Gopher Resource

World Materials Forum 2022



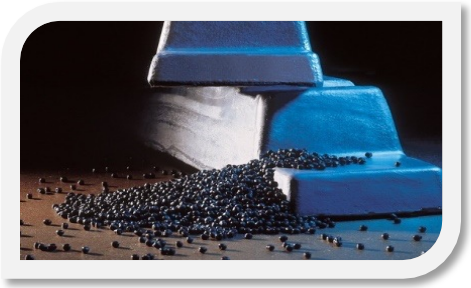

Gopher Resource®

Innovative Recycling Solutions Since 1946

WORLD MATERIALS FORUM

GOPHER RESOURCE OVERVIEW

- Environmental solutions provider in operation for over 75 years. Our purpose is the safe and efficient recycling of lead-based batteries using sustainable practices and advanced technologies.
- Recycle over 25 million spent automotive, industrial and stationary batteries each year, keeping lead batteries out of landfills.
- Second largest lead battery recycler in the U.S.
- Essential role ensuring lead batteries remain the most recycled U.S. consumer product - 99% recycling rate.
- Our process outputs are critical raw materials required to manufacturer new batteries.
- Over 600 employees at two U.S. facilities.



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LEAD BATTERY INDUSTRY & CIRCULAR ECONOMY

Sustainable lead batteries connect, power and protect our everyday energy needs.

- +60% of the global market for rechargeable energy storage is supported by lead batteries.
- Every U.S. mass-produced car and truck (over 275 million), nearly all EVs and approximately 60% of all forklifts rely on lead batteries.
- 92K U.S. jobs are supported by the lead battery industry.

Closed loop, circular economy.

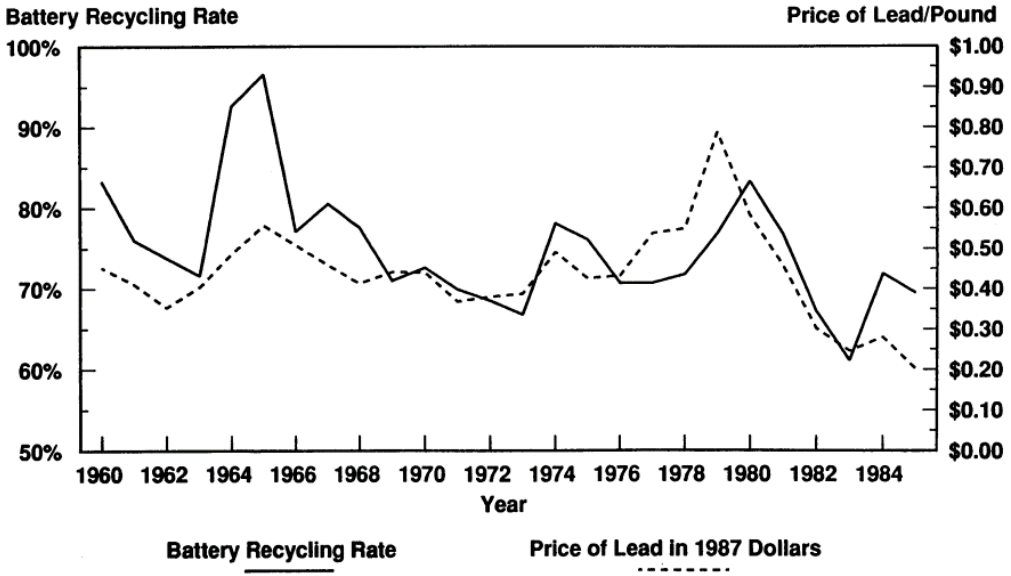
- 62% of U.S. lead demand is met by U.S. lead battery recyclers, providing supply chain security.
- Without domestic lead battery recycling, the U.S. would need to import 1.6 million tons of lead.
- A new lead battery will typically contain 80% recycled lead and plastic material. When that battery is spent the cycle will continue again.
- The recovery and reuse of metal from used lead batteries reduces greenhouse gas emissions by 99% per ton versus the use of primary metal processed from a mine.

Sources: Essential Energy Everyday, Association of Battery Recyclers, http://www3.weforum.org/docs/Manufacturing_Our_Future_2016/Case_Study_8.pdf

EVOLUTION OF THE RECYCLING MODEL

A 1991 study by the EPA shows recycle rates of lead batteries declined from 1960 to 1985 and that the recycle rate generally followed the price of lead.

Battery Recycling Rates and Lead Prices
1960-1985



Source: Putnam, Hayes & Bartlett, Inc., 1987; U.S. Bureau of Mines, 1991.

EVOLUTION OF THE RECYCLING MODEL

In the late 1980's Battery Council International (BCI), began promoting model legislation designed to increase recycling rates.

- Prohibits disposal of a lead battery in ANY landfill.
- Requires battery retailers and wholesalers to accept spent batteries.
- Requires battery retailers to impose a deposit on any sale of a new battery that can only be returned to the purchaser with the return of a spent battery.
- Requires that the retailer or wholesaler return the lead battery to a recycler or other permitted facility.
- Today, 34 states have adopted the model legislation in some form and several others have implemented measures having similar effect.

BATTERY COUNCIL INTERNATIONAL

PROPOSED MODEL BATTERY RECYCLING LEGISLATION

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF _____

Section 1. LEAD-ACID BATTERIES; LAND DISPOSAL PROHIBITED.

(a) No person may place a used lead-acid battery in mixed municipal solid waste, in any landfill, or municipal solid waste incinerator.

(b) No person shall dispose of a used lead-acid battery except by delivery to a retailer or wholesaler, or to a secondary lead smelter, or to a collection or recycling facility authorized under the law of (state) or by the U.S. Environmental Protection Agency.

(c) No retailer shall dispose of a used lead-acid battery except by delivery to the agent of a wholesaler or a secondary lead smelter, or to a battery manufacturer for delivery to a secondary lead smelter, or to a collection or recycling facility authorized under the law of (state) or by the U.S. Environmental Protection Agency.

(d) Each battery improperly disposed of shall constitute a separate violation.

(e) For each violation of this section a violator shall be subject to a fine not to exceed $_____ and/or a prison term not to exceed _____ days (as appropriate under state code).

Section 2. LEAD-ACID BATTERIES; COLLECTION FOR RECYCLING.

A retailer selling replacement lead-acid batteries in the state shall:

(a) Accept from customers, at the point of transfer, used lead-acid batteries of the same general type and in a quantity at least equal to the number of new batteries purchased, if offered by customers;

(b) Collect a deposit of at least $10.00 on the sale of an automotive type replacement lead-acid battery

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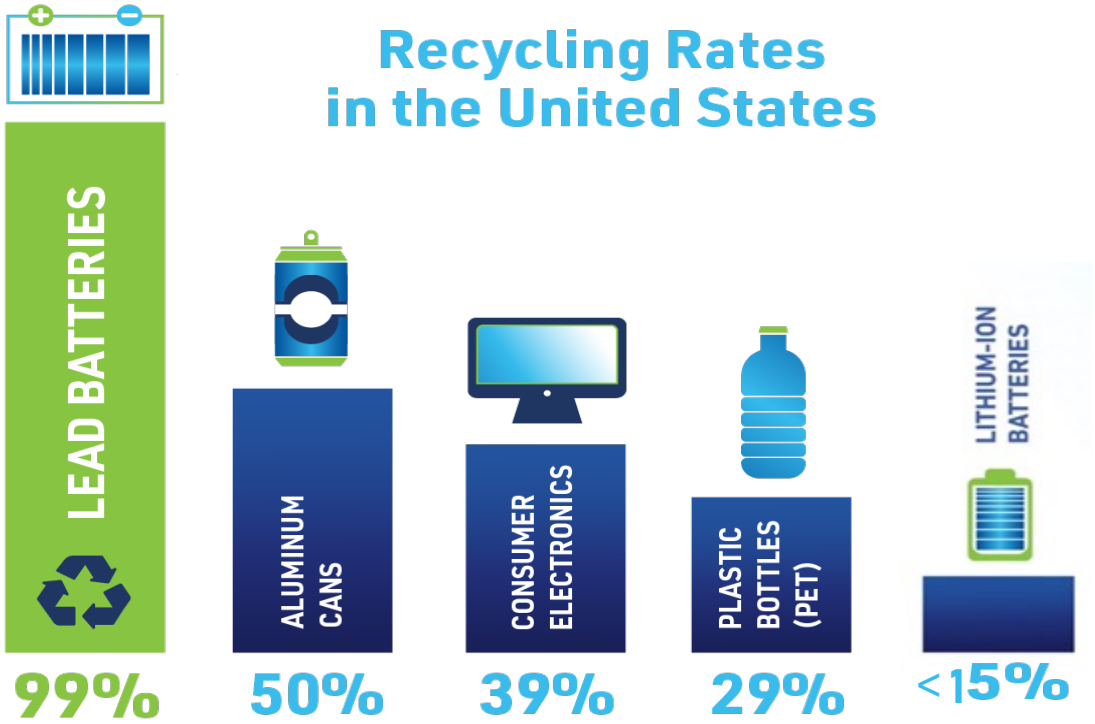
Source: BCI

LEAD BATTERIES: RECYCLED AT A RATE OF 99%



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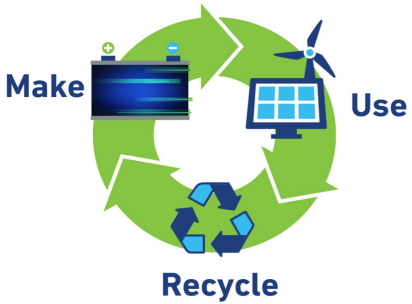
Source: Essential Energy Everyday

LESSONS FROM LEAD BATTERY RECYCLING

Regulation, Scrap Flow, Economics and Supply Chain



- Scrap Availability is Critical
  - The lead battery industry has taken measures to control end-of-life battery flow from the consumer, through the retailers / wholesalers and back to recyclers.
- Factors that could impact scrap availability for lithium recyclers
  - EV adoption rates
  - Re-purpose / re-manufacture applications for batteries could extend battery life
  - Battery and vehicle life – the average age of vehicles has gone from under 9 years old in 2000 to over 12 years old in 2022
- Regulation / Legislation
  - Strong advocacy is a must and trade associations can facilitate building a coalition.
  - A progressive view on environmental impact as well as health and safety can help guide regulators and industry development.
- Economics
  - High primary metal prices help recycling but hurt EV adoption.
  - Cost / Quality / Versatility of the technology – finding the right balance.
  - Collection, transportation and logistics can be costly – for the lead battery industry as much as 30% of the total cost of ownership.

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