do attempt to replace or repurpose their EV batteries, so it is important that they know how to manage their batteries appropriately. Involvement from key players such as government agencies, battery manufacturers and car repair shops is necessary to ensure that adequate collection infrastructure is available for EV batteries to be recycled.[61]

Collection Approaches and Policies

States are beginning to explore using **EPR policies** to manage large format batteries, including EV batteries. In December 2023, New Jersey became the first state to create a framework for collecting and recycling EV batteries.[62] New Jersey's Electric and Hybrid Vehicle Battery Management Act makes manufacturers responsible for properly collecting and recycling EV and hybrid vehicle batteries using a stewardship plan. This law also requires vehicle repair facilities, battery recyclers and other relevant actors to play a role in stewardship plans.[63]

Messaging to Consumers

Consumers should take their EV, with its large format lithium battery still embedded and intact, to automotive retailers, dealerships or car repair shops. Lithium batteries should be repaired or replaced by trained professionals, according to federal and state laws. They should never be placed with their curbside garbage or recycling or taken to HHW collection sites that do not explicitly accept large format lithium batteries.

3.1.5 Large Format Stationary Storage Batteries

Since most stationary storage batteries are extremely large and site specific, they require different collection approaches than smaller batteries. Most stationary storage batteries need to be decommissioned on-site, which involves removing and disassembling parts of the system and transporting the components for disposal, reuse or recycling.[64] Dismantled batteries can be very heavy, requiring trucks, cranes or other equipment to transport them.[64] Many stationary storage batteries are lithium-ion or other lithium chemistries. Federal regulations such as RCRA and shipping regulations by DOT Pipeline and Hazardous Materials Safety Administration cover the post-decommissioning handling and transportation of lithium batteries found in most stationary storage systems.[65] EPA did not find any state-specific laws that address the management of used batteries from stationary storage systems.

Site owners, manufacturers, developers, engineering contractors and utilities may have a role in decommissioning large stationary storage batteries.[66] Best practices include the following:

- Develop a decommissioning plan from project outset and clarify responsibilities. Since many parties are involved in planning, developing and maintaining stationary storage systems, EPA encourages the system owner to understand and communicate who is legally and financially responsible for the system's components and their management during and after decommissioning, including who is responsible for managing the waste material.[66]
- Prioritize repairs to extend the system's life cycle. Individual battery cells and modules can be removed and replaced as needed without disrupting the entire system.[67]

3.2 Best Practices for Tribal Governments

Tribal governments collect batteries of all sizes through established drop-off locations, collection events and partnerships. Many of the existing Tribal collection programs are part of broader efforts to collect HHW or e-waste. Some Tribal communities are in remote areas, which makes cost-effective collection challenging; however, some have developed effective partnerships to collect batteries and transport them off Tribal lands.

Tribal governments have established permanent **drop-off locations**, particularly for small format batteries. For example, the Morongo Band of Mission Indians has community and government collection areas that accept all small format battery chemistries. The community collection area is a battery kiosk located at the Tribal-owned bowling alley, a place commonly visited by community members. Government collection areas include e-waste bins located in government offices.[68]

Some Tribal communities designate specific **collection events** for HHW or e-waste collection. The Pala Band of Mission Indians hosts quarterly, one-week-long collection events at the Pala transfer station to accept all forms of e-waste.[69] The Morongo Tribe holds an HHW drop-off day, as well as an Elders pickup day, to provide all community members with lead-acid battery collection access, along with collection for other HHW.[68] Some organizations provide resources to support collection events for Tribes (Box 7).

Box 7. Collection Event Resources

The Battery Network offers free collection site materials to Tribal communities that reside in states with current or recently enacted EPR laws. Tribes may choose the collection site locations. Each location receives:

- Collection containers with fire retardant lining.
- Educational materials describing the battery collection program.
- A listing on The Battery Network's online locator as a publicly available collection site.

Some Tribal communities in remote areas have established **partnerships** to transport and recycle materials collected at collection sites or events to recycling facilities.[70] The Morongo and La Jolla Tribes have partnered with American Battery and Battery Barn retailers to buy back used lead-acid batteries, offsetting hauling costs. The Backhaul Alaska program works with a network of federal, state, regional and commercial partners to collect SLABs and other materials in rural Alaskan Tribal communities. In 2022, Backhaul Alaska collected and recycled about 145,000 pounds of SLABs across 45 communities.[71]

3.3 Best Practices for Battery Collection Sites

Collection sites are the first stop after a battery leaves the consumer's hands and enters the waste stream. These facilities can include retail battery collection sites; state, municipal or Tribal collection sites; auto shops; or other locations that collect or store batteries. Batteries also can end up at waste facilities mixed in with other waste. Best practices for handling batteries at management facilities vary by battery chemistry and type.

3.3.1 Small and Mid-Format Lithium Batteries

Lithium batteries pose the greatest risk of fires at collection facilities. Key best practices include the following:

- **Collect batteries in a box or drum that is certified to safely hold and transport batteries.** DDR kits also can be used in addition to these containers and come in drum and small sizes. Routinely inspect the contents of the container. Before shipping the box or drum, check that terminals have been protected and foreign objects are not present.
- **Develop a damaged battery protocol.** Most damaged batteries can be identified through visual cues such as swelling, smoking or leaking. If battery is damaged, store it individually (i.e., away from undamaged batteries or other damaged batteries); in a cool and dry place; and outdoors away from buildings, vehicles and other equipment.[72] The battery can be placed in a container filled with nonflammable material.
- **Establish fire suppression measures.** To prepare for fires, battery management facilities could:
    - Store batteries with adequate aisle space, away from other flammable materials, and identify additional requirements from local fire codes.
    - Routinely inspect all materials housed in the facility, both visually and thermally.
    - Conduct equipment maintenance and ensure there are enough fire extinguishers or fire suppression mechanisms in easy-to-access locations.
    - Include lithium battery fire response in the facility's emergency action plans.
    - Create a written standard operating procedure on how to handle batteries and ensure all employees understand battery handling practices and evacuation procedures.
    - Establish relationships with local first responders so they understand the facility and its operations.

MRFs and municipal solid waste haulers often want to ensure that batteries do not damage their equipment or other recyclable materials. These businesses could **develop plans for identifying and removing lithium batteries.** Truck drivers and workers at MRFs can identify lithium batteries to ensure safe handling, sorting and storage. Once a worker identifies a lithium battery or a device that contains a lithium battery, they should separate the battery from non-battery materials, tape the battery's terminals and place it in a 5-gallon metal bucket filled with vermiculite or sand for temporary storage.[72] In 2020, three solid waste and recycling organizations developed the *Guide for Developing Lithium Battery Management Practices at Materials Recovery Facilities*, and MRFs can consult this resource to reduce fire risk.[72]

3.3.2 Large Lithium EV Batteries

Lithium EV batteries may be managed under the universal waste standards until they reach a destination facility (see Appendix B: Standards for Universal Waste Management) As lithium EV batteries become more common throughout the U.S., management facilities and battery handlers must have the necessary tools to manage them safely and effectively. In 2023, the Suppliers Partnership for the Environment (a partnership between global vehicle manufacturers and their suppliers) published a guidebook to educate battery handlers on best practices for managing lithium EV batteries. Storage and handling best practices include the following:

- Regularly perform battery inspections and check for deformities, leaks and signs of thermal runaway.
- Disconnect and deactivate all battery power supplies before handling the battery.
- Use rigid, structured packaging and appropriate spacing to limit fire risk and heat spread.
- Store batteries at temperatures below 80 °F to prevent battery degradation.
- Ensure that employees are trained to recognize and respond to early stages of thermal runaway in batteries.

The guidebook also describes how to identify damaged batteries, minimize potential hazards through facility infrastructure upgrades and increase emergency preparedness.[73]

3.3.3 Mercury-Containing Batteries

Mercury-containing batteries can be managed as universal waste. Since Congress passed the Mercury-Containing and Rechargeable Battery Management Act in 1996, battery producers have largely phased out mercury from most batteries; however, a very small amount of batteries in circulation may still contain mercury.[74] For example, some button cell batteries—which may be found in hearing aids, watches and calculators—may contain mercury.[75] To properly manage these batteries, the New Hampshire Department of Environmental Services recommends keeping them separate from other batteries and taping them. The Minnesota Department of Transportation recommends placing individually packaged batteries in plastic containers and requires facilities to ship them for recycling within one year of collection.

3.3.4 Lead-Acid Batteries

SLABs can be managed as universal waste or under a state's lead-acid battery recycling rules. If the battery is leaking acid, it must be managed as hazardous waste. States such as Connecticut and New Hampshire have published best practice guides for battery handlers, outlining the steps for safely and effectively managing lead-acid batteries.[76,77] Some key steps from both guides include the following:

- Separate SLABs from other materials—such as paper, rags, garbage, flammables, scrap metals or chemicals—by using a wall or barrier.
- Store SLABs on a concrete or leak-proof surface.
- Stack batteries no more than five layers high, using rigid and non-conducting material between layers.
- Protect batteries from weather by storing them inside or under a leak-proof cover.
- Inspect batteries weekly for signs of deterioration or leaks and take notes in an inspection log to record any damage.

4 Conclusion

Careful management of batteries reduces the risk of fires and improves recovery of critical minerals when batteries enter the waste stream. As the number of batteries and battery-containing products increases, so too does the need for efficient battery collection and recycling. Many state, Tribal and local governments are helping consumers learn how to manage batteries and providing them with safe, convenient locations to take used batteries. After collection, batteries also must be carefully handled and transported. The best practices identified in this report help reduce the risk of fires during collection and transport, although more best practices will likely be developed as the number of batteries in the waste stream increases and the recycling industry matures.

EPA's key next steps for battery management in 2026 include the following:

- **Work with federal agencies and organizations.** EPA will continue coordinating with federal partners; state, Tribal and local governments; and relevant nongovernmental and private sector entities to develop and promote battery collection best practices.
- **Publish the best practices toolkit.** EPA has published a web-based toolkit for state, Tribal and local governments that contains customizable templates, tools and case studies for battery collection programs. EPA will continue to develop additional resources for the toolkit that will fulfill the IIJA requirements by highlighting best practices that are "technically and economically feasible for state, Tribal and local governments" and "environmentally sound and safe for waste management workers," and that optimize "the value and use of material derived from recycling of batteries."[1]
- **Release voluntary labeling guidelines.** IIJA required EPA to develop labeling guidelines for information and messaging to help consumers identify battery collection locations, understand battery collection and recycling, and reduce improper disposal of batteries.
- **Publish an EPR framework for batteries.** The IIJA required that EPA and the U.S. Department of Energy (DOE) coordinate to develop a voluntary EPR framework that addresses battery recycling goals, cost structures for mandatory recycling, reporting requirements, product design, collection models and transportation of collected materials.

5 References

1. Infrastructure Investment and Jobs Act, Pub. L. No. 117–58, 135 Stat. 429 (2021). https://www.govinfo.gov/content/pkg/PLAW-117publ58/pdf/PLAW-117publ58.pdf.
2. U.S. Environmental Protection Agency. (2024, April 2). *Feedback sessions for the Bipartisan Infrastructure Law solid waste and recycling programs*. https://www.epa.gov/infrastructure/feedback-sessions-bipartisan-infrastructure-law-solid-waste-and-recycling-programs.
3. U.S. Environmental Protection Agency. (2022, June 9). *Request for information: Development of best practices for collection of batteries to be recycled and voluntary battery labeling guidelines*. Regulations.Gov. https://www.regulations.gov/document/EPA-HQ-OLEM-2022-0340-0001.
4. Eastern Research Group, Inc. & JSE Associates. (2022). *EPA lithium-ion battery disposal and recycling stakeholder workshop: Summary report*. Prepared for the U.S. Environmental Protection Agency. https://www.epa.gov/system/files/documents/2022-03/final_lithium-ion-battery-workshop-public-report_508web.pdf.
5. U.S. Environmental Protection Agency. (2025, August 7). *Battery collection best practices*. Sustainable Management of Electronics and Batteries. https://www.epa.gov/electronics-batteries-management/battery-collection-best-practices.
6. U.S. Fire Administration. (2023). *Battery fire safety*. https://www.usfa.fema.gov/prevention/home-fires/prevent-fires/batteries/.
7. Aber, S. (2023, June 18). Commentary: Powering down safely: The urgent need for L/Li battery disposal education. *Environmental Research and Education Foundation*. https://erefdn.org/powering-down-safely-the-urgent-need-for-l-li-battery-disposal-education/.
8. Association of State and Territorial Solid Waste Management Officials. (2024). *Difficult-to-manage materials survey report*. Sustainable Materials Management Task Force. https://astswmo.org/files/Policies_and_Publications/Materials_Management/2024-04-04-Final-Difficult-to-Manage-Materials-Survey-Report.pdf.

9. Providing for Responsible Environmental Management of Batteries, SB5144, Washington State Senate 68th Legislature (2023). https://legiscan.com/WA/text/SB5144/id/2812504.
10. Responsible Battery Recycling Act of 2022, No. 2440, California State Assembly (2022). https://leginfo.legislature.ca.gov/faces/billPdf.xhtml?bill_id=202120220AB2440&version=20210AB244091CHP.
11. Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 Concerning Batteries and Waste Batteries, Amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and Repealing Directive 2006/66/EC. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1542.
12. Grand View Research. (2023). *Battery market size, share & trends analysis report, 2023–2030* (Nos. 978-1-68038-846–6). https://www.grandviewresearch.com/industry-analysis/battery-market.
13. Grand View Research. (2023). *Battery recycling market size, share & trends analysis report, 2024–2030* (No. GVR-1-68038-624-0). https://www.grandviewresearch.com/industry-analysis/battery-recycling-market.
14. U.S. Environmental Protection Agency. (2019). *Success stories in recycling from the signers of the America Recycles Pledge*. https://nepis.epa.gov/Exe/ZyPDF.cgi/P100Y4DR.PDF?Dockey=P100Y4DR.PDF.
15. Circular Energy Storage. (2024). *Recycling capacity by state/province in North America* [Subscription database]. https://www.circularenergystorage-online.com/capacity-by-state-na.
16. NLR, Inc. (n.d.). *Batteries by the numbers* [Infographic]. Retrieved December 15, 2023, from https://nlr-green.com/batteries-by-the-numbers/.
17. U.S. Environmental Protection Agency. (2021). *An analysis of lithium-ion battery fires in waste management and recycling* (No. EPA 530-R-21-002). Office of Resource Conservation and Recovery. https://www.epa.gov/system/files/documents/2021-08/lithium-ion-battery-report-update-7.01_508.pdf.
18. Zheng, X., Zhu, Z., Lin, X., Zhang, Y., He, Y., Cao, H., & Sun, Z. (2018). A mini-review on metal recycling from spent lithium ion batteries. *Engineering*, *4*(3), 361–370. https://doi.org/10.1016/j.eng.2018.05.018.
19. ReCell Center. (2021). *Novel processing and design technologies will make battery recycling profitable* [Fact sheet]. https://www.anl.gov/sites/www/files/2021-12/RECELL_ReCell%20Fact%20Sheet_FIN-2021.pdf.
20. Fogelman, R. (2023, May 10). *May fire report: Lithium-ion battery fires are everywhere*. Waste 360. https://www.waste360.com/waste-recycling/may-fire-report-lithium-ion-battery-fires-are-everywhere.
21. Montgomery County Department of Environmental Protection. (n.d.). *How to recycle/dispose batteries*. Retrieved March 25, 2024, from https://www2.montgomerycountymd.gov/DepHowDoI/material.aspx?tag=batteries&material_key=22.
22. U.S. Environmental Protection Agency. (2019, May 16). *Used household batteries*. https://www.epa.gov/recycle/used-household-batteries.
23. Gasper, P., Hines, J., Miralda, J.-P., Bonhomme, R., Schaufeld, J., Apelian, D., & Wang, Y. (2013). Economic feasibility of a mechanical separation process for recycling alkaline batteries. *Journal of New Materials for Electrochemical Systems*, *16*(4), 297–304. https://www.researchgate.net/publication/286103970_Economic_Feasibility_of_a_Mechanical_Separation_Process_for_Recycling_Alkaline_Batteries.
24. California Department of Toxic Substances Control. (2023). *What to do with your old batteries*. Managing Hazardous Waste. https://dtsc.ca.gov/universalwaste/universal-waste-for-residents-batteries/#oldbatteries.
25. Pipeline and Hazardous Materials Safety Administration. (2023). *Understanding the risks of damaged, defective or recalled (DDR) lithium batteries* (Nos. PHH50-0199–0323). U.S. Department of Transportation. https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2023-03/final.pdf.

26. ERI. (n.d.). *State e-waste legislation in the U.S.: California*. Retrieved January 31, 2024, from https://eridirect.com/sustainability/us-legislation/california/.
27. Electronic Waste Recycling Act of 2003: Covered Battery-Embedded Products, Senate Bill 1215, Chapter 370, California State Senate 2021–2022. Retrieved December 26, 2023, from https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB1215.
28. *Rechargeable Battery Recycling—NYDEC*. (n.d.). Retrieved January 17, 2024, from https://dec.ny.gov/environmental-protection/recycling-composting/rechargeable-battery-recycling.
29. Connecticut Department of Energy and Environmental Protection. (2020). *Annotated list of CT general statutes concerning recycling requirements.* CT.Gov. https://portal.ct.gov/DEEP/Reduce-Reuse-Recycle/Recycling-Laws---Annotated-List.
30. Seattle Public Utilities. (n.d.). *Ban on batteries and electronics in garbage*. Seattle.Gov. Retrieved March 7, 2024, from https://www.seattle.gov/utilities/your-services/collection-and-disposal/ban-on-batteries-and-electronics-in-garbage.
31. Organisation for Economic Cooperation and Development. (2024). *Extended producer responsibility: Basic facts and key principles (OECD Environment Policy Paper No. 41)*. https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/04/extended-producer-responsibility_4274765d/67587b0b-en.pdf.
32. California Department of Toxic Substances Control. (n.d.). *AB 1125: Rechargeable Battery Recycling Act*. Managing Hazardous Waste. Retrieved April 2, 2024, from https://dtsc.ca.gov/fs-ab1125/.
33. Zero Waste Omnibus Amendment Act of 2020, No. D.C. Law 23-211, Council of the District of Columbia (2020). https://code.dccouncil.gov/us/dc/council/laws/23-211.
34. Goines, N. (2023). *DOEE's free battery recycling program charges forward*. District of Columbia Department of Energy & Environment. https://doee.dc.gov/release/doees-free-battery-recycling-program-charges-forward.
35. The Battery Network. (n.d.). *Recycling laws by state*. https://batterynetwork.org/stewards/state-recycling-laws/.
36. Batteries—Environmental Stewardship, Revised Code of Washington (RCW) Chapter 70A.555. https://app.leg.wa.gov/RCW/default.aspx?cite=70A.555&full=true&pdf=true.%2070A.555.150.
37. Vermont Agency of Natural Resources. (2019). *Report on battery stewardship*. https://dec.vermont.gov/sites/dec/files/wmp/SolidWaste/Documents/Universal-Recycling/2019-Report-on-Battery-Stewardship.pdf.
38. The Battery Network. (2023). *Vermont primary battery stewardship annual report*. Prepared for Vermont Agency of Natural Resources, Department of Environmental Conservation. https://dec.vermont.gov/sites/dec/files/wmp/SolidWaste/Images/VT%202022%20Annual%20Report%20-%20FinalRev2.pdf.
39. Illinois Environmental Protection Agency. (n.d.). *Household hazardous wastes*. Retrieved January 25, 2024, from https://epa.illinois.gov/topics/waste-management/waste-disposal/household-hazardous-waste.html.
40. Los Angeles County Public Works. (n.d.). *Battery disposal*. Retrieved January 25, 2024, from https://dpw.lacounty.gov/epd/hhw/Batteries.
41. U.S. Environmental Protection Agency. (2025). *Battery Collection in Action Case Study: Leading the Charge: Marion County's Battery Collection and Recycling Program.* https://www.epa.gov/electronics-batteries-management/battery-collection-action-case-study-leading-charge-marion-countys.
42. Heffernan, M. (2023, February 6). *Oregon counties collect batteries at curbside*. Resource Recycling News. https://resource-recycling.com/recycling/2023/02/06/oregon-counties-collect-batteries-at-curbside/.
43. WM, Inc. (n.d.). *Service locations*. Retrieved January 18, 2024, from https://www.wm.com/us/en/location.

44. WM, Inc. (n.d.). *Residential service*. Retrieved January 25, 2024, from https://wmatyourdoor.com/residential/.
45. The Battery Network. (n.d.). *Find a drop-off location near you*. Retrieved April 4, 2024, from https://batterynetwork.org/locator/.
46. The Battery Network. (n.d.). *Stewards program overview*. Retrieved January 25, 2024, from https://batterynetwork.org/stewards/.
47. Recology. (n.d.). *FAQ: Batteries*. Retrieved March 6, 2024, from https://www.recology.com/faq/shoreline-batteries/.
48. Recology. (n.d.). *Our mission & vision*. Retrieved January 16, 2024, from https://www.recology.com/about-us/mission-vision/.
49. Ridwell. *Wasting less, made easy. Join today!* (n.d.). Retrieved January 18, 2024, from https://www.ridwell.com.
50. The Battery Network. (n.d.). *Battery collection & recycling services*. The Battery Network Store. Retrieved January 31, 2024, from https://store.batterynetwork.org/.
51. TerraCycle. (n.d.). *Recycling solutions*. Retrieved January 18, 2024, from https://www.terracycle.com/en-US/collection-programs.
52. e-Bike Battery Recycling. (n.d.). *FAQ for riders*. Hungry for Trash E-Bike Batteries. Retrieved April 2, 2024, from https://www.hungryforbatteries.org/#faq.
53. Home Depot. (n.d.). The Home Depot & Call2Recycle: Making battery recycling easy for customers. *Eco Actions Blog*. Retrieved July 24, 2025, from https://ecoactions.homedepot.com/blog/home-depot-battery-recycling-call2recycle/.
54. Washington State Department of Ecology. (n.d.). *Battery stewardship*. Retrieved April 2, 2024, from https://ecology.wa.gov/waste-toxics/reducing-recycling-waste/our-recycling-programs/battery-stewardship.
55. Portable and Medium-Format Battery Stewardship Act, Illinois Public Act 1033 (2024). https://www.ilga.gov/legislation/publicacts/103/103-1033.htm.
56. Underwriters Laboratories. (n.d.). *E-bikes certification: Evaluating and testing to UL 2849*. Retrieved April 7, 2024, from https://www.ul.com/services/e-bikes-certificationevaluating-and-testing-ul-2849.
57. Gottesfeld, P. (2017). The lead battery: A growing global public health challenge. *American Journal of Public Health*, *107*(7), 1049–1050. https://doi.org/10.2105/AJPH.2017.303836.
58. Battery Council International. (2023). *The U.S. lead battery industry by the numbers* [Fact sheet]. https://batterycouncil.org/resource/u-s-lead-battery-industry-by-the-numbers/.
59. Battery Council International. (n.d.). *State recycling laws*. Retrieved January 16, 2024, from https://batterycouncil.org/recycling-sustainability/state-recycling-laws/.
60. Baum, Z. J., Bird, R. E., Yu, X., & Ma, J. (2022). Lithium-ion battery recycling – Overview of techniques and trends. *ACS Energy Letters*, *7*(2), 712–719. https://doi.org/10.1021/acsenergylett.1c02602.
61. Brinn, J. (2023). *Building batteries better: Doing the best with less*. Natural Resources Defense Council. https://www.nrdc.org/sites/default/files/2023-07/ev-battery-supply-chains-report.pdf.
62. Voloschuk, C. (2023, December 22). *New Jersey passes EV battery recycling legislation*. Recycling Today. https://www.recyclingtoday.com/news/new-jersey-passes-ev-battery-recycling-legislation/.
63. New Jersey Electric and Hybrid Vehicle Battery Management Act, S3723, New Jersey Senate 220th Legislature (2023). https://www.bdlaw.com/content/uploads/2024/01/3723_R3-5.pdf.
64. New York State Energy Research and Development Authority. (2021, June 16). *Decommissioning and end-of-life considerations* [Webinar presentation]. https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Programs/Clean-Energy-Siting/Decommissioning-and-End-of-Life-Considerations.pdf.
65. Electric Power Research Institute. (2017). *Recycling and disposal of battery-based grid energy storage systems: A preliminary investigation*. https://www.epri.com/research/products/000000003002006911.

66. U.S. Energy Storage Association. (2020). *ESA corporate responsibility initiative: Guidelines for end-of-life and recycling of lithium ion battery energy storage systems*. https://www.mitchellwilliamslaw.com/webfiles/ESA-Corporate-Responsibility-Initiative-Guidelines-for-End-of-Life-and-Recycling-of-Lithium-Ion-Battery-Energy-Storage-Systems.pdf.
67. U.S. Energy Storage Association. (2020). *End-of-life management of lithium-ion energy storage systems*. https://energystorageassociationarchive.org/wp-content/uploads/2020/04/ESA-End-of-Life-White-Paper-CRI.pdf.
68. U.S. Environmental Protection Agency (Director). (2024, August 22). *Improving battery collection and recycling rates on Tribal lands* [Video recording]. https://mediaspace.nau.edu/media/Improving+Battery+Collection+%26+Recycling+Rates+on+Tribal+Lands/1_04g88csk.
69. Pala Band of Mission Indians. (n.d.). *Pala Transfer Station collection events 2024*. Retrieved September 19, 2024, from https://palatribe.com/events/household-hazardous-waste-collection-7/.
70. U.S. Environmental Protection Agency (Director). (2022, July 13). *Bipartisan Infrastructure Law: Battery initiatives Tribal feedback session* [Video recording]. https://www.youtube.com/watch?v=ED2Y5AtqWhE.
71. Responsible Battery Coalition. (2023). *Backhaul Alaska retrieves, recycles 145,000 pounds of spent vehicle, equipment batteries from remote Alaskan communities*. https://www.responsiblebatterycoalition.org/news/backhaul-alaska-retrieves-recycles-145-000-pounds-of-spent-vehicle-equipment-batteries-from-remote-alaskan-communities.
72. Solid Waste Association of North America, ISRI, & National Waste & Recycling Association. (2020). *Guide for developing lithium battery management practices at materials recovery facilities*. https://swana.org/docs/default-source/safety-documents/mrf-lithium-battery-guidance.pdf?sfvrsn=2fa340ea_6.
73. Suppliers Partnership for the Environment. (2023). *Guidance document: EV battery safe handling & storage*. https://www.supplierspartnership.org/wp-content/uploads/2023/07/Suppliers-Partnership_EVSafetyGuidance_7.21.2023-FINAL.pdf.
74. U-Cycle: Urbana's Recycling Program. (n.d.). *Battery recycling processes*. City of Urbana, Illinois. https://www.urbanail.gov/public-works/page/u-cycle-recycling.
75. U.S. Environmental Protection Agency. (2015, September 21). *Mercury in batteries*. https://www.epa.gov/mercury/mercury-batteries.
76. Connecticut Department of Energy and Environmental Protection. (2023). *Pit stops fact sheet: Batteries (lead acid)*. https://portal.ct.gov/-/media/DEEP/p2/business_industry/PitStops/PS2014LeadAcidBatteriespdf.pdf.
77. New Hampshire Department of Environmental Services. (2013). *Best management practices for N.H. solid waste facilities: Batteries* [Fact sheet]. https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/bmp-batteries.pdf.
78. Saini, M. K. (2023). *Difference between lithium-metal and lithium-ion batteries*. Tutorials Point. https://www.tutorialspoint.com/difference-between-lithium-metal-and-lithium-ion-batteries.
79. Niu, C., Liu, D., Lochala, J. A., Anderson, C. S., Cao, X., Gross, M. E., Xu, W., Zhang, J.-G., Whittingham, M. S., Xiao, J., & Liu, J. (2021). Balancing interfacial reactions to achieve long cycle life in high-energy lithium metal batteries. *Nature Energy*, *6*(7), 723–732. https://doi.org/10.1038/s41560-021-00852-3.
80. Webstaurant Store. (n.d.). *Types of batteries*. Retrieved December 12, 2023, from https://www.webstaurantstore.com/guide/923/batteries-buying-guide.html.
81. ScienceDirect. (n.d.). *Alkaline battery*. Retrieved January 19, 2024, from https://www.sciencedirect.com/topics/earth-and-planetary-sciences/alkaline-battery.
82. Energizer Brands, LLC. (2018). *Eveready carbon zinc battery handbook and application manual*. https://data.energizer.com/pdfs/carbonzinc_appman.pdf.

83. U.S. Environmental Protection Agency. (2019, May 16). *Used lithium-ion batteries*. https://www.epa.gov/recycle/used-lithium-ion-batteries.
84. ScienceDirect. (n.d.). *Nickel cadmium battery*. Retrieved January 19, 2024, from https://www.sciencedirect.com/topics/engineering/nickel-cadmium-battery.
85. ScienceDirect. (n.d.). *Nickel metal hydride battery*. Retrieved January 19, 2024, from https://www.sciencedirect.com/topics/engineering/nickel-metal-hydride-battery.
86. ScienceDirect. (n.d.). *Nickel zinc battery*. Retrieved January 19, 2024, from https://www.sciencedirect.com/topics/engineering/nickel-zinc-battery.
87. U.S. Environmental Protection Agency. (2016). *Hazardous Materials Transportation Act*. https://archive.epa.gov/emergencies/content/lawsregs/web/html/hmtaover.html.
88. Pipeline and Hazardous Materials Safety Administration. (2023). *Transporting lithium batteries*. https://www.phmsa.dot.gov/lithiumbatteries.
89. Pipeline and Hazardous Materials Safety Administration. (2022). Hazardous materials: Enhanced safety provisions for lithium batteries transported by aircraft (FAA Reauthorization Act of 2018). In *Federal Register: Vol. 87 (244)* (pp. 77995–78011). U.S. Department of Transportation. https://www.federalregister.gov/documents/2022/12/21/2022-27563/hazardous-materials-enhanced-safety-provisions-for-lithium-batteries-transported-by-aircraft-faa.
90. U.S. Environmental Protection Agency. (2023). *EPA history: Resource Conservation and Recovery Act*. https://www.epa.gov/history/epa-history-resource-conservation-and-recovery-act.
91. U.S. Environmental Protection Agency. (2024). *Requirements for transboundary shipments of specific wastes*. Hazardous Waste Generators. https://www.epa.gov/hwgenerators/requirements-transboundary-shipments-specific-wastes.
92. U.S. Environmental Protection Agency. (2025, April 16). *Information for exporters of Resource Conservation and Recovery Act (RCRA) hazardous waste*. Hazardous Waste Generators. https://www.epa.gov/hwgenerators/information-exporters-resource-conservation-and-recovery-act-rcra-hazardous-waste.
93. Hoskinson, C. (2023, May 24). *Lithium battery recycling regulatory status and frequently asked questions*. U.S. Environmental Protection Agency. https://rcrapublic.epa.gov/files/14957.pdf.
94. U.S. Environmental Protection Agency. (2024, April 17). *Universal waste*. Hazardous Waste. https://www.epa.gov/hw/universal-waste.
95. U.S. Environmental Protection Agency. (1997). *Implementation of the Mercury-Containing and Rechargeable Battery Management Act* [EPA530-K-97-009]. Office of Solid Waste and Emergency Response. https://www.call2recycle.org/wp-content/uploads/ImplementationoftheMercury-ContainingandRechargeableBatteryManagementAct.pdf.
96. U.S. Environmental Protection Agency. (n.d.). *The Mercury-Containing and Rechargeable Battery Management Act—Public Law 104-142*. Resource Conservation and Recovery Act (RCRA) Laws and Regulations. Retrieved December 21, 2023, from https://www.epa.gov/rcra/mercury-containing-and-rechargeable-battery-management-act-public-law-104-142.
97. U.S. Environmental Protection Agency. (n.d.). *Solid waste infrastructure for recycling grant program*. Retrieved August 27, 2025, from https://www.epa.gov/infrastructure/solid-waste-infrastructure-recycling-grant-program.
98. ZETA Education Fund. (2023). *Fostering an electric future: A federal perspective on the U.S. critical mineral supply chain*. https://www.zeta2030.org/white-paper-fostering-an-electric-future-a-federal-perspective-on-the-us-critical-mineral-supply-chain.
99. U.S. Department of Energy. (n.d.). *Funding selections: Bipartisan Infrastructure Law battery recycling, reprocessing, and battery collection funding opportunity*. Office of Energy Efficiency & Renewable Energy. Retrieved May 27, 2024, from https://www.energy.gov/eere/vehicles/funding-selections-infrastructure-investment-and-jobs-act-battery-recycling.

100. U.S. Department of Energy. (2022, October). *Bipartisan Infrastructure Law: Battery materials processing and battery manufacturing recycling selections*. Energy.Gov. https://www.energy.gov/mesc/battery-materials-processing-grants.

101. U.S. Environmental Protection Agency. (2022). *Building a circular economy for all: Progress toward transformative change* (No. EPA 530-R-22-004). Office of Resource Conservation and Recovery. https://www.epa.gov/system/files/documents/2022-09/EPA_Circular_Economy_Progress_Report_Sept_2022.pdf.

Appendix A: Battery Chemistries

Table A-1 summarizes the common uses, composition and lifespan for single-use battery chemistries. It also provides a visual example of each battery type.

Table A-1. Common Single-Use Battery Chemistries

Chemistry	Common Uses	Composition	Lifespan	Photo
Lithium metal[78,79]	Emergency devices such as pacemakers and fire alarms	Lithium anode in pure metallic form	10–12 years	
Alkaline[22,80,81]	Household items such as toys, digital cameras and radios	Zinc and manganese dioxide	5–10 years	
Carbon-zinc[80,82]	Household items including toys, remote controls and clocks	Zinc anode, manganese dioxide and zinc chloride	2–3 years	
Silver oxide[80]	Watches and other small devices	Silver and other metals	3–5 years	

[Table A-2](#) summarizes the common uses, composition and lifespan for rechargeable battery chemistries. It also provides a visual example of each battery type.

Table A-2. Common Rechargeable Battery Chemistries

Chemistry	Common Uses	Composition	Lifespan	Photo
Lead-acid[22]	Starting batteries for automobiles, boats, snowmobiles, motorcycles and golf carts	Metallic lead, lead dioxide, lead sulfate and sulfuric acid	3–5 years	
Lithium-ion[22,83]	Power tools, cameras, laptops, smartphones, toys, appliances, tablets and EVs	Lithium compounds	About 300–500 charging cycles	
NiCd[22,84]	Power tools, cordless products, cameras and radios	Nickel hydroxide, nickel oxyhydroxide, metallic cadmium and cadmium hydroxide	15–20 years	
NiMH[22,85]	Phones, cordless tools, cameras and radios	Nickel hydroxide, potassium hydroxide and metal hydride	5 years	
NiZn[22]	Cameras, keyboards and smaller electronic devices	Nickel oxide and zinc metal[86]	10–15 years	

Appendix B: Federal Activities Supporting Battery Collection and Recycling

Over the past 50 years, the U.S. has enacted regulations and issued guidance to ensure proper management, handling and transport of used batteries. These regulations include congressional acts and rules from agencies such as DOE, EPA and DOT (Figure B-1) that provide management practices for and encourage recycling of used batteries.

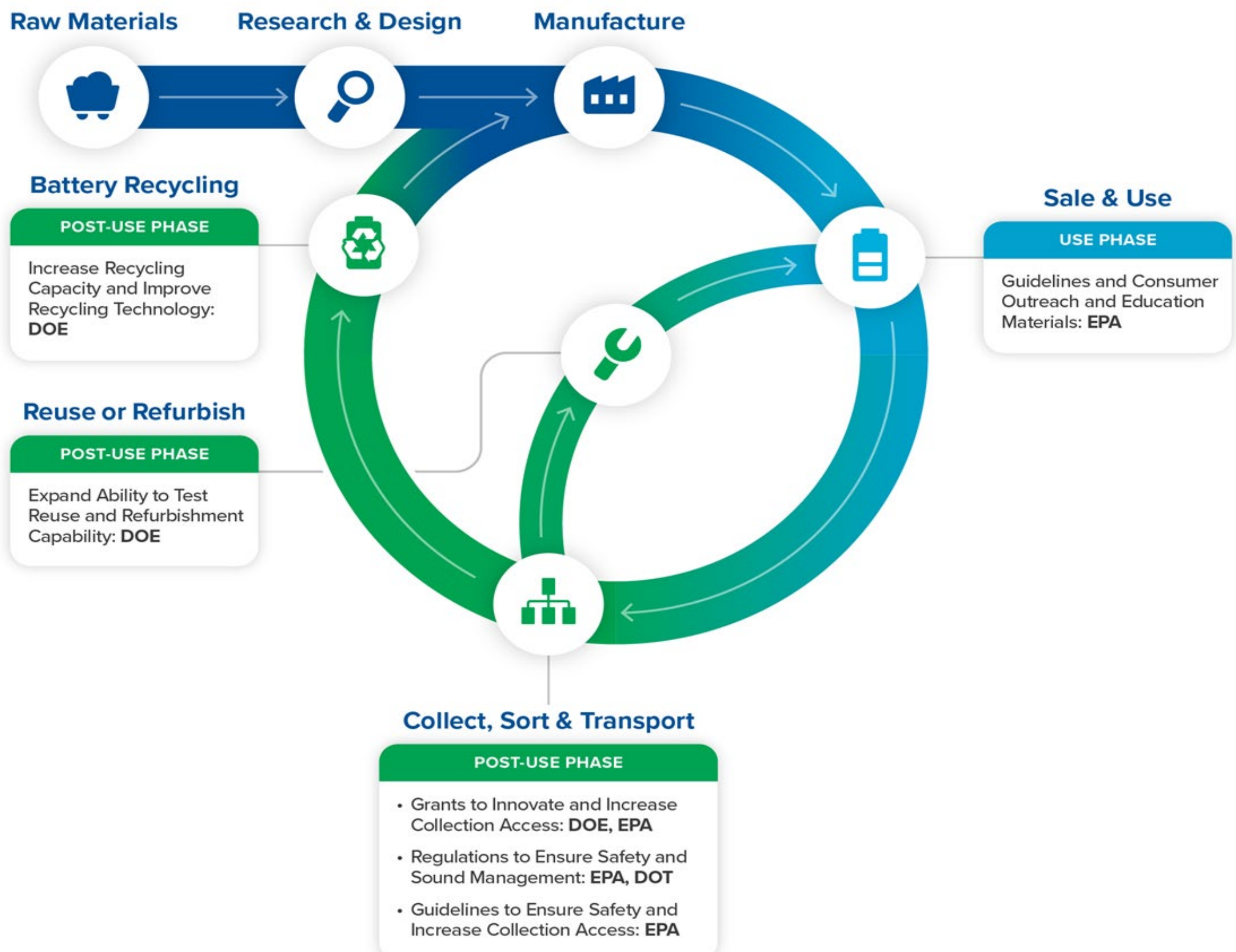

Figure B-1. Federal activities that support battery recycling.

Hazardous Materials Regulations

DOT regulates the transportation and shipment of materials that pose a risk to the public. DOT's Hazardous Materials Regulations are codified under Title 49 of the Code of Federal Regulations (49 CFR 171–180) to align with the Hazardous Materials Transportation Act, which was enacted in 1975.[87] Under these regulations, lithium batteries are considered a hazardous material (due to risks of overheating, flammability and explosion), and anyone transporting them must comply with specific requirements.[88] In December 2022, DOT PHMSA issued a Final Rule Amendment to the Hazardous Materials Regulations that incorporated important revisions, including prohibiting lithium cells and batteries from being carried as cargo on passenger aircraft.[89]

Resource Conservation and Recovery Act

RCRA is the primary U.S. federal law that regulates the management and disposal of solid and hazardous waste. Subtitle C of RCRA establishes a cradle-to-grave framework for properly handling, treating, storing and disposing of hazardous waste to prioritize waste reduction, conserve energy and protect human health and the environment.[90] Several types of batteries (e.g., NiCd, mercury, lithium-ion, lead-acid) are classified as hazardous waste and regulated under RCRA Subtitle C,[91] but the law exempts HHW from regulation, and many used batteries fall under that category.[90] In addition, long-standing provisions in the regulations exempt spent, recycled lead-acid batteries from many hazardous waste requirements during collection and accumulation. For more information about managing SLABs, refer to RCRA 266 subpart G. Requirements for exporting SLABs can be found on EPA's website.[91,92]

In May 2023, EPA published a memorandum clarifying how RCRA Subtitle C applies to used lithium-ion batteries, saying "most lithium-ion batteries are likely hazardous waste at end-of-life (EOL) and…they can be managed under the streamlined hazardous waste management standards for universal waste until they reach a destination facility for recycling or discard."[93] This memo did not affect batteries that are considered HHW, such as lithium-ion batteries used in common household electronics and toys,[83] but specifically stated that EV lithium-ion batteries removed at a facility are regulated under RCRA Subtitle C.[93]

Standards for Universal Waste Management

Roughly 20 years after Congress passed RCRA, EPA established Standards for Universal Waste Management (40 CFR 273) to streamline the collection of certain hazardous wastes, including batteries, and to promote proper management at hazardous waste recyclers or other permitted facilities.[93] These universal waste regulations also streamline several requirements put forth by RCRA Subtitle C, including those that pertain to labeling, permittable storage time after use, effective management and suitable handling facilities.[94] In May 1996, the Mercury-Containing and Rechargeable Battery Management Act made these standards effective in all 50 states to avoid regulation discrepancies across the country.[95]

The universal waste regulations aim to simplify and promote the safe collection, transportation and recycling of certain widely generated hazardous wastes such as batteries, pesticides, mercury-containing equipment, lamps and aerosol cans.[94] This framework reduces the regulatory burden on entities that generate and transport universal waste, allowing for longer storage periods and reduced paperwork, as long as specific handling and recycling practices are followed. Facilities that manage universal waste during collection and aggregation, such as handlers and transporters, benefit from these streamlined requirements, which help prevent improper disposal in the municipal waste stream while encouraging recycling and reuse. Recycling or disposal of universal wastes, however, must take place at a permitted treatment or disposal facility or a hazardous waste recycler—the same type of facility that would handle other hazardous wastes.[94]

The Mercury-Containing and Rechargeable Battery Management Act

Congress passed the Mercury-Containing and Rechargeable Battery Management Act in 1996 to establish EOL management protocols for rechargeable batteries and to phase out mercury in batteries. The Act regulates industry (i.e., battery manufacturers and handlers) rather than consumers.[95] It is made up of two titles:

- **Title I—The Rechargeable Battery Recycling Act.** Establishes labeling requirements for NiCd rechargeable batteries and SSLA rechargeable batteries, among others. The Act requires that labels include instructions for how to recycle batteries and mandates that batteries regulated under the Act must be easily removeable. It also streamlines regulations for battery collection programs that incentivize compliance with collection and recycling practices by easing the financial burden on consumers and businesses.[96]
- **Title II—The Mercury-Containing Battery Management Act.** Aims to phase out the manufacture of batteries containing mercury by limiting the sale of battery types with significant mercury content. These battery types include alkaline-manganese batteries containing mercury (Section 203), carbon-zinc batteries containing mercury (Section 204), button cell mercuric-oxide batteries (Section 205) and other mercuric-oxide batteries (Section 206).[96]

The Infrastructure Investment and Jobs Act

The IIJA, signed into law in 2021, calls out batteries as a national priority and supports battery management and recycling in the U.S. The IIJA tasked several agencies to support battery recycling, including EPA and DOE. The IIJA mandated EPA develop the following deliverables:

- Best practices for collection. The IIJA required EPA to develop best practices that could be implemented by state, Tribal and local governments for collecting and recycling batteries in a manner that "is technically and economically feasible for state, Tribal and local governments; is environmentally sound and safe for waste management workers; and optimizes the value and use of material derived from recycling of batteries."[1]
- Voluntary labeling guidelines and consumer outreach materials. IIJA required EPA to develop guidelines to help consumers identify battery collection locations, learn about battery collection and recycling, and reduce improper disposal of batteries.
- EPR framework. The IIJA required that EPA and DOE coordinate to develop a voluntary EPR framework that addresses battery recycling goals, cost structures for mandatory recycling, reporting requirements, product design, collection models and transportation of collected batteries.
- Solid Waste Infrastructure for Recycling grants. The SWIFR grant program aims to improve post-consumer materials management and infrastructure, support local infrastructure improvements and help localities improve their waste management systems.[97] These grants broadly support recycling, including battery recycling. In 2023, EPA announced the grant selectees for Tribes and intertribal consortia, states, territories and communities. Many states and territories are using their grants to better understand how to collect and recycle EOL products (including electronics and batteries), or to improve data management systems and incorporate life cycle assessment tools.
- Recycling Education and Outreach grants. REO grants fund projects that inform the public about residential or community recycling or composting programs, provide information about materials accepted as part of these programs and increase collection rates while decreasing contamination. Grantees can use this support to provide education and outreach on battery recycling.

The IIJA also required DOE to support the building or upgrading and expansion of commercial-scale facilities that produce battery materials and execute battery recycling. Section 40207 of the IIJA tasked DOE with bolstering the U.S. battery industry by providing grants for:

- Battery collection and recycling projects
- Collection systems at retailers

- A battery material processing program
- Battery manufacturing and recycling
- A lithium-ion battery recycling prize competition
- An EV battery design, recycling and reuse program
- Research, development and demonstration on cost reduction for battery logistics and processing

The Battery Manufacturing and Recycling Grants Program seeks to ensure that the nation has the capacity to support a North American battery supply chain. In 2022, DOE awarded a first round of grants from this program, helping 20 companies in 12 states expand commercial-scale facilities to extract and process lithium and other battery materials, manufacture components and demonstrate new approaches.[98] In March 2024, under the Battery Recycling, Reprocessing and Battery Collection Funding Opportunity, DOE awarded $61.5 million to 14 projects aimed at increasing consumer battery recycling, improving battery recycling economics and supporting state and local collection programs.[99] The Battery Materials Processing Grants and Battery Manufacturing and Recycling Grants allocate about $7 billion in grants to support the domestic development of battery supply chains, including recycling efforts.[100]

Coordination among agencies is important because their activities relate to one another. The DOE's Federal Consortium for Advanced Batteries brings together federal agencies to cooperate on ensuring a domestic supply of lithium batteries. EPA is one of the 19 agencies that participate in the Consortium. EPA also participates in DOT PHMSA's Interagency Working Group on Lithium Battery Safety to ensure regulatory coordination between RCRA hazardous waste regulations and DOT hazardous materials regulations.

Other EPA Activities Related to Batteries

EPA developed considerations for safe installation and incident response at battery energy storage systems. Battery Energy Storage Systems help stabilize electrical grids by providing steady power flow despite fluctuations from inconsistent generation from varied energy sources and other disruptions. While BESS technology is designed to bolster grid reliability, lithium battery fires at some installations have raised legitimate safety concerns in many communities. BESS incidents can present unique challenges for host communities and first responders:

- Fire Suppression: Lithium battery fires are extremely difficult to extinguish and may reignite hours or days later.
- Emissions: Battery fires can release harmful gases that pose health risks to nearby residents and first responders.
- Environmental Impact: Proper cleanup and disposal of damaged batteries requires specialized procedures.

EPA developed comprehensive guidance to help communities safely plan for installation and operation of BESS facilities as well as recommendations for incident response. This fact sheet includes information from first responder and industry guidance as well as background information on battery energy storage systems and resources.

EPA's activities to increase battery recycling also support implementation of the Circular Economy Strategy Series (Figure B-2). The 2020 Save Our Seas 2.0 Act provided the foundation and authority for the development of this series and defined "circular economy." The series offers a comprehensive approach to transform the way materials are managed across their life cycles, focusing on sustainability and waste reduction.[101] The National Recycling Strategy, launched in 2021, was the first strategy published as part of the series. It outlined the necessary actions to modernize recycling systems across the U.S. The strategy emphasizes collaboration among federal, Tribal and state partners to enhance recycling infrastructure, improve materials management and reduce contamination in recycling streams. The IIJA provided financial support for implementing the strategies.

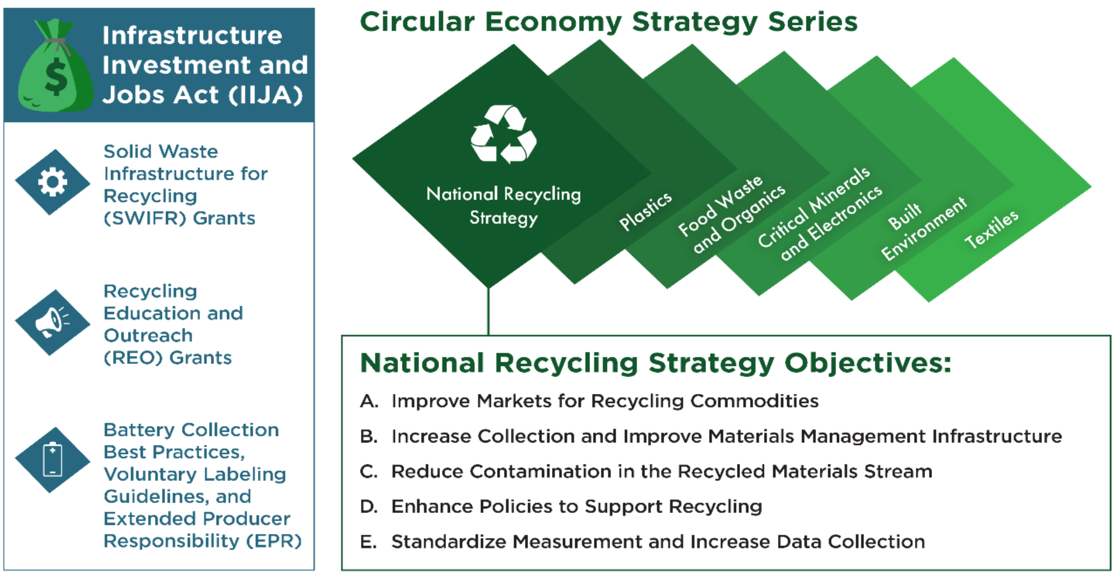

Figure B-2. EPA's Circular Economy Strategy initiatives.