State Policymakers and EV Battery Recycling

By Dan Wilkins and John Kuna | October 2023

30 Second Snapshot:

- States currently have a patchwork of policy and regulations related to battery recycling – 10 states and the District of Columbia require producers to offer or fund battery recycling; 20 states and Puerto Rico have recycling requirements in effect; and 20 states lack any such requirements.
- Collaborative efforts amongst all stakeholders are crucial to create a seamless and effective battery recycling ecosystem.
- Industry leaders can work with policymakers to offer valuable insights, data, and best practices to shape successful battery safety and recycling policies.

Introduction

With the surge in passenger electric vehicle (EV) adoption and micro-mobility solutions such as e-bikes and scooters, increasing attention is being paid by policymakers to recycling batteries, with a focus on safety, sustainability, and cost effectiveness. The policies, priorities, and challenges faced by state policymakers in addressing the rise in e-mobility are an important part of the broader framework for a sustainable, battery-powered transportation system.

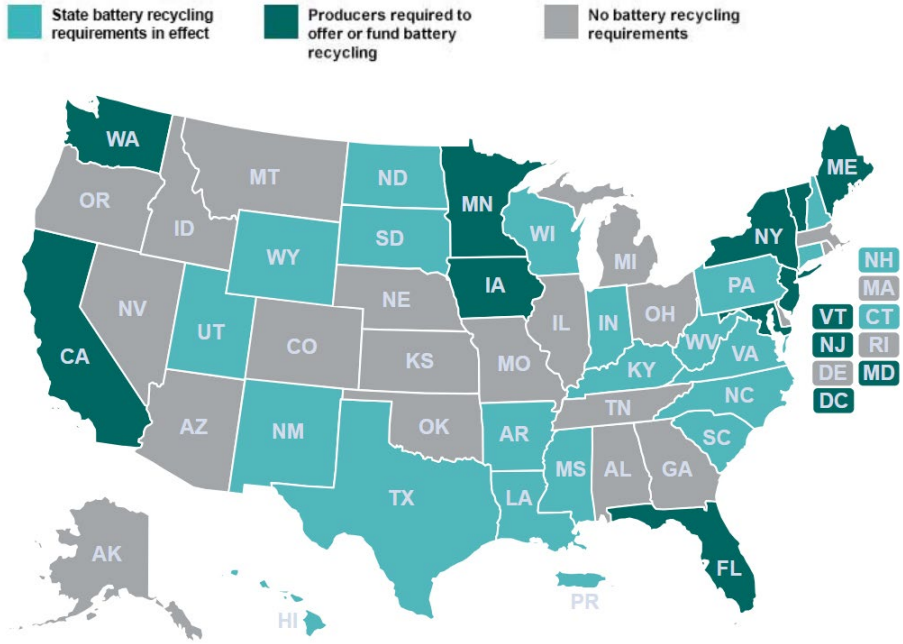
This fact sheet provides a snapshot of current national legislation on the handling of lithium-ion batteries and shows how the recycling sector has worked and can continue to use its expertise to improve new laws and regulations.

National Overview of Battery Safety and Recycling Policy

The United States is currently in the process of implementing best practices and guidelines for recycling lithium-ion batteries. As of October 23, 2023, the U.S. Environmental Protection Agency (EPA) has noted it is working on a proposal for universal waste standards specially tailored for lithium batteries, which includes changes to regulations such as the Universal Waste Rule.

States nationwide have taken diverse, but fragmented approaches to address safety and recycling challenges with batteries. California, for example, has revised existing recycling law to encompass modern embedded batteries in e-mobility solutions such as motorized scooters, skateboards, and hoverboards. Simultaneously, Minnesota and New York have set standards for battery manufacturers and retailers, and New York has safety requirements and disposal best practices for waste handlers at both the local and state level. California and Washington enacted extended producer responsibility (EPR) laws specifically for batteries, which shifts the responsibility for battery recycling from consumers to manufacturers. In Washington, the Department of Ecology is directly engaging with stakeholders in the recycling sector to determine best practices for EV battery recycling, which will feed a report due on November 30, 2023 to the state legislature. The patchwork of state policy and regulations related to battery recycling (See Figure 1) reflects the complex and inconsistent approach to handling batteries in the electric mobility industry.

Figure 1: Recycling Laws by State Vary



This figure shows the current state laws related to battery recycling and collection. While many states reference 'rechargeable batteries' without specificity, legislative changes in states like California, New York, and Minnesota have begun to explicitly mention lithium-ion. Note: states that have 'no battery recycling requirements' are still bound by federal law which requires, with certain exceptions, used nickel cadmium (Ni-Cd) and small sealed lead acid (Pb) batteries to be managed as Universal Waste (40 CFR Part 273). Lithium-ion batteries are only 'recommended' by EPA to be handled as either hazardous or universal waste, depending on handler discretion.

Source: Call2Recycle

What Policymakers Need to Develop Comprehensive Policies

To develop relevant policies for battery safety and recycling, it is important that policymakers have access to a variety of information. Industry leaders in the recycling sector have a unique opportunity to provide needed insights, and federal agencies are keen on capturing this thought leadership, as displayed by the DOE's efforts in soliciting information in 2022 on the collection, transportation, sorting, processing, and second-life applications for end-of-life lithium-ion batteries. While not exhaustive, the list below was gathered from stakeholder insights found in the EPA best practices guidelines and the EPA workshop on lithium batteries in the waste stream held in 2021 and 2022, and outlines areas of potential further collaboration and consultation between the industry and policymakers:

- **Battery Technologies Overview**: A comprehensive understanding—by both policymakers and recyclers—of the various battery chemistries and technologies in use, including lithium-ion batteries common in EVs and portable electronics, and emerging chemistries such as solid state batteries. This knowledge is crucial to tailor recycling policies to specific battery types both in the present and the near future because drafting legislation or rules around a specific technology can result in policies becoming obsolete as inevitable advances are made in the industry.
- **Safety Data:** Detailed data on safety risks associated with different battery chemistries, embedded batteries, and usage scenarios. This includes information on the potential for thermal runaway, fire hazards, and hazardous materials in batteries. Access to accident and incident reports related to battery safety is essential.
- **Recycling Infrastructure**: Information on the state of recycling infrastructure, including the capacity, capabilities, and locations of recycling facilities equipped to handle various battery types. Identifying gaps in the infrastructure is critical for developing effective recycling policies, particularly as hazardous materials cross state lines where regulations may differ between jurisdictions.
- **EPR Models:** Insights into successful EPR programs, both domestically and internationally. This includes understanding the impact of EPR on recycling rates, costs, and consumer behavior. However, it is worth noting that some EPR programs are unsuccessful, which is why identifying best practices is crucial.
- **Labeling and Consumer Education**: Data on the effectiveness of battery labeling and public awareness campaigns. Understanding how well consumers comprehend disposal and recycling instructions on batteries can guide the development of clear, standardized labeling and education efforts.
- **Environmental and Economic Impacts**: Assessments of the environmental and economic impacts of battery production, use, and disposal. This includes evaluating the carbon

footprint of battery manufacturing, resource depletion, and the potential economic benefits of recycling.

- **Cross-State Collaboration**: Insights into the benefits and challenges of harmonizing battery recycling and safety regulations across states. Understanding how different regulatory frameworks interact can inform strategies for achieving consistency.
- **Technological Advancements**: Updates on emerging battery technologies, recycling methods, and safety innovations. Staying informed about technological advancements can help policymakers anticipate future challenges and opportunities.
- **International Best Practices**: Learning from international best practices and successful policies related to battery safety and recycling can provide valuable guidance for domestic policymaking and universal labeling.
- **Public and Industry Stakeholder Input**: Engaging with experts, industry stakeholders, environmental organizations, and affected communities to gather diverse perspectives and feedback during the policy development process.

With this information, policymakers can make informed decisions and develop effective policies that address the evolving landscape of battery safety and recycling while promoting sustainability and public safety.

The Role of the Federal Government

While state governments play a pivotal role in implementing and enforcing battery recycling programs and policies within their jurisdictions, the federal government—primarily through the EPA—provides nationwide regulations, guidance, and support.

To that end, the EPA conducted a virtual workshop in 2021 to address lithium batteries in the waste stream. It united stakeholders from diverse sectors, including the recycling sector, manufacturers, and government officials. The workshop focused on critical issues arising from batteries in the waste stream, such as fire hazards caused by improper disposal, and was instrumental in helping inform the role the federal government will play in this space. Key messages from the workshop breakout groups, and how the federal government could further promote each key message, can be found in Table 1.

Table 1: Key Takeaways from the EPA Workshop and the EPA's Role in Promoting Each

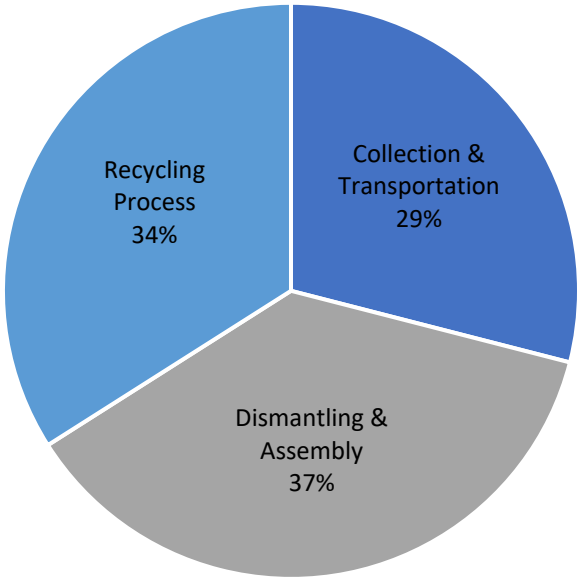
Topic	Takeaway	EPA Role
Design	Promote product designs featuring easily removable batteries, robust casing, and internal separators to prevent short circuits, and incentivize systematic changes through promoting EPR models, minimum recycled	Federal regulations and initiatives can encourage adoption of battery designs that align with safety and recycling objectives through standards and incentives.

Topic	Takeaway	EPA Role
	content requirements, or by adding lithium-ion batteries to the chemistries covered by the 1996 Mercury-Containing and Rechargeable Battery Management Act.	
Labeling	Use QR codes, color codes, and informative labels to guide users on lithium-ion battery management.	Establish standardized, nationally recognized labeling requirements for batteries.
Education	Develop educational toolkits to spread consistent messages and support government outreach on lithium-ion battery risks and disposal methods.	In collaboration with states, develop and disseminate comprehensive educational material and campaigns to raise public awareness about the risks of improper battery disposal and storage.
Collection	Expand collection sites to enhance convenience of recycling.	Support the establishment of more collection sites and provide guidance on effective collection practices.
Recycling	Simplify regulations and permitting to facilitate lithium-ion battery recycling, including updating the 1995 Universal Waste Rule for lithium-ion batteries specifically, or creating an exemption for waste lithium-ion batteries that are recycled.	Use authority to streamline and update regulations related to lithium-ion batteries, possibly through amending the Universal Waste Rule.

Source: EPA

State and federal policymakers also have a pivotal role in influencing the costs associated with battery recycling as well. According to the U.S. Department of Energy, there is an end-of-life net cost to recycling EV batteries presently, and Figure 2 provides a typical breakdown of these costs. Variables such as damaged batteries requiring extra precautions and remote areas with battery collection points requiring longer transport distances can increase these costs. State and federal initiatives through regulations, incentives, direct investments, and research, can help reduce the cost for battery recycling in many ways. Collaboration between both levels of government is essential for creating a seamless and effective battery recycling ecosystem.

Figure 2: Typical Cost of Recycling EV Batteries



Only about one-third of total costs for recycling EV batteries is the recycling process itself. The remainder of the costs are separating the battery from the vehicle and bringing the battery to a recycling facility.

Source: Union of Concerned Scientists

Public Concerns on Battery Safety and Recycling & Opportunities to Alleviate

Constituents and stakeholders have voiced several key concerns regarding battery recycling. For instance, a 2022 survey of approximately one thousand Americans by engineering firm Ascend Elements revealed significant misconceptions among consumers. Approximately 47 percent of respondents mistakenly believe lithium-ion batteries from EVs are not recyclable, while 37 percent are unaware that recycled lithium-ion batteries can be used to produce new EV batteries. Additionally, 39 percent of respondents did not know that critical minerals within EV batteries can be recycled multiple times without significant performance loss.

Similarly, in June 2022, EPA solicited public comments on best practices surrounding the recycling and handling of batteries as part of the implementation Infrastructure Investment and Jobs Act of 2021. While not an aggregate collection of the public's battery recycling concerns, the most frequent and echoed concerns among constituents included:

- **Need for Clarity on Disposal and Recycling**: Communities seek more information about safe battery disposal and recycling practices. For instance, Kitsap County, Washington emphasized the challenge of educating the public on various battery chemistries and their respective proper disposal methods. The public in Kitsap County also requested more

accessible recycling options including more drop-off sites. Additionally, clearer guidelines and labeling for battery handling at end-of-life are desired. Kane County, Illinois highlighted the confusion surrounding battery chemistries and disposal symbols, leading to batteries going to landfills rather than recycling centers.

- **Safety Measures and Precautions**: Concerns about battery safety are front and center. Vermont's Department of Environmental Conservation noted the importance of safety protocols and the need for equipment to handle damaged batteries. Wisconsin Department of Natural Resources noted the difficulty in preventing disposal drop-off sites being contaminated by improper handling of batteries.

Stakeholders within and adjacent to the recycling sector were among those who provided comments to the EPA, outlining concerns and recommendations. Notably, except for the National Waste & Recycling Association and ISRI joint comment advocating for a national campaign, most submissions predominantly addressed local or regional campaigns. This suggests an opportunity for broader collaborative efforts to unify these individual initiatives. Table 2 highlights the collective concerns from various stakeholders across the United States aimed at improving battery recycling in the coming years.

Table 2: Recyclers' Current Concerns on Recycling Efforts Nationwide

Category	Detail
Public Education	Miami-Dade and Kane Counties emphasized the need for increased public education surrounding disposal and awareness of batteries and further outreach efforts. The National Waste & Recycling Association and ISRI joint comment noted that development of educational materials that can be adapted and used throughout the United States would help address this problem.
Clear Labeling	Vermont, Kane County, and the Automotive Recyclers' Association highlighted the importance of clear and consistent labeling for batteries.
Safety and Handling	Kitsap County, Vermont, and the National Waste & Recycling Association joint comments underscored the importance of proper safety measures at recycling sites and handling to prevent hazards like fires.
Ease of Recycling	Both Kitsap County and the Automotive Recyclers' Association discussed making batteries more accessible for recycling, whether through design or information access.
Resources and Funding	Several stakeholders, including Miami-Dade and the National Waste & Recycling Association joint comments, touch on the need for more resources and funding to improve the current battery recycling infrastructure.

These diverse concerns echo the will of many stakeholders to ensure a sustainable and safe battery recycling ecosystem, combining a consistent regulatory framework with actionable guidelines and public awareness initiatives.