



U.S. DEPARTMENT OF ENERGY

## Lithium-Ion Battery Recycling Prize

### PHASE III OFFICIAL RULES

## OFFICAL RULES: MODIFICATIONS

Modifications made to the rules are summarized below and highlighted in the text.

<b>Modification 1</b> <b>2/10/2021</b>	<ul style="list-style-type: none"><li>Updated the “Phase III Contest Structure” (pages 7-8) to change the date of the Industry Networking Event. This event will take place at the NAATBatt 2021 Recycling Meeting &amp; Conference.</li></ul>
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# INTRODUCTION

This document contains the rules for Phase III of the U.S. Department of Energy (DOE) \$5.5-million Lithium-Ion Battery Recycling Prize (Prize), as administered by the National Renewable Energy Laboratory (NREL). Phases I and II are complete and the official rules for these phases were released separately and can be found [here](#). Seven winners of the Phase II contest received \$357,000 in cash, in addition to up to \$100,000 of non-cash prize vouchers. Voucher funds are to validate or support the demonstration of pilot-scale solution concepts during the Phase III contest.

The Phase III contest, Pilot Validation, is the final phase in this three-contest series. The objective of Phase III is to provide validation of the Phase II end-to-end solution at pilot scale. For the purposes of this contest, pilot validation demonstrates the commercial feasibility to recover the lithium-ion batteries (LIBs) from Phase II Final Submissions. The proposed solution may or may not include an intermediate step for secondary use.

Phase III may include a site visit by DOE, industry, and/or stakeholders to review each team's end-to-end solution and validation. Up to four winners of Phase III will be selected. Up to \$2 million in cash prizes will be distributed equally among the winners, with a minimum of \$500,000 and a maximum of \$1 million per winner.

## 1. BACKGROUND

There is a growing demand for LIBs in a variety of commercial uses. For purposes of this prize, “commercial uses” of LIBs are divided into the following categories:

- Consumer electronics
- Electric vehicles (EVs)
- Stationary storage and/or other large industrial uses.

The cathode is the most expensive portion of LIBs. Current LIB cathodes contain a substantial amount of cobalt, a critical material that is both expensive and dependent on foreign sources for production. The Democratic Republic of the Congo supplies over half of the world's cobalt, and China is the world's leading producer of refined cobalt and a leading supplier of cobalt imports to the United States.<sup>1</sup> Other valuable materials in the battery include lithium, nickel, manganese, graphite, and electrolyte.

Unlike lead-acid batteries, which are collected and recycled at a rate of 99%, LIBs are only collected and recycled at a rate of less than 5%. DOE's goal is to enable the industry to reach a 90% recycling rate of LIBs. With this 90% recovery rate, recycled material could potentially provide one-third of United States cathode material needs for LIBs by 2030.<sup>2</sup>

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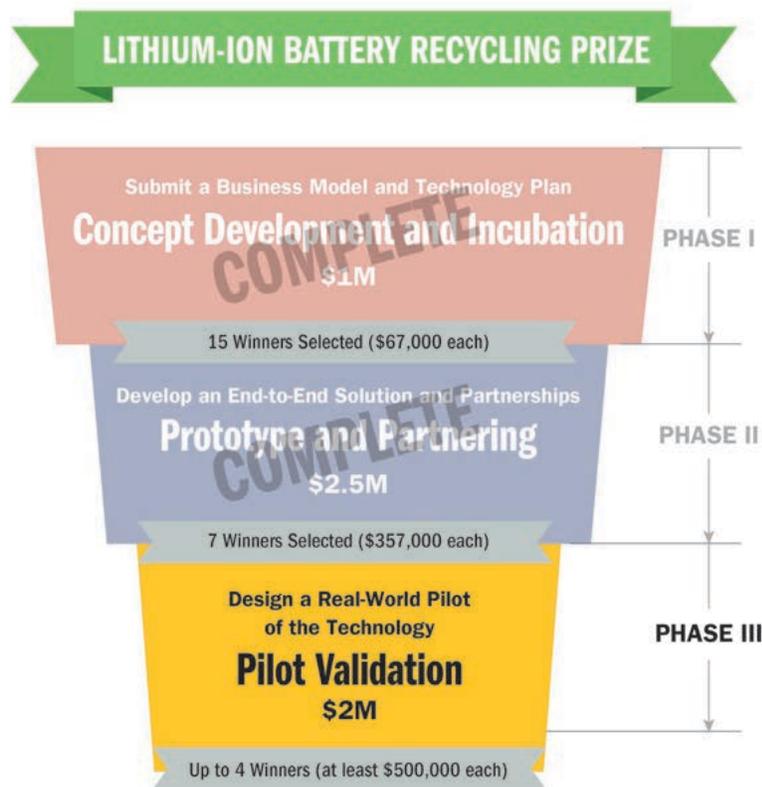
<sup>1</sup> United States Geological Survey (USGS). 2018. *Mineral Commodity Summaries 2018*. Reston, VA: USGS. <https://minerals.usgs.gov/minerals/pubs/mcs/2018/mcs2018.pdf>.

<sup>2</sup> U.S. Department of Energy Office of Energy Efficiency and Renewable Energy (EERE). 2019. *Vehicle Technologies Office's Research Plan to Reduce, Recycle, and Recover Critical Materials in Lithium-Ion Batteries*. Washington, D.C.: EERE. <https://www.energy.gov/sites/prod/files/2019/07/f64/112306-battery-recycling-brochure-June-2019%202-web150.pdf>.

The Prize is designed to motivate American innovators to develop and demonstrate profitable business and technology strategies to achieve an LIB recovery rate of 90%. This might be accomplished by:

- Increasing collection
- Implementing cost-effective, automated methods or technologies for separation and sorting of various collected battery types and sizes
- Developing cost-effective methods or technologies that will render LIBs safe or inert during storage and transport
- Optimizing the efficiency of logistics
- Designing an entirely unanticipated solution.

Regardless of the starting point, the ultimate aim is to incentivize a diversity of problem-solvers to create several end-to-end solutions that focus on one or more commercial uses. An end-to-end solution, for the purposes of this contest, collects lithium-ion batteries at the end of their useful life and delivers them to a facility where they can be recycled. It is DOE's hope that together, these solutions will result in the collection of 90% of all LIBs. Participants in this prize program will help establish the infrastructure that moves spent LIBs from consumers to recyclers across all commercial uses.



**Figure 1. Lithium-Ion Battery Recycling Prize**

In Phase I of the Prize, Concept Development and Incubation, dozens of teams submitted innovative concepts to address barriers associated with recycling spent LIBs in either *Collection, Separating and Sorting, Safe Storage and Transportation, Reverse Logistics, or Other Ideas*. Fifteen of these participating

teams were identified as Phase I winners and invited to continue developing their winning concept within Phase II of the Prize, Prototype and Partnering. The emphasis during Phase II was to develop a complete end-to-end solution and demonstrate a viable business model that can be fully scaled. During this phase, teams were encouraged to establish partnerships and identify potential voucher service providers to assist in the development, testing, and validation of their innovative solutions in Phase III. Phases I and II of the contest are now complete.

Seven Phase II winners were identified to move forward in Phase III, Pilot Validation. To learn more about the Phase I and Phase II winners, go to <https://www.herox.com/BatteryRecyclingPrize>. Only eligible winning teams from the Phase II contest can provide submissions to the Phase III contest.

## 2. PRIZES

Contest	Winners	Prizes
Phase III: Pilot Validation	Up to 4	Up to \$2,000,000 distributed equally among the winners in cash prizes (minimum of \$500,000 and maximum of \$1,000,000 per winner)

**Figure 2. Prizes for Phase III**

Phase III is the final phase in this three-contest series. Participants are asked to implement a pilot validation of the end-to-end solution and gather data to support the projected impact of the solution defined in the Phase II Final Submissions. Phase III participants will be able to redeem the non-cash vouchers (up to \$100,000 per team) from winning Phase II with national labs and qualified members of the American-Made Network to validate or support the pilot validation of the complete end-to-end solution. At least one Phase I Battery Recycling Prize winner must be listed as a Phase III team member on each team. However, a Phase I team member does not have to lead the team. See the “Who Can Win” section for more details.

## 3. USE OF PHASE II VOUCHERS IN PHASE III

In addition to cash prizes, winners of the Phase II contest will receive vouchers. Vouchers are intended to pay for participating teams to consult expertise outside of their own organization. In their Phase II Final Submission, each team provided a brief overview of the Voucher Service Provider (VSP) partnerships they plan to pursue in Phase III. The VSP partnerships identified in the team’s Phase II Final Submission are the only VSP partnership each team can work with in Phase III using voucher funds.

A *draft* statement of work (SOW) must be prepared with each VSP and submitted to the Prize Administrator at [BatteryRecyclingPrize@nrel.gov](mailto:BatteryRecyclingPrize@nrel.gov) within 28 days of the Phase II Winner Announcement. A *final* negotiated SOW and itemized budget for any VSP collaborations must be submitted to the Prize Administrator by April 1, 2021. Each VSP will follow its own process for contracts and agreements, and the teams are responsible for negotiating with their chosen VSPs and ensuring Prize deadlines are considered. Phase III participants are encouraged to initiate the voucher process by submitting their SOW draft to the Prize Administrator as soon as possible after the Phase II Winner Announcement, as the contracts and agreements process with each VSP

may be a lengthy process. In addition, the Prize Administrator will provide feedback on whether the SOW contains activities that qualify for voucher work and suggest revisions before the final SOW is submitted. All work conducted by VSPs and funded through vouchers must be exclusively dedicated to advancing the participants' proposed solutions in the Battery Recycling Prize.

Participants and VSPs can renegotiate the SOW after a final SOW has been submitted to the Prize Administrator if they so choose, as participant needs may change over time. The period of performance for all voucher work is 12 months or by the Phase III submission deadline, whichever is sooner. The Prize Administrator may consider a no-cost time extension beyond the 12 months for work scheduled to end before the Phase III submission deadline. The extension requests must be submitted to the Prize Administrator. All work must be completed by the Phase III submission deadline. This process and the guidelines for voucher payments are outlined in the "Voucher Guidelines" at <https://www.herox.com/BatteryRecyclingPrize/resource/399>.

# PHASE III: PILOT VALIDATION

## 1. GOAL

The primary objective of the Phase III contest, Pilot Validation, is to provide validation of the Phase II end-to-end solution at pilot scale. In this phase, each team is expected to demonstrate their ability to recover LIBs. The performance will be measured against the estimated number of batteries delivered to recyclers as defined by the participants in the impact modeling portion of the Phase II Final Submissions. Phase III participants should verify that the end-to-end solution business model is a viable solution. This business model should be supported by the number of LIBs recovered from pilot validation in Phase III. If the planned pilot validation is not completed by the Phase III deadline, teams should provide supporting information from the initiated pilot-scale work to project what would be recovered once the pilot-scale phase is complete.

Phase III will also verify the feasibility of achieving the end-to-end solution's projected impact when fully scaled. For the purposes of this contest, a fully scaled solution is one that is implemented and in operation for one year and achieves the projected impact presented in the Phase II Final Submission. The projection of collected batteries delivered to recyclers when the solution is scaled nationally assuming one year of operation is defined in the impact modeling portion of Phase II Final Submissions. The pilot validation will verify these projections and provide updated estimates of the impact of the end-to-end solution at full scale to help achieve DOE's goal of a 90% LIB recovery rate.

Phase III will include a mandatory virtual kickoff meeting to review Phase II feedback from the reviewers. A mandatory progress update later in the process will ensure that teams are using vouchers in alignment with their proposed SOW. This update will also include a review of the pilot validation approach, the progress made against the planned approach, and identified problem areas with plans to address those risks, as needed. Phase III teams are invited to connect with potential industry partners and key stakeholders to assist in the commercialization of the end-to-end solution. Phase III will also include a site visit from the Prize Administrator, the nature of which will be determined by the Prize Administrator after reviewing the progress updates.

Phase III Final Submissions will provide documentation of results from the pilot validation that evaluates the feasibility of the business model that enables the end-to-end solution, and the projected impact at full scale. Phase III participants will also provide a presentation of the pilot validation approach and results, as well as the next steps and plans to bring the solution to full scale. The Phase III submission scores will be based on the online Final Submission, the pilot validation presentation, and the site visit by the Prize Administrator. At DOE's discretion, these events may be in-person or virtual.

## 2. PHASE III CONTEST STRUCTURE



**Figure 3. Phase III contest structure**

Phase III consists of nine steps within the 16-month duration:

1. **Virtual Kickoff Event – Mandatory:** Phase III participating teams will meet with the Prize Administrator at a date to be determined that will likely be 8 weeks after the Phase II Winner Announcement, to discuss feedback on their Phase II Final Submission and review draft SOWs.
2. **Phase III Registration – Mandatory:** All eligible Phase II participants intending to participate in Phase III must register on HeroX within two weeks of the Virtual Kickoff Event.
3. **SOW Deadline for Voucher Funds – Mandatory:** Phase III participating teams must finalize the SOW with VSPs by April 1, 2021.
4. **Phase III Progress Update – Mandatory:** Phase III participating teams must provide a progress update at a date that will be approximately 6 months after the Phase II Winner Announcement to summarize the pilot validation approach and their VSP partnership progress.
5. **Industry Networking Event – Voluntary:** Phase III participants will be provided an opportunity to showcase their progress and receive feedback from industry on their pilot validation approach and pursue additional partnering opportunities.
6. **Prize Administrator Site Visit – Mandatory:** The Prize Administrator will organize a site visit with Phase III participating teams to review aspects of the pilot validation approach at a date and location that will be determined by the Prize Administrator after reviewing the Phase III Progress Updates.
7. **Industry Collaboration Event – Voluntary:** Phase III participating teams will have the opportunity to present to key industry stakeholders to promote their solutions for commercialization at the **NAATBatt 2022** Annual Meeting & Virtual Conference.

8. **Phase III Online Final Submissions – Mandatory:** Online submissions of documented results from the pilot validation will be due at a date to be determined by the Prize Administrator that will be at the end of the 16-month contest phase. Requirements for the online submissions are defined in “What To Submit” and will be evaluated according to the “Scoring Criteria.”
9. **Phase III Participants Day Presentations – Mandatory:** In addition to online submissions, teams will provide a 30-minute live presentation to the Prize Administrator at a date to be determined by the Prize Administrator that will likely be within two weeks of the Phase III Online Final Submissions, including a summary of the pilot validation results and plans to bring the end-to-end solution to full scale.

<b>Event Timing</b>	<b>Description and What To Submit</b>	<b>Requirement</b>
<b>Phase II Winner Announcement</b>	Participating teams will be notified of the Phase II winners.	N/A
<b>Virtual Kickoff Event</b> <i>Within 8 weeks of announcement</i>	Meet with Prize Administrator.	Mandatory
<b>Phase III Registration</b> <i>Within 14 days of Virtual Kickoff Event</i>	Register on HeroX.	Mandatory
<b>SOW Deadline for Voucher Funds</b> <i>April 1, 2021</i>	Finalize SOW and submit to Prize Administrator.	Mandatory
<b>Phase III Progress Update</b> <i>~6 months into Phase III</i>	Submit 10-page update on HeroX.	Mandatory
<b>Industry Networking Event</b> <i>To be determined</i>	Attend and present at <b>NAATBatt 2021 Recycling Meeting &amp; Conference.</b>	Voluntary
<b>Prize Administrator Site Visit</b> <i>To be determined</i>	Meet with Prize Administrator.	Mandatory
<b>Industry Collaboration Event</b> <i>February 2022</i>	Attend and present at <b>NAATBatt 2022 Annual Conference.</b>	Voluntary
<b>Phase III Online Final Submissions</b> <i>April 8, 2022</i>	Submit 20-page narrative on HeroX.	Mandatory
<b>Phase III Participants Day</b> <i>~2 weeks after Phase III Online Final Submissions</i>	Provide a 30-minute live presentation.	Mandatory

**Figure 4. Phase III contest structure and what to submit**

### 3. WHAT TO SUBMIT

1. **Phase III Registration** – Register online at HeroX within two weeks of Virtual Kickoff Event.
2. **SOW Deadline for Voucher Funds** – Phase III participating teams must submit the finalized negotiated SOW and itemized budget for the VSPs they designated in Phase II Final Submissions. Phase III participants are encouraged to initiate the process by submitting their SOW draft to [BatteryRecyclingPrize@nrel.gov](mailto:BatteryRecyclingPrize@nrel.gov) as soon as possible once Phase III has started, as the Prize Administrator will provide feedback on whether the SOW contains activities that qualify for voucher work and suggest revisions.
3. **Phase III Progress Update** – Provide a 10-page maximum online submission concept update via HeroX approximately 6 months after the Phase II Winner Announcement. (The cover sheet will not count toward page limits.) This submission should address **all** of the following topics:
  - a. Description of the pilot validation approach
  - b. Impact modeling of pilot validation
  - c. Business model supporting the pilot validation
  - d. Progress report against SOW for the use of voucher funds
  - e. Progress report of pilot validation against the planned approach
  - f. Identified end recycler (The end recycler must meet all EPA and state requirements. Specifically, Phase III participants should pay close attention to requirements for universal and hazardous waste, and Resource Conservation and Recovery Act (RCRA) Laws and Regulations as applicable. The end recycling facility must be located in the U.S.)
  - g. As appropriate, address reviewer comments from Phase II submissions and kickoff discussions.

#### Format Guidelines:

- Submit files in unlocked, searchable PDF form
  - Submit all files in the following format: **Team-Name\_BRP\_Phase III Concept Update.pdf**
  - Any Confidential Business Information (CBI) included in the update is subject to and should follow instructions in “Additional Terms and Conditions.”
4. **Phase III Online Final Submission** – Teams will submit a 20-page maximum written narrative online with documented results of the recovered LIBs from the pilot validation, evaluation of the feasibility of the business model that enables the end-to-end solution at a national scale, and the estimated impact of the fully scaled solution based on pilot validation results. All assumptions used in documentation, analysis, modeling, and simulation must be explicitly stated. The cover sheet will not count toward page limits. An online submission for the Phase III contest should include the following items:
    - a. **Executive Summary:** A high-level overview of your end-to-end solution, the pilot validation approach, the pilot validation results, an updated estimate of the impact of the end-to-end solution based on the results, and the plans to bring the solution to full scale.

- b. Pilot Validation Approach:** Describe the plans for the pilot validation approach in depth. Define the duration of time required for the approach and what was accomplished during Phase III.
- c. Use and Results of Voucher Funds:** Describe each VSP's work objective, the work results, how the work enabled the pilot validation, and any planned continuation of the work.
- d. Detailed Technical Explanation of Pilot Validation Results:** Describe your results from initiating pilot validation for the designated commercial use and what was achieved in the Phase III contest. Present the results against the approach plans, provide a projection of results for pilot validation based on actual results if a full demonstration wasn't completed, and describe plans for continued work or demonstration after the end of the Phase III contest.
- e. Recovered LIBs:** The end recycler will provide verification of the recovered LIBs during the pilot validation. The end recycler must meet all EPA and state requirements. Specifically, Phase III participants should pay close attention to requirements for universal and hazardous waste and Resource Conservation and Recovery Act (RCRA) Laws and Regulations, as applicable. The end recycling facility must be located in the United States.
- f. Impact Modeling:** Define the following metrics:
  - i. The number of LIBs estimated to be recovered by pilot validation in Phase II submission
  - ii. The number of actual recovered LIBs that resulted from the pilot validation
  - iii. The updated projection of recovered LIBs from the end-to-end solution after operating for one year at full scale, and
  - iv. The updated estimate of the projected number of recovered batteries when fully scaled assuming one year of operation as a percentage of the total population of the battery commercial use based on 2018 sales data.

Based on the pilot validation results, estimate the number of recovered LIBs after one year of operation of the end-to-end solution at full scale. When calculating the estimated percentage of recovered LIBs after one year of operation at full scale, utilize the 2018 sales data as defined in the Appendix. The number of recovered LIBs from the pilot validation should justify the percentage of the battery population impacted when the end-to-end solution is fully scaled. For modeling purposes, participants should assume that the number of batteries available for recycling in your fully scaled solution is equal to the 2018 sales data as described in the Appendix. Submissions should develop their own assumptions as to when their solution will be fully scaled. For the purposes of your impact modeling, a single

battery is defined as a single saleable unit.<sup>3</sup> **Please fill out and include the table below in your Phase III final submission.**

Battery use – please include only the commercial uses that you are targeting	Number of batteries projected to be delivered to recyclers by your pilot validation project as defined in Phase II	Actual number of batteries delivered to recyclers as result of pilot validation in Phase III	Updated projection of recovered batteries delivered to recyclers when your solution is fully scaled, assuming one year of operation  Start date of operation: _____	Estimate for collected batteries delivered to recyclers as a percentage of the total using 2018 data in the Appendix*
Consumer electronics				%
Electric vehicles				%
Stationary storage and/or other large industrial uses				%

\* Assume that the number of batteries available for recycling in your nationally scaled solution is equal to the 2018 sales data as described in the Appendix.

- g. Documented Costs of the Pilot Validation:** Provide the actual costs to support the pilot validation broken into the tracks from Phase I, as applicable (Collection, Separating and Sorting, Safe Storage and Transportation, Reverse Logistics, and Other Ideas) and estimate the total end-to-end solution costs when fully scaled.
- h. Plans to Scale:** Submissions should provide a market transformation plan based on their own assumptions as to when their solution will operate at full scale. The following items must be included in the plans to bring the solution to full scale:
  - i. Identification of the target market
  - ii. Existing and potential competitors in the target market
  - iii. Commercialization timeline to bring concept to full scale
  - iv. Budget estimate supported by actual costs from the pilot validation
  - v. Financing plans
  - vi. Challenges to full-scale implementation and mitigation plans

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<sup>3</sup> For example, a single EV pack should be counted as one unit as opposed to the multitude of cells in that pack. A single laptop battery or cell phone battery will also count as one unit.

1. Address the challenges of scaling to rural, suburban, and urban localities
  2. Highlight the greatest risk and plan against it
  - vii. Identified distribution channels and product distribution plans
  - viii. Legal/regulatory considerations.
  - i. **Team and Resources:** Provide a list of individual members and team partners, external advisers (e.g., a board), external sponsorships and established partnerships, and interested venture capitalists. Include the roles and responsibilities of each party. The team composition should demonstrate the capability to successfully implement the proposed end-to-end solution at full scale. At least one Phase III team member must have been a member of the Phase I winning team.
- 5. Phase III Participants Day** – Phase III participants will have at least one team representative provide a 30-minute presentation to DOE representatives that includes a robust overview of their pilot validation. This presentation may be part of an in-person visit by the Prize Administrator to the team’s facility or a virtual event. The presentation must include:
- a. Review of voucher work performed
  - b. Demonstration of pilot validation and impact results
  - c. Summary of the end-to-end solution with the updated estimated impact at full scale
  - d. Plans to bring the solution to full scale
  - e. Established partnership(s) and resources.

Phase III participants will be allocated a total of 60 minutes (30-minute presentation followed by 30 minutes for questions) for their presentation and questions from reviewers on their designated presentation day.

Please read and comply with requirements in the “Additional Terms and Conditions” section. A cover sheet may be warranted if your submission contains CBI; any CBI included in the submission is subject to and should follow instructions in the “Additional Terms and Conditions.” **PARTICIPANTS THAT DO NOT COMPLY WITH THESE REQUIREMENTS MAY BE DISQUALIFIED.**

## 4. SCORING CRITERIA

### Phase III Contest Submissions

Phase III participants’ online submissions and presentations will be scored based on the metrics below. Each scoring category will receive a score from 0 to 6. The categories have defined weights. Scores will reflect both the review of the online submission and the in-person presentation.

Prize Administrators will evaluate the submissions and presentations by agreeing or disagreeing with the scoring category statements on a 0–6 scale, as shown below. These statements are the scoring criteria.

0	1	2	3	4	5	6
Not Demonstrated	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree

### Scoring Categories (Weights)

#### 1. Pilot Validation of End-to-End Solution Approach (40%):

- The pilot validation uses a robust, well-articulated approach to successfully deploy and test a small-scale validation of the end-to-end solution in Phase III.
- The pilot validation results demonstrate a high level of functionality and feasibility for the end-to-end solution at full scale.

#### 2. Plans to Scale (35%):

- The proposed approach is grounded in sound scientific or engineering principles, reasonable assumptions, and valid technical foundations and is supported by the pilot validation results.
- The market transformation plan demonstrates a high level of functionality and feasibility to successfully bring the end-to-end solution to full scale.
- The team has demonstrated a clear understanding of the key technical risks involved in the proposed work and has appropriate mitigation strategies to address them.

#### 3. Impact (25%):

- The pilot validation results are verified by a recycler located in the United States and appears to meet all EPA and state requirements, specifically for universal and hazardous waste and RCRA laws and regulations, as applicable. The final destination facility must be located within the United States.
- The estimated recovery rate at full scale is supported by the pilot validation results as well as credible calculations and assumptions in the impact model.
- The estimated recovery rate of the LIB commercial use at full scale significantly contributes to DOE's overall goal of a 90% recovery rate, as defined in the Appendix, and reduces the foreign dependency on sources for critical materials used for production of LIBs.

Final determination of winners will include the Prize Administrators' final scores of the Phase III submission package and Program Policy Factors.

## 5. HOW TO ENTER

Phase II winners may register and complete a submission package online at <https://www.herox.com/BatteryRecyclingPrize>.

## 6. WHO CAN WIN (Eligibility Requirements)

Only the Phase II winners are eligible to enter Phase III and win cash awards. The Phase II eligibility requirements and those who are not eligible to win cash awards are defined in the Phase II rules.

To win the Phase III contest, participants must comply with the following eligibility requirements. By uploading a submission package, a participant certifies that they comply with the eligibility requirements below. As soon as the Prize Administrator becomes aware that a participant is not eligible to win the Phase III contest, the participant may be disqualified.

- Phase III participants must be a team led by a legal business entity formed under state law or the laws of the United States, such as a corporation or other organization that maintains a primary place of business in the United States with majority domestic ownership and control. If a private entity seeking to compete does not have domestic ownership and control, EERE may consider issuing a waiver of this requirement. Entities seeking a waiver should include a justification along with their submission. EERE may require additional information before making a determination on the waiver request. There are no rights to appeal DOE's decision on the waiver request. See "Additional Terms and Conditions" for details and instructions on seeking a waiver.
- At least one Phase II Battery Recycling Prize winner must be a listed team member on each team, defined as a listed team member on a winning Phase II submission. However, a Phase II winner does not have to lead the team.
- DOE employees and DOE support service contractors, individuals who have been employed by DOE, or individuals working for DOE as a support service contractor within 6 months prior to the submission deadline of the Phase I contest are not eligible to participate in any prize contests in this program.
- NREL employees directly involved in the administration of the Prize are not eligible to participate in any prize contest in this program. Receipt of voucher funds is not considered participation in this prize program.
- NREL employees not involved in the administration of the Prize and all other national lab employees, including laboratory researchers, may participate as private individuals, provided they do not use their facilities at the national laboratories.
- Non-DOE federal entities and federal employees are also not eligible to win any prize contests in this program.
- Federal grantees may not use federal funds to develop submissions.
- Federal contractors may not use federal funds from a contract to develop prize competition submissions or fund efforts in support of a prize competition submission.
- A participating entity shall not be deemed ineligible because the entity used federal facilities or consulted with federal employees during a competition if the facilities and employees are made available to all entities participating in the competition on an equitable basis.

## 7. GENERAL SUBMISSION REQUIREMENTS

Only submissions relevant to the goals of this program are eligible to compete. The Prize Administrator must conclude that all of the following statements are **true** when applied to a submission:

- The proposed solution is related to LIB recycling.
- Activities that are described in and support the submission package are performed in the United States.
- The proposed solution represents an innovation that will move the LIB recycling industry beyond its current state.
- The proposed solution does not involve the lobbying of any federal, state, or local government office.
- The proposed solution is not dependent on new, pending, or proposed federal, state, or local government legislation, resolutions, appropriations, measures, or policies.
- The proposed solution is based on fundamental technical principles and is consistent with a basic understanding of the U.S. market economy.

# ADDITIONAL TERMS AND CONDITIONS

## 1. UNIVERSAL CONTEST REQUIREMENTS

PARTICIPANTS THAT DO NOT COMPLY WITH THE REQUIREMENTS IN THIS SECTION MAY BE DISQUALIFIED.

Your submission for the Phase I, Phase II, and Phase III contest is subject to the following terms and conditions:

- You must complete registration at <https://www.herox.com/BatteryRecyclingPrize> to participate in the Prize by the registration deadline.
- You must post the final content of your submission or upload the submission form online at <https://www.herox.com/BatteryRecyclingPrize> before the Phase I, Phase II, and Phase III contests close. Late submissions or any other form of submission may not qualify.
- The cover page, video, and summary slide will be made public.
- The submission, except for the cover page, video, and summary slide, is not intended to be made public; however, see the “Records Retention and FOIA” section.
- You agree to release your submission video under a Creative Commons Attribution 4.0 International License (see <http://creativecommons.org/licenses/by/4.0/>).
- You must include all the required submission elements. The Prize Administrator may disqualify your submission after an initial screening if you fail to provide all required submission elements. Participants may be given an opportunity to rectify submission errors due to technical challenges.
- Your submission must be in English as an unlocked, searchable PDF. Scanned handwritten submissions will be disqualified.
- Submissions will be disqualified if they contain any matter that, in the sole discretion of the Prize Administrator, is indecent, obscene, defamatory, libelous, lacking in professionalism, or demonstrates a lack of respect for people or life on this planet.
- If you click "Accept" on the HeroX platform and proceed to register for any of the contests described in this document, these rules will form a valid and binding agreement between you and DOE and is in addition to the existing HeroX Terms of Use for all purposes relating to these contests. You should print and keep a copy of these rules. These provisions only apply to the contests described here and no other contests on the HeroX platform or anywhere else.
- The Prize Administrator, when feasible, may give participants an opportunity to fix non-substantive mistakes or errors in their submission packages.

## 2. VERIFICATION FOR PAYMENTS

The Prize Administrator will verify the identity and role of a participant potentially qualified to receive the prize payment. Receiving a prize payment is contingent upon fulfilling all requirements contained herein. The Prize Administrator will notify the winning participants using provided email contact information after the date that results are announced. Each participant will be required to sign and return to the Prize Administrator, within 30 days of the date the notice is sent, a completed NREL Request for ACH Banking Information form (to be shared via email), and a completed W9 form (<https://www.irs.gov/pub/irs->

[pdf/fw9.pdf](#)). At the sole discretion of the Prize Administrator, a winning participant will be disqualified from the competition and receive no prize funds if: (1) the person/entity cannot be contacted, (2) the person/entity fails to sign and return the required documentation within the required time period, (3) the notification is returned as undeliverable, or (4) the submission or person/entity is disqualified for any other reason.

### 3. TEAMS AND SINGLE-ENTITY AWARDS

The Prize Administrator will award a single dollar amount to the designated primary submitter (team leader) whether a team consists of single or multiple entities. The primary submitter is solely responsible for allocating any prize funds among member participants as they deem appropriate. The Prize Administrator will not arbitrate, intervene, advise on, or resolve any matters between team members.

### 4. SUBMISSION RIGHTS

By submitting materials for Phase III of the Prize, submitters agree to allow DOE and the Prize Administrator to release their submissions (i.e., video submission, summary slide, and cover page) to the public under a Creative Commons Attribution 4.0 International License (see <http://creativecommons.org/licenses/by/4.0/>). The remaining portions of the submission, however, will not be made public.<sup>4</sup>

Other than the licenses granted above, DOE and the Prize Administrator take no interest in any intellectual property associated with the submissions.

By entering, the participant represents and warrants that:

1. Participant's entire submission is an original work by participant and participant has not included third-party content (such as writing, text, graphics, artwork, logos, photographs, dialogue from plays, likeness of any third party, musical recordings, clips of videos, television programs or motion pictures) in or in connection with the submission, unless (i) otherwise requested by the Prize Administrator and/or disclosed by participant in the submission and (ii) participant has either obtained the rights to use such third-party content, including providing for the licensing rights to the submission as required by the rules, or the content of the submission is considered in the public domain without any limitations on use.
2. Unless otherwise disclosed in the submission, the use thereof by DOE, Prize Administrator, and any other third parties supporting DOE in the contest, or the exercise by DOE, Prize Administrator, and any other third parties supporting DOE in the contest of any of the rights granted by participant under these rules, does not and will not infringe or violate any rights of any third party or entity, including, without limitation, patent, copyright, trademark, trade secret, defamation, privacy,

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<sup>4</sup> Subject to "Records Retention and FOIA" section.

publicity, false light, misappropriation, intentional or negligent infliction of emotional distress, confidentiality, or any contractual or other rights.

3. All persons who were engaged by the participant to work on the submission or who appear in the submission in any manner have:
  - a. Given participant their express written consent to submit the submission for exhibition and other exploitation in any manner and in any and all media, whether now existing or hereafter discovered, throughout the world.
  - b. Provided written permission to include their name, image, or pictures in or with the submission; participant may be asked by Prize Administrator to provide permission in writing.
  - c. Not been and are not currently under any union or guild agreement that results in any ongoing obligations resulting from the use, exhibition, or other exploitation of the submission.

## 5. COPYRIGHT

Each participant represents and warrants that the participant is the sole author and copyright owner of the submission; that the submission is an original work of the participant or that the participant has acquired sufficient rights to use and to authorize others, including DOE, the Prize Administrator, and any other third parties supporting DOE in the contest, to use the submission, as specified throughout the rules that the submission does not infringe upon any copyright or upon any other third-party rights of which the participant is aware, or should be aware; and that the submission is free of malware.

## 6. CONTEST SUBJECT TO APPLICABLE LAW

All contests are subject to all applicable federal laws and regulations. Participation constitutes each participant's full and unconditional agreement to these Official Contest Rules and administrative decisions, which are final and binding in all matters related to the contest. This notice is not an obligation of funds; the final awards are contingent upon the availability of appropriations.

## 7. RESOLUTION OF DISPUTES

DOE is solely responsible for administrative decisions, which are final and binding in all matters related to the contest. The Prize Administrator will not arbitrate, intervene, advise on, or resolve any matters between teams. If a dispute arises within or between teams, teams should consider engaging in informal or formal dispute resolution or hiring legal counsel at their own expense to resolve their issues.

In the event of a dispute as to any registration, the authorized account holder of the email address used to register will be deemed to be the participant. The "authorized account holder" is the natural person or legal entity assigned an email address by an internet access provider, online service provider, or other organization responsible for assigning email addresses for the domain associated with the submitted address. Participants and potential winners may be required to show proof of being the authorized account holder.

## 8. PUBLICITY

The winners of these prizes (collectively, “winners”) will be featured on the DOE and NREL websites.

Except where prohibited, participation in the contest constitutes each winner’s consent to DOE’s and its agents’ use of each winner’s name, likeness, photograph, voice, opinions, and/or hometown and state information for promotional purposes through any form of media, worldwide, without further permission, payment, or consideration.

## 9. LIABILITY

Upon registration, all participants agree to assume and, thereby, have assumed any and all risks of injury or loss in connection with or in any way arising from participation in this contest and development of any submission. Upon registration, except in the case of willful misconduct, all participants agree to and, thereby, do waive and release any and all claims or causes of action against the federal government and its officers, employees, and agents for any and all injury and damage of any nature whatsoever (whether existing or thereafter arising; whether direct, indirect, or consequential; and whether foreseeable or not) arising from their participation in the contest, whether the claim or cause of action arises under contract or tort.

Participants in Phases II and III shall be required to obtain liability insurance for \$1,000,000 by the U.S. Department of Energy, for claims by:

- Third parties for death, bodily injury, or property damage, or loss resulting from an activity carried out in connection with participation in a prize competition, with the Federal Government and the Alliance for Sustainable Energy, LLC named as an additional insured under the registered participant’s insurance policy and registered participants agreeing to indemnify the Federal Government and the Alliance for Sustainable Energy, LLC against third party claims for damages arising from or related to prize competition activities; and
- Federal Government for damage or loss to Government property resulting from such an activity.

## 10. RECORDS RETENTION AND FOIA

All materials submitted to DOE as part of a submission become DOE records, subject to the Freedom of Information Act (FOIA).

The purpose of the FOIA is to afford the public the right to request and receive agency records unless those agency records are protected from disclosure under one or more of the nine FOIA exemptions. Decisions to disclose or withhold information received from the participant are based upon the applicability of one or more of the nine FOIA exemptions, not on the existence or nonexistence of protective markings or designations. Only the agency’s designated FOIA Officer may determine if information received from the participant may be withheld pursuant to one of the nine FOIA exemptions. All FOIA requests received by DOE are processed in accordance with 10 C.F.R. Part 1004.

In general, the Prize Administrator will only use data and other information contained in submissions for evaluation purposes, unless such information is generally available to the public or is already the property of the government.

Participants should not include trade secrets or commercial or financial information that is privileged or confidential in their submission unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in these rules.

DOE intends to prevent the release of any information submitted that contains trade secrets or confidential commercial or financial information. If the submission contains trade secrets or confidential commercial or financial information, such CBI should be designated at the time of submission in the following manner:

- The cover sheet must identify the specific pages containing CBI and include the following language: “Notice of Restriction on Disclosure and Use of Data: Pages [list applicable pages] of this document may contain CBI—trade secrets or commercial or financial information that is privileged or confidential—and is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source. [End of Notice]”
- The header and footer of every page that contains trade secrets or commercial or financial information that is privileged must be marked as follows: “CBI”.
- In addition, each line or paragraph containing trade secrets or commercial or financial information that is privileged or confidential must be enclosed in brackets.

However, participants should be aware that the use of protective markings is not dispositive as to whether information will be publicly released pursuant to the Freedom of Information Act, 5 U.S.C. §552, et. seq., as amended by the OPEN Government Act of 2007, Pub. L. No. 110-175.

## 11. PRIVACY

If you choose to provide HeroX with personal information by registering or completing the submission package through the contest website, you understand that such information will be transmitted to DOE and may be kept in a system of records. Such information will be used only to respond to you in matters regarding your submission and/or the contest, unless you choose to receive updates or notifications about other contests or programs from DOE on an opt-in basis. DOE and NREL are not collecting any information for commercial marketing.

## 12. GENERAL CONDITIONS

DOE reserves the right to cancel, suspend, and/or modify the contest, or any part of it, at any time. If any fraud, technical failures, or any other factor beyond DOE’s reasonable control impairs the integrity or proper functioning of the contests, as determined by DOE in its sole discretion, DOE may cancel the contest.

Although DOE indicates in the Phase I, Phase II, and Phase III contests that it will select up to several winners for each contest, DOE reserves the right to only select participants that are likely to achieve the goals of the program. If, in DOE’s determination, no participants are likely to achieve the goals of the program, DOE will select no participants to be winners and will award no prize money.

**ALL DECISIONS BY DOE ARE FINAL AND BINDING IN ALL MATTERS RELATED TO THE CONTEST.**

## 13. PROGRAM POLICY FACTORS

Although the scores of the reviewers will be carefully considered, it is the role of the Prize Administrator to maximize the impact of contest funds. Some factors outside the control of participants and beyond the independent reviewer's scope may need to be considered to accomplish this goal. In addition to the reviewers' scores, the following program policy factors may be considered in determining winners:

- Geographic diversity and potential economic impact of projects in a variety of markets
- Whether the use of additional DOE funds and provided resources continue to be non-duplicative and compatible with the stated goals of this program and the DOE mission generally
- Entity diversity from individuals to teams, small businesses, and large corporations
- The degree to which the submission exhibits technological or programmatic diversity when compared to the existing DOE project portfolio and other participants
- The level of industry involvement and demonstrated ability to accelerate commercialization and overcome key market barriers
- The degree to which the submission is likely to lead to increased employment, productivity, and manufacturing in the United States or provide other economic benefits to U.S. taxpayers
- The degree to which the submission will accelerate transformational technological, financial, or workforce advances in areas that industry by itself is not likely to undertake because of technical or financial uncertainty
- The degree to which the submission supports complementary DOE efforts or projects that, when taken together, will best achieve the research goals and objectives
- The degree to which the submission enables new and expanding market segments
- Whether the project promotes increased coordination with nongovernmental entities for the demonstration of technologies and research submissions to facilitate technology transfer
- The degree to which the activities described in the submission package to this contest have been or will be performed in the United States.

## 14. DEFINITION

**Prize Administrator** means both the Alliance for Sustainable Energy, LLC, operating in its capacity under the Management and Operating Contract for the National Renewable Energy Laboratory (NREL), and the U.S. Department of Energy Vehicle Technologies Office (VTO) and Advanced Manufacturing Office (AMO). When the Prize Administrator is referenced in this document, it refers to staff from the Alliance for Sustainable Energy, VTO, and AMO. Ultimate decision-making authority regarding contest matters rests with the Director of the Vehicle Technologies Office.

## 15. REQUEST TO WAIVE THE “DOMESTIC OWNERSHIP AND CONTROL” ELIGIBILITY REQUIREMENT

If an entity seeking to compete as the registered competitor does not have domestic ownership and control, the entity should include a waiver request that addresses the following waiver criteria and content

requirements along with their submission. EERE may consider issuing a waiver of that eligibility requirement where the entity submits a compelling justification, the entity is incorporated in and maintains a primary place of business in the United States, and the entity otherwise meets the eligibility criteria. There are no rights to appeal EERE's decision on the waiver request.

### **Waiver Criteria**

Entities seeking a waiver must demonstrate to the satisfaction of EERE that its participation: (1) has a high likelihood of furthering the objectives of this prize competition and (2) aligns with the best interest of the U.S. industry and U.S. economic development.

### **Content for Waiver Request**

A waiver request must include the following information:

- a. Entity's name and place of incorporation
- b. The location of the entity's primary place of business
- c. A statement describing the extent to which the entity is owned or control by a foreign government, agency, firm, corporation, or person who is not a citizen or permanent resident of the United States, including the applicable percentage of ownership/control
- d. A compelling justification that addresses the waiver criteria stated above
- e. A description of the project's anticipated contributions to the U.S. economy
- f. A description of how the entity has benefitted U.S. research, development, and manufacturing, including contributions to employment in the United States and growth in new U.S. markets and jobs
- g. A description of how the entity has promoted domestic manufacturing of products and/or services.

Requests should be submitted through the HeroX portal

## APPENDIX: Supplementary Information and Assumptions for Impact Modeling

Although lead-acid batteries are collected and recycled at a rate of 99%, LIBs are only collected and recycled at a rate of less than 5%. DOE is targeting an LIB recovery rate of 90% to provide one-third of cathode material needs for LIBs by 2025.<sup>5</sup> The U.S. Department of Energy Lithium-Ion Battery Recycling Prize is designed to incentivize American innovators to develop and demonstrate profitable business and technology strategies to achieve the goal of an LIB recovery rate of 90% across all commercial uses. DOE is interested in individual participants' contribution to the 90% recovery rate and does not expect any individual team to meet 90%.

Please use the info below as inputs to inform your projected battery recovery.

### CONSUMER ELECTRONICS

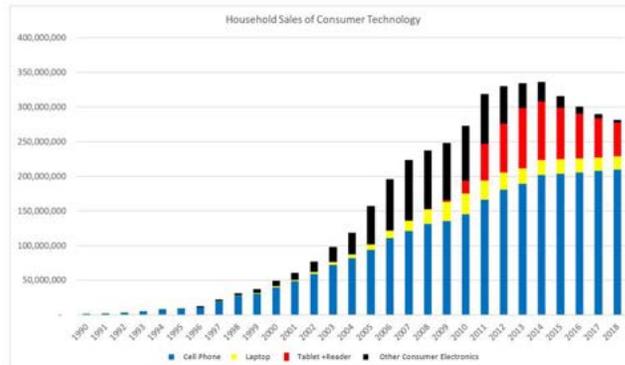
As consumer electronics inventory is not tracked as comprehensively as electric vehicle and stationary-use LIBs, DOE is aware of the difficulty in quantifying the amount of spent LIBs available for recovery. To estimate the number of LIBs in consumer electronics, DOE is using annual sales numbers of devices into households. Phase III participants will utilize the selected LIBs sales data from 2018 depicted below in Figure 5 as the number of consumer electronics batteries available for recycling in 2024. Figure 6 shows the percentage of household consumer economic sales in 2018. When constructing the collection model of your proposed solution, either assume that the numbers below represent all consumer electronics leaving the market in 2024 or include additional batteries and provide source info showing the 2018 consumer electronics outside of households.

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<sup>5</sup> EERE. 2019. *Vehicle Technologies Office's Research Plan to Reduce, Recycle, and Recover Critical Materials in Lithium-Ion Batteries*. Washington, D.C.: EERE. <https://www.energy.gov/sites/prod/files/2019/07/f64/112306-battery-recycling-brochure-June-2019%20-web150.pdf>.

## ANNUAL SALES OF CONSUMER ELECTRONICS DEVICES INTO HOUSEHOLDS

This neglects the sale of goods into businesses



- Cellphones dominate the number of battery electronics devices investigated

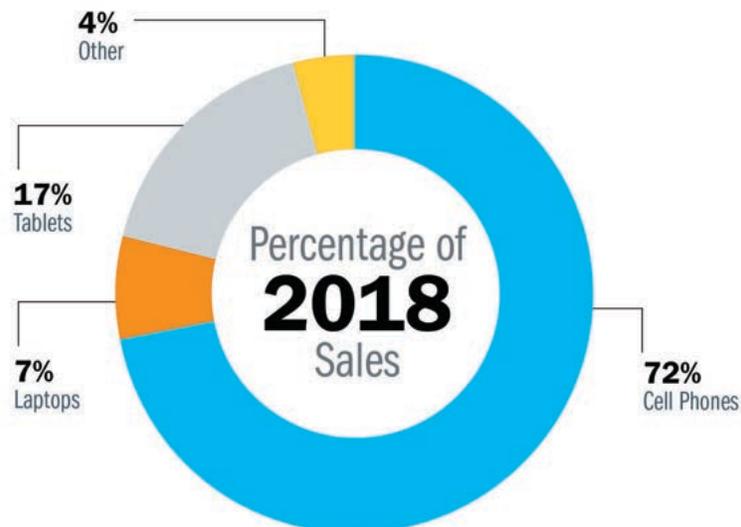
Babbitt, C. W., S. Althaf, and R. Chen. "Sustainable Materials Management for the Evolving Consumer Technology Ecosystem." (2017). <https://www.rit.edu/gis/ssil/docs/Final%20Report%20SMM%20Phase%201%202017.pdf>

**Figure 5. Annual consumer electronics sales to households. Though many of these batteries will be available at a point in the future, for evaluation purposes, we will be considering 2018 exclusively.**

Source: Babbitt, C.W., S. Althaf, and R. Chen. 2017. "Sustainable Materials Management for the Evolving Consumer Technology Ecosystem." <https://www.rit.edu/gis/ssil/docs/Final%20Report%20SMM%20Phase%201%202017.pdf>.

For simplification, please assume that consumer electronics encompasses all applications of cells that use the 18650 format or small pouch cells, as the collection, disassembly, logistics, and safety considerations should be similar enough to be applied from one solution to another.

Successful proposals to create an end-to-end solution that impacts the 90% recovery rate of the defined household consumer electronics should address specific devices listed in Figure 5.

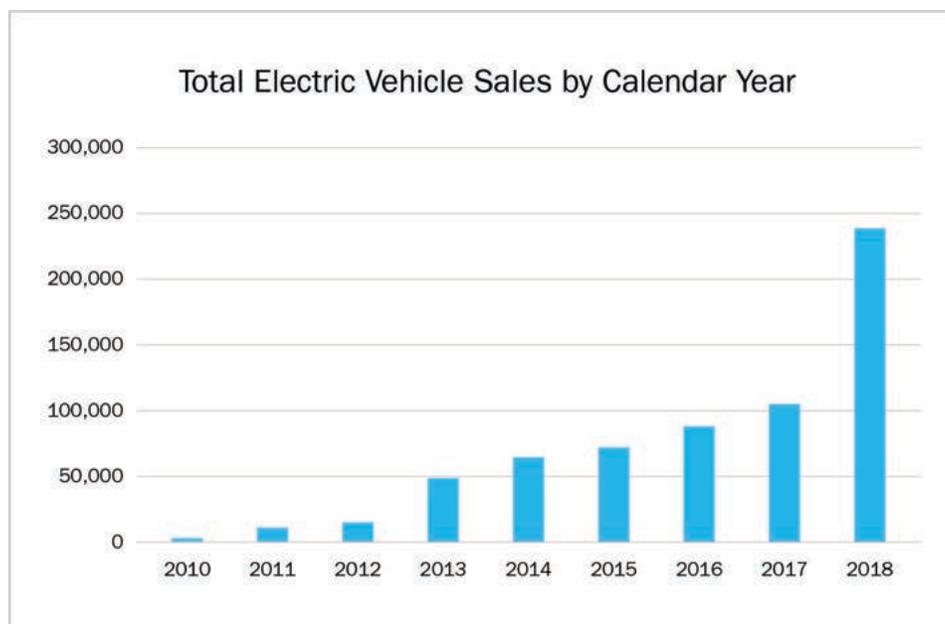


**Figure 6. Estimated household sales percentages for consumer electronics from Figure 5**

Source: Babbitt, C.W., S. Althaf, and R. Chen. 2017. "Sustainable Materials Management for the Evolving Consumer Technology Ecosystem." <https://www.rit.edu/gis/ssil/docs/Final%20Report%20SMM%20Phase%201%202017.pdf>.

## ELECTRIC VEHICLES

Proposed end-to-end solutions that include EVs will utilize the 2018 EV sales data provided in Figure 7 to quantify the amount of spent LIBs available for recovery in 2024.



**Figure 7. Total EV sales by calendar year, 2010–2018**

Source: Argonne National Laboratory,

<https://www.anl.gov/es/light-duty-electric-drive-vehicles-monthly-sales-updates>

Although model year 2018 EVs are not expected to reach their end of life until approximately 2028, for the purpose of the impact modeling in this prize, assume that 2018 sales data represent the EV batteries available for recycling in 2024. Phase III participants must provide a credible analysis showing that their concept will contribute toward the 90% recovery goal of the nationwide 2018 EV sales when fully scaled.

## STATIONARY STORAGE AND LARGE INDUSTRIAL USES

Stationary storage uses offer their own set of logistics challenges. The large installations (typically above 1 MWh) are heavy and require unique handling and disassembly to get them to recyclers. In the case of stationary storage, collection should be less problematic because the large installations will remain until they are transported to recycling facilities. Submissions that are proposing solutions for stationary storage should focus on the disassembly and transportation to recycling facilities.

Large industrial LIBs can also be considered in this category, in which large batteries are too heavy to move by hand and are operated by business entities and not consumers. These batteries, typically over 100 Ah, have similar logistics issues to the stationary storage batteries described above.

For purposes of the impact model, solutions that include stationary storage and large industrial uses should also include assumptions for the quantity of batteries that are available for recycling and the span of time covered by their model.