Mid-Format Battery Recycling: Role of Manufacturers and Retailers in Promoting Safer Collection and Recycling

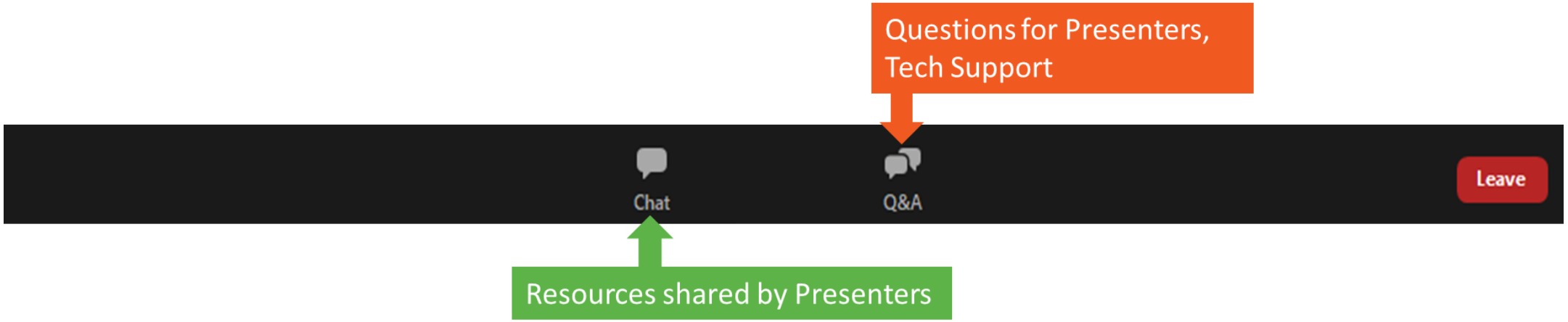
October 15, 2024

U.S. Environmental Protection Agency (EPA)

Logistics and Agenda Review

Pat Tallarico, ERG Team

Webinar Logistics



- **To ask a question:** Type your questions for presenters in the Q&A box. We will answer questions at the end of each presentation.
- **Technical difficulties:** If you are having technical difficulties, please send a message through the Q&A box or email Audrey.Njo@erg.com

Agenda Overview

1. Opening remarks, logistics, and agenda review
2. Overview of Call2Recycle's Mid-Format Collection Systems (e-Mobility and Power Tools)
   - **Todd Ellis,** Call2Recycle
3. Manufacturer's Perspective on Battery Collection and End-of-Life Solutions (Outdoor Power Equipment)
   - **Jim Gessford**, The Toro Company
4. E-mobility Program Battery Management
   - **Ted Randell**, DC District Department of Transportation (DC DDOT)
4. Point-of-Sale Messaging/Retail Collection for E-mobility Devices
   - **Jay Townley and Mike Fritz**, Human Powered Solutions
7. Questions/Comments
8. Wrap up/Next steps

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Background

Ellen Meyer, US Environmental Protection Agency (EPA)

EPA's Ongoing Battery-Related Projects

Separate but complementary requirements in the Bipartisan Infrastructure Law (BIL):

- **Battery Collection Best Practices** to identify and increase accessibility to battery collection locations, promote consumer education, and reduce hazards from improper disposal [Sec. 70401(b)]
- **Voluntary Battery Labeling Guidelines** to improve battery collection and reduce battery waste by promoting consumer education and reducing safety concerns related to improper disposal. [Sec. 70401(c)]

Vision for EPA's Resources & Guidance

Battery Collection Best Practices

- EPA will develop best practices for state, tribal, and local governments to recycle batteries in a manner that is:
  - Technically and economically feasible
  - Environmentally sound and safe
  - Optimizing value and use of materials, including critical minerals
- Anticipated resources for publication in 2025 and 2026
  - Best practices guidelines
  - Tailored outreach materials
  - Case studies

Vision for EPA's Resources & Guidance

Voluntary Battery Labeling Guidelines

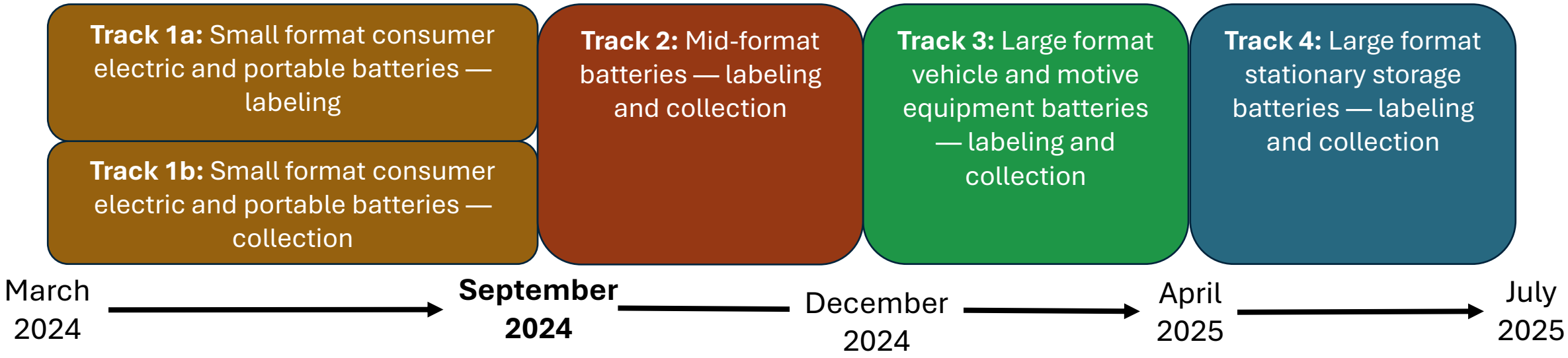
- EPA aims to develop guidelines for labels that will:
  - Identify battery collection locations
  - Educate consumers about recycling opportunities
  - Reduce safety concerns from improper disposal
- Anticipated resources for publication in 2025 and 2026
  - Sets of written guidelines for various battery categories
  - Guidance will build on existing standards; emphasize good ideas; and address inconsistencies.

Scope of Batteries

Category	Small format consumer electric and portable batteries		Mid-format batteries	Large format vehicle and motive equipment batteries	Large format stationary storage batteries
Type	Single use (Primary)	Rechargeable (Secondary)	Rechargeable	Rechargeable	Rechargeable
Use	Removable or embedded in electronics and electric devices, such as watches, hearing aids, cameras, key fobs, toys, portable radios, flashlights.	Removable or embedded in electronics and electric devices, such as phones, computers, appliances, small uninterruptable power supplies (UPS), power tools, power banks.	E-mobility including e-bikes, e-scooters. Outdoor power equipment. Portable power stations.	All scales of automotive starting and motive vehicle batteries. Materials handling equipment (forklift, crane, etc.) Recreational (golf carts, marine equipment, recreational vehicles, etc.)	Residential, including power wall, backup generators. Grid, including utility, solar, wind. Off grid and microgrid. Commercial, including building systems, data centers, server rooms, medical and hospital equipment, retail backup power.

Conversation Timeline

- A sequenced approach to conversations
- Leveraging existing, in-person industry meetings to test ideas and share updates



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What are the most significant differences you see in management of consumer-generated small format and mid-format batteries?

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Highlights from Work to Date

Pat Tallarico, ERG Team

Safe Collection, Storage, and Transportation for Small Format Batteries

- **Collection Systems**
  - Curbside, central/regular drop-off, periodic collection events
  - Convenient locations
  - Well-marked instructions/directions for consumers
  - Consistent and diverse outreach mechanisms with clear instructions
  - Hub and spoke models for more rural/remote locations.
- **Collection Sites**
  - Require employee training for all collection site workers, battery handlers, and recyclers.
  - Partner with Call2Recycle and receive collection boxes with a fire-retardant liner.
  - Use fire suppressants and/or specific buckets to isolate battery fires.
  - Ask consumers to take basic action – e.g., put each battery in an individual plastic bag, tape ends.
  - Coordinate with local fire departments first responders.
  - DDR batteries: check for leakage/physical damage; use a heat detecting gun; isolate batteries with non-combustible and absorbent cushioning; obtain special shipping permit.
- **Transportation**
  - When shipping lithium batteries, use packaging that prevents battery damage, short circuits, and release of contents; tape terminals with heavy-duty tape
  - Partner with a battery collector/recycler to receive collection boxes appropriate for shipping

Education and Outreach for Small Format Batteries

- Common drivers for action:
    - Reducing fires
    - Keeping batteries out of landfills
- Have a clear “call to action” for residents.
- Conduct continuous, direct, and diverse outreach tailoring to community needs.
- Partner with nonprofits and industry groups to amplify campaign messages.

Key Themes: Labeling

- Consumers need to:
  - Be able to recognize a battery and products with batteries
  - Know what to do and not do with a battery at end of life
- Collection facilities need to:
  - Know battery types and state/condition
  - Train employees
  - Make it easy for consumers to drop off batteries
- Material recovery facilities/sorters
  - Care about size and shape for optical sorting
  - New technologies may aid in identifying batteries/battery containing products
  - Can't eliminate all hazards—be prepared for fires

Key Themes: Labeling

- Labels should direct consumers to a website for more information.
- Modifying existing labels takes time.
- Products have limited real estate and already need to convey a lot.
- Use of "chasing arrows" recycling symbol can be confusing without more information.
- Color has had/may have limited utility.

Transitioning to Mid-Format

- Trend is to more electrification of equipment in the mid-format range (e.g., power tools, outdoor equipment, e-mobility).
- More power in smaller packages – longer battery life.
- Mid-format may be less likely to end up in landfills because of size of products.
- Transportation can get more complicated.
- Growing level of interest in regulating at the state level.
- Designating drop-off bins as "rechargeable" may get confusing to distinguish between small and mid-format.

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What are your biggest questions about mid-format battery management?

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Overview of Call2Recycle's Mid-Format Collection Systems (E-Mobility and Power Tools)

Todd Ellis, Call2Recycle

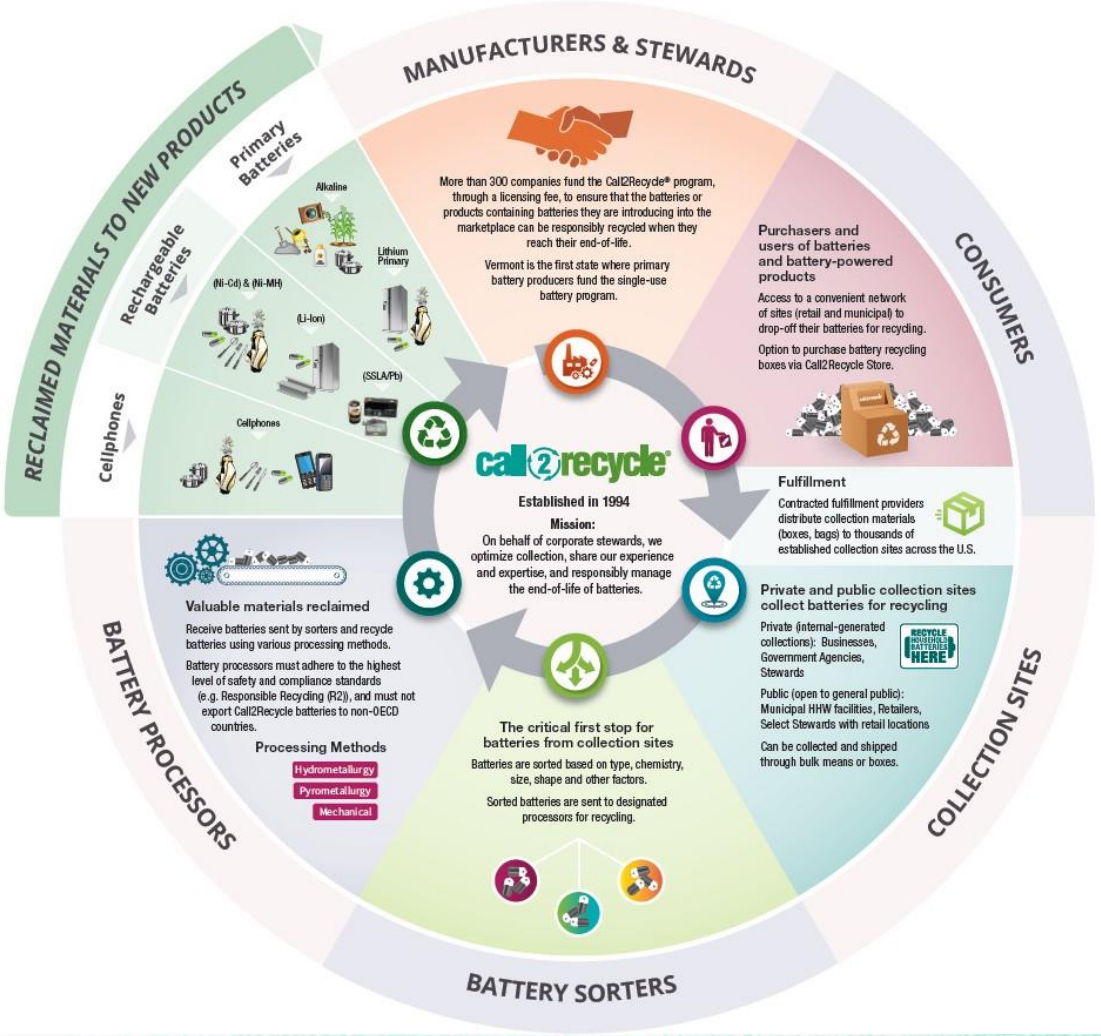
Mid-Format Batteries: Role of Manufacturers and Retailers in Promoting Safer Use and Management

Todd Ellis
Call2Recycle, Inc.

call2recycle®
Leading the charge for recycling.℠

About Call2Recycle

How the Program Works



Millions of products powered by mid-format batteries have been sold and will need to be collected, transported and recycled in a safe and environmentally sound manner.

Call2Recycle has partnered with dozens of OEMs from two industries - bicycle & outdoor power equipment – to provide a turnkey solution to safely transport and compliantly recycle used mid-format batteries.

Industry Funded Programs

Industry Funded Mid-Format Battery Recycling Programs

e-bike battery recycling
powered by Call2Recycle | endorsed by PeopleForBikes

- Started in March of 2022.
- Call2Recycle administers the first, voluntary industrywide e-bike battery recycling program in the U.S. - the first transportation sector united under one battery recycling solution.
- Supported by more than 50+ e-bike brands with more than 2,000+ collection sites trained and actively accepting e-bike batteries for recycling.

high energy battery recycling
powered by Call2Recycle

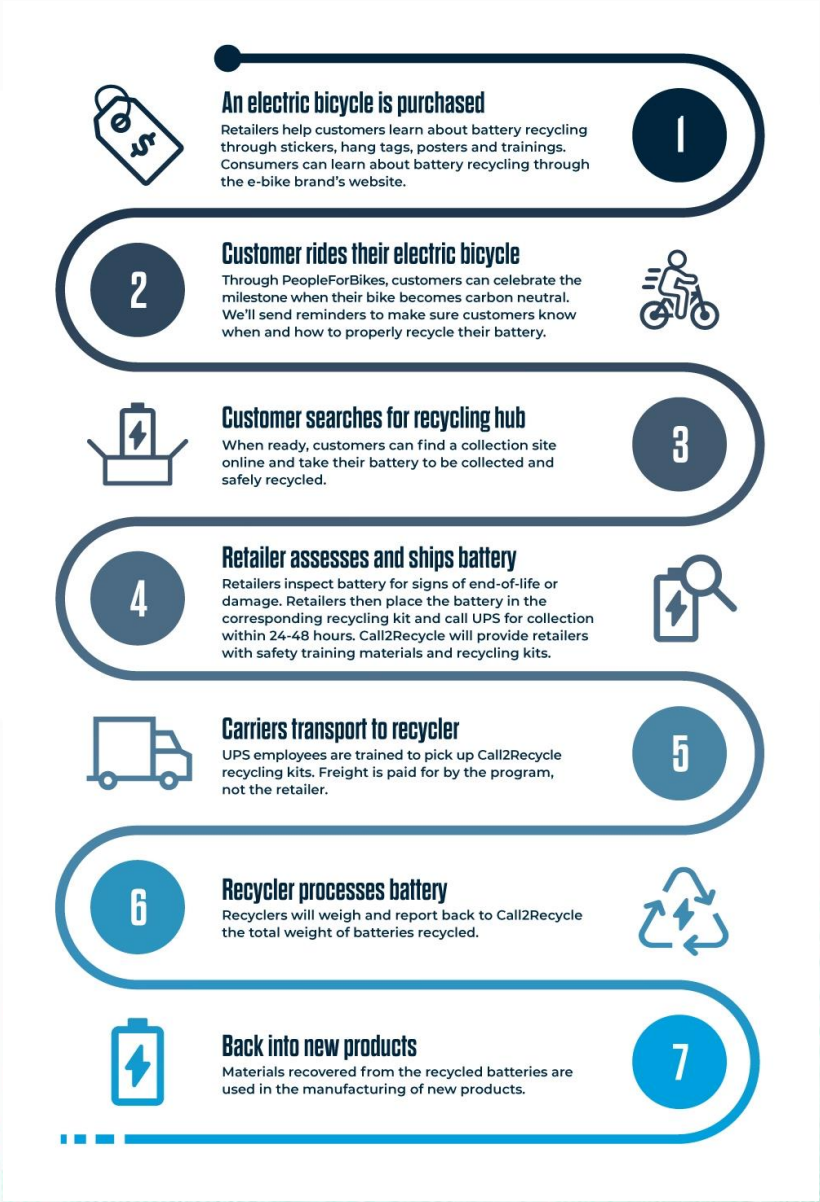
- Started April 2024
- Call2Recycle administers the first, voluntary high-energy battery (over 300-watt hours) recycling program in the U.S.
- Supported by seven manufacturers (16 brands) of outdoor power equipment to responsibly recycle batteries at select (~100) and national retailers (Lowe's nationally launching in Late October 2024).

Participating Brands

Participating E-Bike Brands

Participating High Energy Brands

How the Programs Work



Collection Sites

How Does a Location Become a Collection Site?

How Are Batteries Collected & Transported?

End-of-Life Batteries

- All-In-One recycling kit with US DOT Special Permit.
- Cumulative watt-hours cannot exceed 3,600. Any battery 1,200 watt-hours or greater must be at 30% or less SOC.
- *This kit will exempt retail employees from having to be specially trained to ship hazardous material*.

Damaged / Defective Batteries

- All-In-One recycling kit for damaged / defective batteries.
- Available on an as needed basis.

E-Bike Shops – Lithium Ion Battery Incident Kit

Educating Consumers

How does Industry Educate Consumers?

[Hungry For Batteries Campaign]

How do Collection Sites Educate Consumers?

Hang Tags

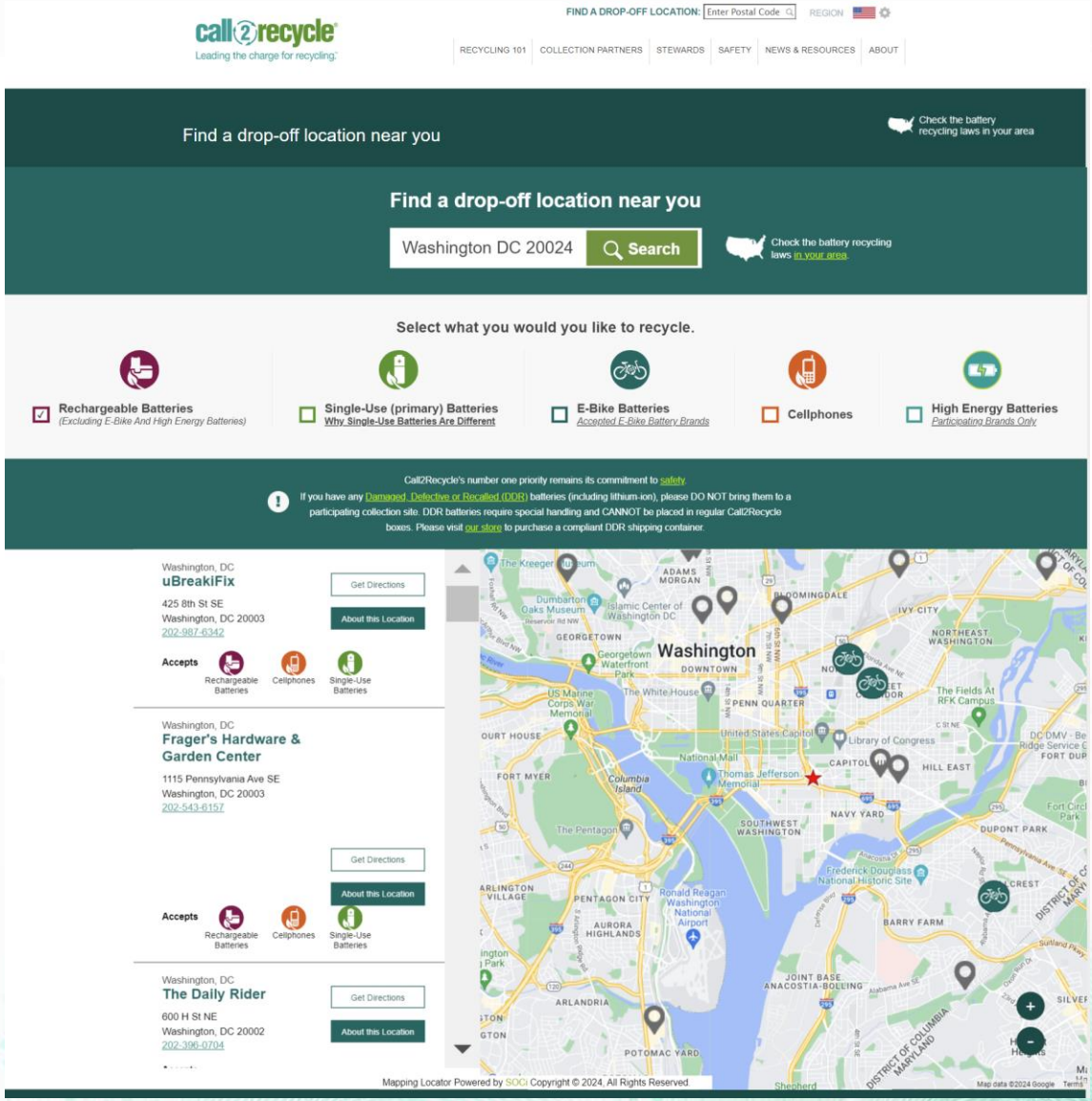
Posters

11”x17”

Stickers + Window cling

- Point of sale materials available to foster customer interactions around recycling
- Digital campaign assets available for website, emails, and newsletters.

How Do Consumers Find a Collection Site?



Frequently Asked Questions

Todd Ellis
Call2Recycle, Inc.
tellis@Call2recycle.org

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Are there other examples of systems that people are using to collect and recycle mid-format batteries outside of Call2Recycle?

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Manufacturer Perspective - Outdoor Power Equipment

Jim Gessford, The Toro Company

U.S. EPA Webinar

Mid-Format Battery Recycling: Role of **Manufacturers** and Retailers in Promoting Safer Use and Management

October 15, 2024

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Sustainability

Recycling

REVITALIZING RESOURCES

Our commitment to renewable resources doesn't end with product design; we embrace responsible practices for end-of-life scenarios and prioritize product component recyclability. We strive to play a pivotal role in fostering a more circular economy.

Our ongoing dedication to planet-conscious design is reflected in the integration of elements consistent with the EU Ecodesign Directive. We champion the use of recyclable and reusable materials, where appropriate, underscoring the significance of recyclability as the optimal end-of-life scenario for our products.

Through active engagement with industry associations and strategic partnerships, The Toro Company is at the forefront of identifying and implementing effective battery recycling solutions. Our collaboration with Call2Recycle and industry peers on the development of a new high-energy battery (HEB) recycling program demonstrates our commitment to offering customers and channel partners a safe and legal way to return and recycle qualifying lithium-ion batteries, including our Flex-Force Power System® batteries, with a capacity greater than 300 Wh.

60V BATTERY BRANDS

TORO

eXmark

FLEX-FORCE POWER SYSTEM

HAYTER

MAKERS OF THE FINEST MOWERS

60V Flex-Force Ecosystem

Falls into the broader 60V Flex-Force Power System® and all 60V Max* batteries are interchangeable across all products

ZERO TURN **SNOW** **WALK MOWER** **HANDHELD**

Toro Battery Line-Up







	60V Max* 2.0Ah Battery	60V Max* 2.5Ah Battery	60V Max* 4.0Ah Battery	60V Max* 5.0Ah Battery	60V Max* 6.0Ah Battery	60V Max* 7.5Ah Battery	60V Max* 10.0Ah Battery
Model	88620	88625	88640	88650	88660	88675	66810
Capacity (Ah)	2.0	2.5	4.0	5.0	6.0	7.5	10.0
Total Power (Wh)	108	135	216	270	324	405	540
EPA Battery Type	Small Format	Small Format	Small Format	Small Format	Mid-Format	Mid-Format	Mid-Format
Compatible with all 60V Max* Flex-Force Power System Tools							

call2recycle® Leading the charge for recycling.™

high energy battery recycling powered by Call2Recycle

Key Considerations

- Recycling option(s) available to and understood by customers
- Program(s) available to meet channel partner needs
- Legal and regulatory compliance
  - MN, NY, CA, WA and District of Columbia
  - Many more states considering battery EPR bills

Key Considerations

- Consistent classifications/terminology at Federal and state level
  - Small, medium, large format batteries
    - Classification by weight (lbs.) and battery capacity (Wh)

- Accommodate/align with existing programs
  - e.g., Call2Recyle High Energy Battery (HEB) program

Key Considerations

- Label based on appropriate collection/recycling program
  - Chasing arrow recycling symbol creates confusion for customers
  - Operator manual and program websites used to instruct customers on how to properly recycle battery

- Color options for labels
  - Do not force OEMs to use colors that create brand confusion/dilution
  - Black and white always and option

Key Considerations

- Federal regulation preferable to state-by-state approach
- Requirements for OEM participation
  - Non-participating OEMs prohibited from placing batteries in commerce
- Prohibition on retailers selling batteries from non-participating OEMs
  - Online and brick and mortar
  - Addresses free-rider concerns

Key Considerations

- Private right of action for:
  - Producer Responsibility Organizations
  - Recyclers
  - Citizens

- Addressing hazmat shipping issues
  - Multi-modal solution(s) - ground, air and vessel
  - 50 states, incl. Alaska and Hawaii
  - Acceptance by all major carriers

E-Mobility Program Battery Management

Ted Randell, District of Columbia District Department of Transportation (DC DDOT)

DISTRICT DEPARTMENT OF TRANSPORTATION

Shared Fleet Device Mid-Form Battery Safety

Shared Fleet Devices

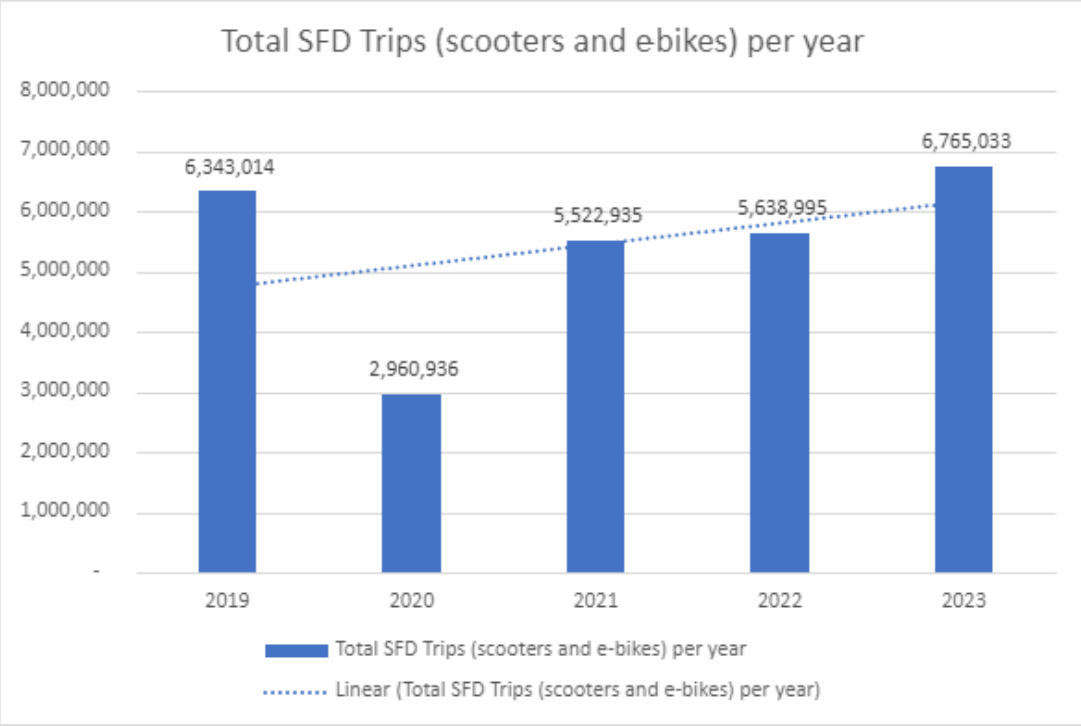
Shared fleet electric mobility devices (Scooters)

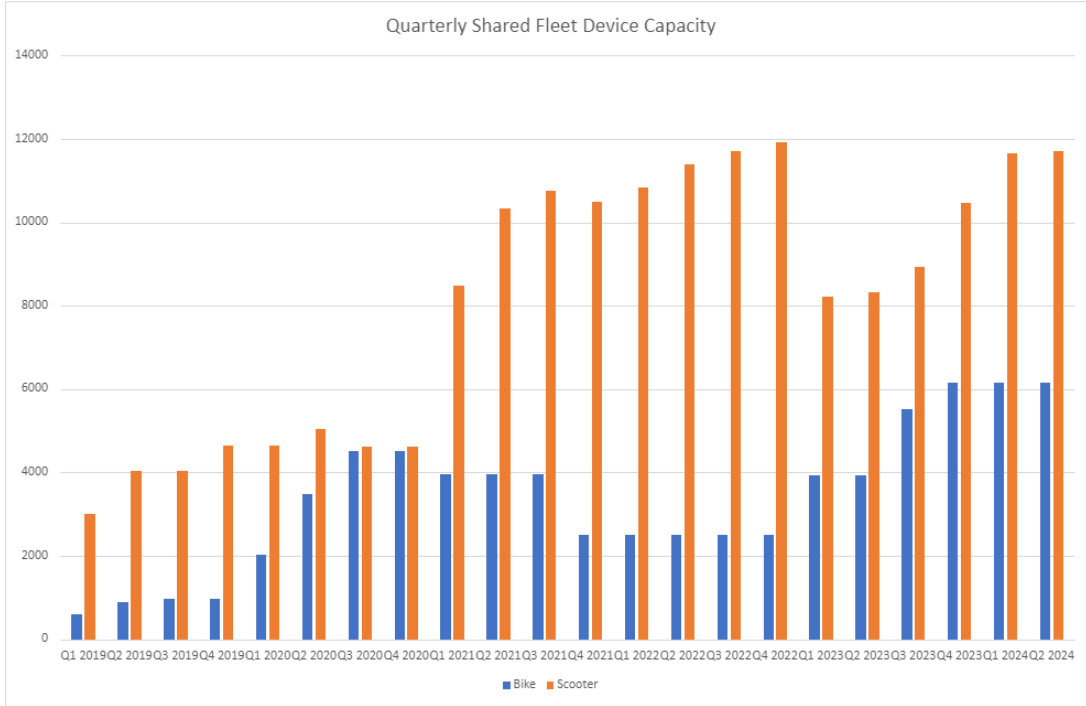
- Tandem wheel
- Standing or seated
- ~60 Lbs.
- Electric powered throttle
- Max speed 10mph
- **UL Standard 2272**

Shared fleet e-bikes

- Tandem wheel
- Seated
- Operable pedals for human powered propulsion
- Electric pedal assist or throttle
- 16-inch wheel diameter
- Max speed 20mph
- **UL Standard 2849**

Shared Fleet Device Program Scale





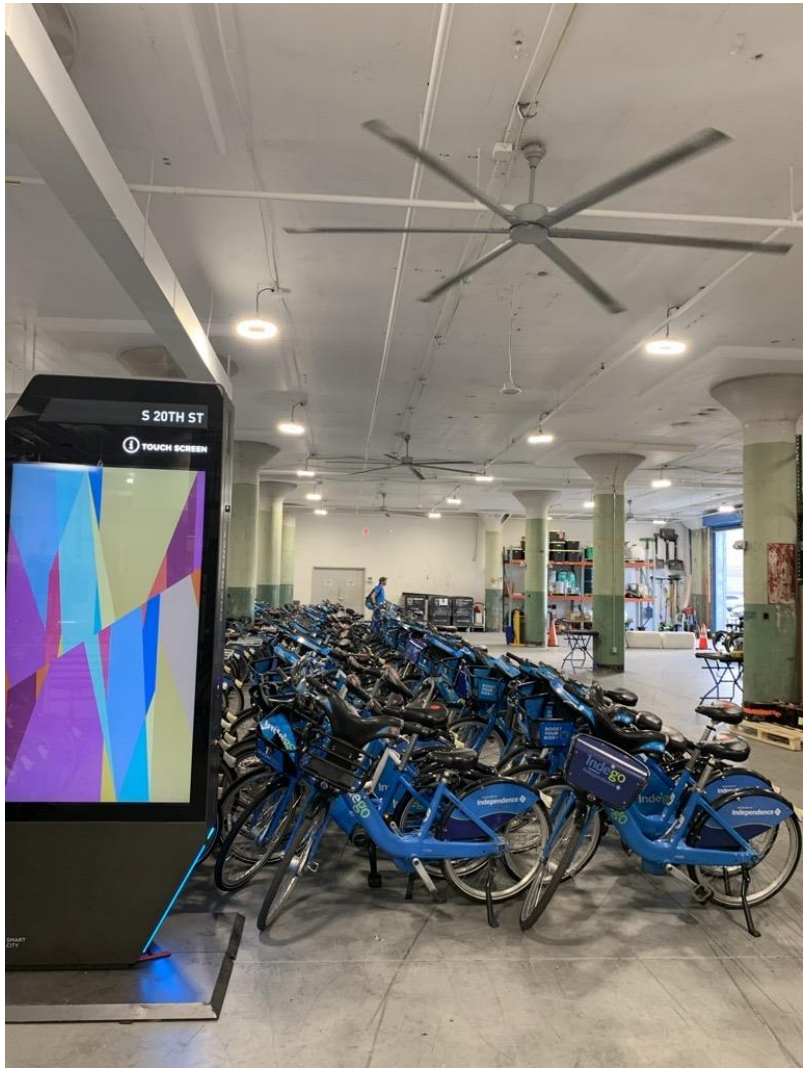
Permit Requirements (safety)

- Application Criteria
  - List prior battery-related incidents
  - Overview of operations and device specifications
  - Life cycle analysis
- Operations plan
  - Battery storage
  - Battery charging
  - Battery transportation
  - Battery recycling (EOL)
  - Battery Tampering
- Industry standards
  - Swappable batteries for ease of charging
  - Proprietary methods for removing batteries
  - Weather-proof and tamper-proof cattery casing
  - Strive for zero waste

The shared micromobility industry has adopted a method of swappable batteries to streamline and reduce environmental impacts of operations.

Bike Share Industry Standardizing

- Controlled-climate charging
- Triage of damaged components (one damaged cell is too many)
- Emergency response equipment (CO2 extinguishers, sand, closed off rooms).
- Hazardous materials barrels for storage/transportation of damaged cells
- Recycling partners
- UL certified purchasing and product certification



Emergency Response and Education

TAKE

C

Choose certified products

- When purchasing lithium-ion battery-powered devices, be sure to look for products that are listed or safety certified by a nationally recognized testing laboratory to ensure they meet important safety requirements.
- Countless products sold online do not meet these critical safety standards.

H

Handle lithium-ion battery-powered devices with care

- Follow the manufacturer's instructions.
- Only use the charging equipment that comes with the product.
- Store batteries away from extreme temperatures, direct sunlight, exits, and anything flammable.
- Do not modify the battery or the charger in any way.
- Charge larger devices (such as eBikes) outside the home – and never in your exit path.
- Do not charge larger devices overnight.

A

Always stay alert for warning signs

- Check battery-powered devices often for damage or abuse such as swelling or punctures.
- Listen for unusual hissing or popping sounds.
- Watch out for excessive heat or a strange odor.
- If you notice any of these warning signs, stop using the lithium-ion powered devices.
- White or gray wispy smoke indicates immediate danger of thermal runaway.

R

Recycle devices and batteries properly

- Responsibly dispose of old or damaged batteries and devices by taking them to the nearest battery recycling center.
- Never discard batteries, chargers, or battery-powered devices in regular trash bins.

G

Get out quickly if there's a fire

- Know the warning signs to look and listen for and get out if you see – or hear – one.
- Follow your home fire escape plan to leave immediately and **call 9-1-1**.

E

Educate others on battery safety

- Now that you know what actions to take, spread the word. Protect your friends and loved ones by sharing how they can **Take C.H.A.R.G.E. of Battery Safety**.

Recommendations

- **Cities**
  - Industry standards and certifications (UL, ANSI) for expanding micromobility options
    - E-bike incentives, e-bike libraries, docked and non-docked operators
  - Incorporate battery safety practices into procurement, permit documents
  - Data requirements
  - Ebike/e-scooter battery buybacks
  - Coordinate consumer education and emergency response

- **Operators**
  - Innovate, invest, expand
    - Devices, storage, transportation, recycling
  - Coordinate with emergency response, establish communication channels
  - Data and incident transparency with cities, police, Fire and EMS

- **Private**
  - One bad battery muddies the entire ecosystem. Retailers and consumers are equally responsible
  - Engage in safe charging and storage
  - Look for certified products, do not modify or adapt devices or components

Questions and Contact

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Planning and Sustainability Division

District Department of Transportation

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Point-of-Sale Messaging/Retail Collection for E-Mobility Devices

Jay Townley and Mike Fritz, Human Powered Solutions

Mid-Format Batteries: Role of Manufacturers and Retailers in Promoting Safer Use and Management

Prepared by the
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For the EPA

NBDA national bicycle dealers association

hps HUMAN POWERED SOLUTIONS

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national bicycle dealers association

HUMAN POWERED SOLUTIONS

End-of-Life / Recycling Is Just One Important Issue Bike Shops Face Relative to Lithium-Ion Batteries!

Major concerns:

- Can only accept batteries from brands participating in program
- Must turn away other brands, including D-to-C and mass retail brands
- Identification of compromised battery packs
- Must configure the store and train staff for receipt and storage of packs pending transfer

Bike Shops need to prepare for the storage of end-of-life / compromised battery packs

Internal policies and protocols including education and training of staff

Purpose built battery storage cabinet suppliers:

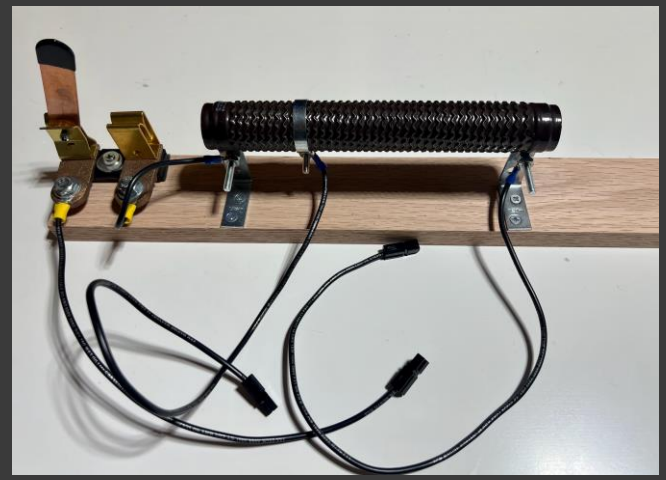
- CellBlock
- Energy Storage Safety Products Intl.
- Raclan
- Outdoor options

Store batteries in a discharged condition:

- How to discharge?

Ride to LVCO:

Use a discharge appliance:



Staff training curriculum:

- Brand identification
- Differentiate between end-of-life and compromised battery packs
- How to safely discharge an end-of-life pack
- Do not discharge a compromised battery pack
- General handling considerations

If not participating in the Call2Recycle Program, dealers must become certified HazMat shippers to legally ship lithium-ion batteries

- HazMat shipper training and certification offered by FedEx, UPS and other agencies
- Certification must be renewed annually
- Specific requirements:
  - Special packaging and labeling
  - Shipment must be treated as HazMat with restrictions on means of conveyance

Link to published NBDA battery safety guidelines:

- https://www.dropbox.com/scl/fi/9fh9oykf8qi7n1wn0bh51/NBDA-eBike-battery-protocols.pdf?rlkey=m4bzdgr0mr9e38k9i1t5cfyfo&dl=0

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Questions/Comments

Pat Tallarico, ERG Team

Wrap Up/Next Steps

Pat Tallarico, ERG Team

Ellen Meyer, U.S. EPA

Mid Format Consumer Electric and Portable Batteries Working Sessions

Past Webinars

Mid-Format Batteries	Meeting Topic	Meeting Date	Meeting Time	Format
Labeling and Collection	Current Policies, Practices, and Trends	September 12, 2024	2:00-4:00 PM EDT	Virtual
Labeling and Collection	Role of Manufacturers and Retailers in Promoting Safer Use and Management	October 15, 2024	2:00-4:00 PM EDT	Virtual

Upcoming Webinars

Labeling and Collection	Consumers Information Needs and Safety Concerns	October 30, 2024	2:00-4:00 PM EDT	Virtual
Labeling and Collection	Expanding End-of-Life Management	November 21, 2024	2:00-4:00 PM EST	Virtual

Next Steps

- Register for the October 30th Mid-Format Batteries: Consumers Information Needs and Safety Concerns
  - https://www.zoomgov.com/webinar/register/WN_OtMlGitxQVSKtyib0sx5AQ

- Email batteries@epa.gov if you have an interesting story to tell about battery collection

Questions & Answers from Webinar

Call2Recycle

Are you required to take non-participating program batteries in your recycling bins for small-format batteries?

In regulated states, yes. For the national program, it is often difficult to prevent them from getting into the bins, so they may be processed as well.

Why would a retail facility want to participate in your mid-format collection program? What benefit does it provide?

Batteries are being returned now, and participation in the program provides them with an outlet for them. Participating in the program is free, so it can result in cost savings and drive traffic to the store. For larger retailers, it helps demonstrate sustainability goal commitment.

How do sites determine a 30% state of charge (the amount of energy left in a battery)?

Some batteries are being equipped with light indicators that show the level of charge. There are also devices you can purchase that will provide charge information such as a calibrated resistor.
The 30% is of the nominal battery capacity.

Questions & Answers from Webinar

Call2Recycle

Does the 3600 Watt-hour limit for shipping apply to the entire box – can the contents include a lot of batteries totaling 3600 Watt-hours?

Yes. It is a cumulative number. Individual batteries cannot exceed 1200 Watt-hours.

Are high energy battery collection e-bike retailers limited to collecting only from the brands that are participating in the program?

Yes. 50 brands participate in the e-bike program, and 16 brands participate for the broader high-energy batteries. Only dealers of the brands can participate as collection sites – not available to HHW facilities.

Does this program take damaged batteries, or must they be shipped as fully regulated hazardous waste?

They must be shipped as hazardous waste.

What happens to batteries that are not part of the Call2Recycle list?

These batteries must be handled directly by the facility collecting them or by the user of the battery via some other mechanism (e.g., local HHW facilities).

Questions & Answers from Webinar

Call2Recycle

What type of confusion is caused by the presence of the chasing arrows image?

Consumers often get confused and think that they should put all items with a chasing arrows symbol in their recycling bin.