ALLIANCE FOR AUTOMOTIVE INNOVATION

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AUTOMOTIVE RECYCLING

Autos are the most recycled consumer product, with 95% of retired passenger vehicles processed for recycling every year.

From floor mats and fluids, to aluminum and steel, approximately 86% of a car's material content is recycled, reused, or used for energy recovery. Innovative technologies and vehicle advancements, like Li-ion batteries, require a coordinated, proactive approach from industry and other stakeholders to ensure end-of-life uses are properly managed.

What's Recycled

Automakers rely on auto recyclers to remove parts that can be reused or remanufactured for use in other vehicles. These include engines, transmissions, doors, bumpers, starters, alternators, and water pumps. Other parts, like batteries, catalytic converters, tires and some plastics, are removed and recycled into new products. Fluids such as engine oil, coolant, and gasoline are carefully managed to prevent releases and then reused or recycled, as appropriate.

In addition, old consumer products can be recycled into components for new vehicles:

- milk jugs are recycled into auto trim
- carpet and used clothing are made into soundproofing material
- spent battery casings become splash shields
- recycled plastic bottles are made into heating and air conditioning vent covers and engine oil level gauges
- nylon carpet is used in air cleaners and evaporative emissions systems
- recycled tire rubber is used in brake pedals or floor mats
- additional post-consumer plastics are used in components like underbody shields, battery trays, fan shrouds, air conditioner housings and carpets

The Three Pillars of Lithium-Ion EV Battery Recycling

Reuse
Refurbishing battery modules or packs to as good or better quality and performance levels through the replacement of worn or deteriorated components and re-certifying them to OEM specifications.

Repurpose
Refurbishing EV battery components or packs to fulfill a different use from what was originally intended.

Recycle
Treating EV batteries to recover the maximum amount of raw materials for reuse in identical or alternative industries.

https://www.autosinnovate.org/initiatives/energy-and-environment/automotive-recycling

Battery Recycling

What happens to Tesla battery packs once they reach their end of life?

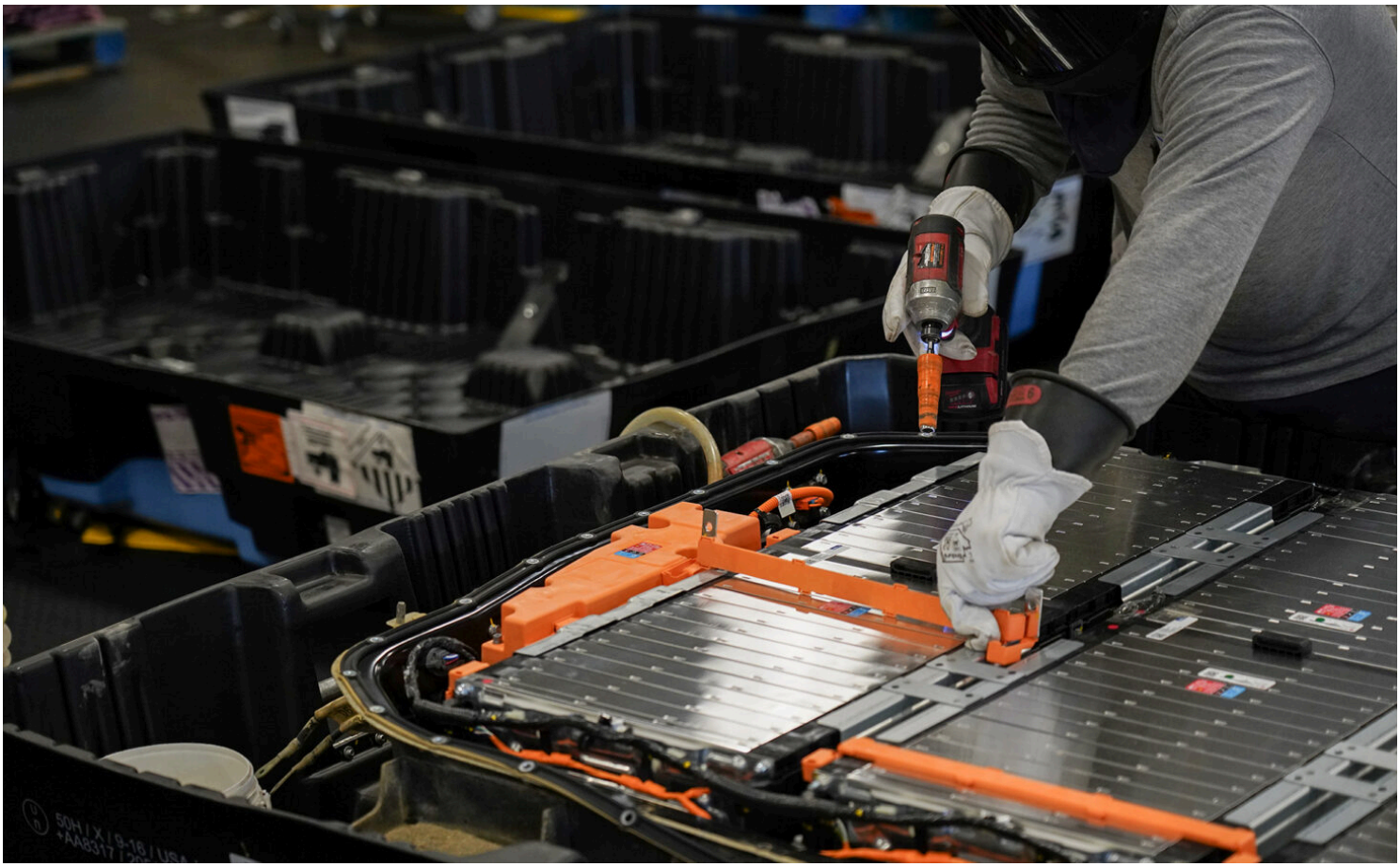
Unlike fossil fuels, which release harmful emissions into the atmosphere that are not recovered for reuse, materials in a Tesla lithium-ion battery are recoverable and recyclable. Battery materials are refined and put into a cell, and will still remain in the cell at the end of their life, when they can be recycled to recover its valuable materials for reuse over and over again.

Extending the life of a battery pack is a superior option to recycling for both environmental and business reasons. For those reasons, before decommissioning a consumer battery pack and sending it for recycling, Tesla does everything it can to extend the useful life of each battery pack. Any battery that is no longer meeting a customer's needs can be serviced by Tesla at one of our Service Centers around the world. None of our scrapped lithium-ion batteries go to landfilling, and 100% are recycled.

MOBILITY

Cirba Solutions Helps Toyota Expand Battery Recycling Network to Nationwide Program

December 07, 2023



- **Agreement with Cirba Solutions includes battery collection, storage, testing and processing to support the growing EV market**
- **Expected to reduce Toyota's overall end-of-life battery transportation and logistics costs by 70 percent, while also reducing transportation-related emissions**
- **Up to 95 percent recovery rate expected to extract critical minerals**

PLANO, Texas and LANCASTER, Ohio (Dec. 7, 2023) – Furthering its mission to create a closed-loop battery ecosystem while working toward its carbon neutrality goals, Toyota Motor North America (Toyota) today announced that it is expanding its battery recycling network with a new collaboration with Cirba Solutions, a premiere battery recycling materials and management company. The agreement enhances Toyota and Cirba Solutions' growing relationship by expanding Toyota's battery recycling network and optimizing its logistics network for end-of-life electrified vehicle battery collection, including those from hybrid (HEV), plug-in hybrid (PHEV) and battery electric vehicles (BEV).

"Cirba Solutions' large and well-established transportation and recycling network ensures Toyota has nationwide battery collection and recycling to reduce both our costs as well as our operational carbon footprint," said Christopher Yang, group vice president, Business Development, Toyota Motor North America. "This moves us closer to our ultimate goal of creating a sustainable, closed-loop ecosystem for our automotive batteries."

As one of the largest battery recycling companies in North America, Cirba Solutions has extensive experience and offers a coast-to-coast collection and recycling network. Toyota's collaboration with Cirba Solutions will focus on the collection, transportation, dismantling and processing of end-of-life lithium-ion electrified vehicle batteries from the Midwest and East Coast regions. Processing will take place at Cirba Solutions' Lancaster, Ohio facility, which recently received an $82+ million Department of Energy grant as part of the Bi-Partisan Infrastructure Law. This facility will use advanced technology to extract critical minerals from scrap and end-of-life batteries with an up to 95 percent recovery rate, then supply battery-grade metals back into the supply chain.

"Our collaboration with Toyota helps move toward a long-term vision of a sustainable closed-loop battery supply chain. With aligned purpose, and Toyota's growing electric vehicle line-up in North America, we are proud to be a partner," said Jay Wago, chief commercial officer at Cirba Solutions.

Toyota currently collects approximately 25,000 used automotive batteries, primarily nickel-metal hydride batteries found in its hybrid electric vehicles, from its dealership network each year, and expects the number of batteries, particularly end-of-life lithium-ion batteries, to rise as the number of battery electric vehicles it sells increases in the future. Through the agreement with Cirba Solutions, Toyota expects to reduce its overall transportation and logistics costs by at least 70 percent from reducing the average miles driven for collection and recycling from 1,251 to 582, based on 2022 data, and by focusing on the Midwest and

East Coast regions. In some cases, such as the Cincinnati region, the new recycling collaboration should reduce the total mileage driven for these activities by approximately 94 percent. In addition, the company expects that by reducing the amount of miles driven for collection and recycling activities, it will be able to make a significant reduction in transportation-related emissions as well.

Globally, Toyota has been the number one seller of electrified vehicles for more than 25 years, and, in North America, Toyota has sold more than 6.2 million combined PHEVs and HEVs since 2000. With decades of electrified vehicles in the market, Toyota is focused on how to recycle, remanufacture, or repurpose automotive batteries used in Toyota's electrified vehicles that have reached the end of their life, a number that is set to increase in the coming years. In fact, Toyota forecasts that its end-of-life batteries will likely double by 2030.

The company also has a new plant for automotive batteries, Toyota Battery Manufacturing North Carolina (TBMNC), currently under construction that is anticipated to go online in 2025 and has a total announced investment of nearly $14 billion. Originally announced in 2021, the North Carolina facility will have a phased ramp up for production and will support the creation of more than 5,000 new jobs to support vehicles assembled in North America.

About Toyota

Toyota (NYSE:TM) has been a part of the cultural fabric in North America for more than 65 years, and is committed to advancing sustainable, next-generation mobility through our Toyota and Lexus brands, plus our more than 1,800 dealerships.

Toyota directly employs more than 63,000 people in North America who have contributed to the design, engineering, and assembly of nearly 45 million cars and trucks at our 13 manufacturing plants. By 2025, Toyota's 14th plant in North Carolina will begin to manufacture automotive batteries for electrified vehicles. With more electrified vehicles on the road than any other automaker, Toyota currently offers 26 electrified options. For more information about Toyota, visit www.ToyotaNewsroom.com.

About Cirba Solutions

Cirba Solutions is a premiere battery recycling materials and management company using advanced technology to extract critical materials from scrap and used batteries and then supplying those battery-grade metals back into the supply chain. The only vertically integrated team with an operational, differentiated platform and a full suite of capabilities. Creating a circular battery supply chain is critical to ensuring that today's resources are used to their fullest potential. Cirba Solutions combines the resources and expertise of Heritage Battery Recycling, Retriev Technologies and Battery Solutions.

www.cirbasolutions.com

Follow Cirba Solutions on LinkedIn and Twitter.

For Toyota customer inquiries, please call 800-331-4331.

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RELATED STORIES

We Know Batteries.

Period.

And safety is our #1 priority.

Paving the future by recycling the past

Cirba Solutions has been a leader in battery recycling sustainability and end-to-end solutions for 30 years. With a commitment to conserving natural resources from spent batteries, diverting them from landfills through scalable programs. Handling all battery chemistries, sizes, and formats, Cirba Solutions charts a path forward for their customers by supporting fully traceable end-of-life management services and products.

Recharging The Recycling Conversation

GM and Cirba Solutions continue to recharge the conversation about battery recycling from supporting EV battery recycling to the millions of pounds of household batteries recycled, or when they create impactful engagement opportunities.

Data from 2017-2022

HOW HOUSEHOLD BATTERIES GET RECYCLED

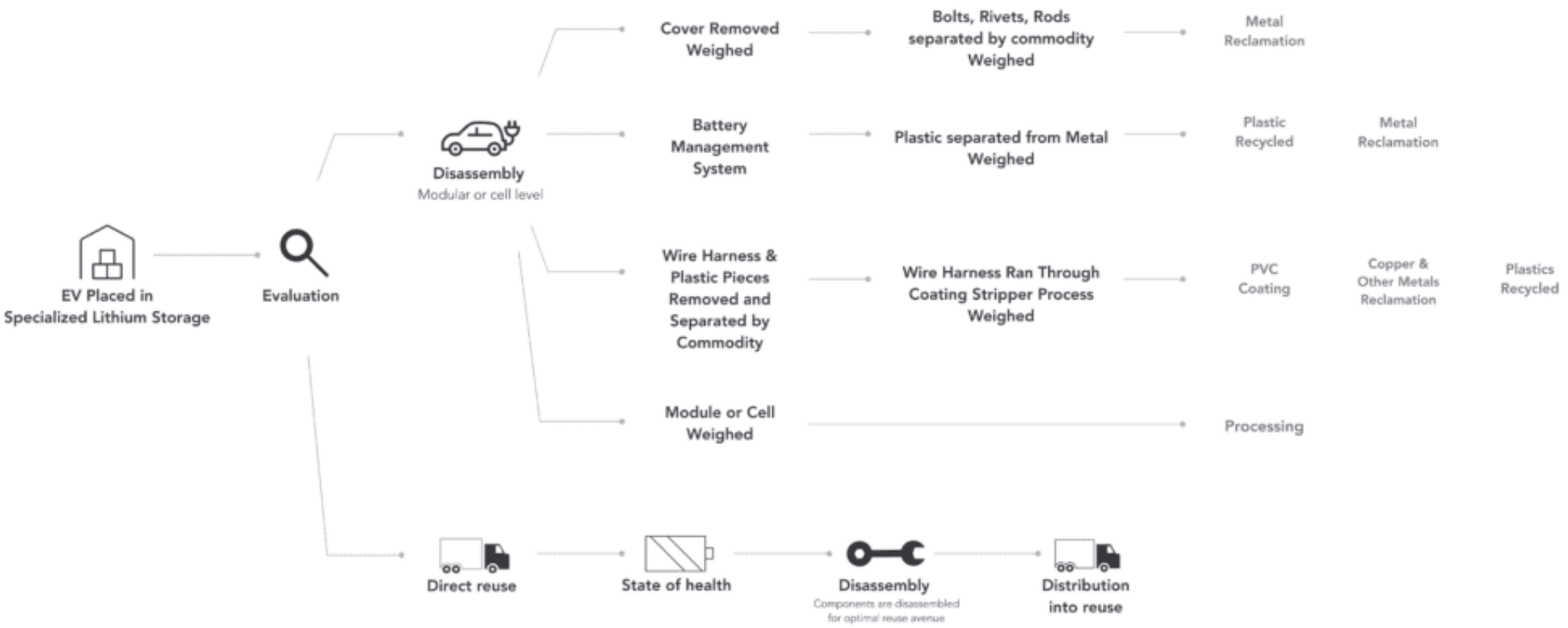
Household Battery Recycling

1. Extensively trained battery recognition experts sort batteries to handle them safely, and properly identify and categorize them.
2. The batteries then go to processing, which is done in-house without producing emissions. Experts separate the batteries into three components. One of them is zinc and manganese concentrate that is repurposed as a micronutrient in fertilizer.

Electric Vehicle Battery Recycling

GM's partnership with Cirba Solutions includes a program to recycle preproduction, production scrap and end-of-life batteries. This includes packs, cells, modules and damaged batteries.

Example of Electric Vehicle Disassembly



Reintroducing these materials into the value chain is not always easy, especially when it comes to EV packaging. But, Cirba Solutions and its partners have a solution. Their next life? Some electric vehicle batteries that come in cocoon containers become raised garden beds.

The reuse and repurposing of the cocoons and leveraging fertilizer made from recycled batteries is a true example of supporting the circular economy.

- Support our local community
- Provide access to fresh produce
- Support well-being
- Give access to all and create a sustainable solution.

Supporting Our Communities, Together

Working with a wide range of teams here, Cirba Solutions keeps education at the-forefront of battery recycling. With our shared efforts, we have provided our communities with information about sustainability and tools to recycle their end-of-life batteries.

We have also provided 7 school districts, over 300 students in grades 5-9 access to battery recycling around Michigan by providing a lesson plan outline, educational video and a virtual Cirba Solutions tour.

EPA's Cited Benefits

- Reduction in waste sent to landfills
- Conservation of natural resources, such as metals and minerals
- Helps prevent pollution by reducing the need to collect new, raw materials
- Saves energy spent on refining virgin materials
- Reduces greenhouse gas emissions that contribute to global climate change
- Helps sustain the environment for future generations

- Helps create new, well-paying jobs in the recycling and manufacturing industries in the United States
- Once the materials are recycled they can be reused in making new products

Benefitting the Environment

Identifying what kind of batteries you have is simple, just look on the sides of the battery for the chemistry name and/or the

Identifiers

voltage.

The crossed-out garbage can is a common symbol found on rechargeable (including lithium-based) batteries. If you see it and cannot further identify the battery, tape the terminals just to be sure.

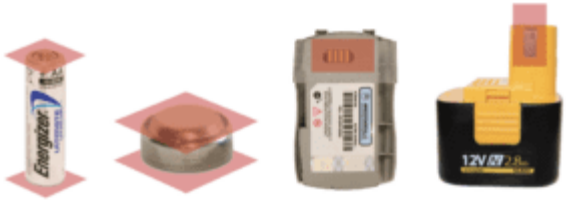
Most batteries have either the full name or chemical abbreviation of their base battery chemistry somewhere on the outer shell.

- Cover the terminals of the battery with clear tape in the areas indicated in red.

Taping Tips

- Batteries for tools may have multiple terminals around a similar area, so make sure each is covered completely.

- *Use only clear/translucent tape,* electrical or duct tape prevents battery identification.



Quick Reference

Want a quick visual look at what batteries need taping, or how the program works?

- Battery Recycling Poster
- Battery Terminal Protection Guide

FREQUENTLY ASKED QUESTIONS

Is my battery recyclable? Can you recycle it?

What kind of battery do I have?

How can I tell if a battery is damaged?

Is recycling worth it?

Can I throw away my alkaline batteries?

What batteries/devices can go in my pail?

Where are you located?

Where can I find your audit or compliance information?

How do I protect my batteries for storage and transport?

How do I send my pail back?

Michigan Recycling Resources

General Michigan Resources

Recycle MI

Michigan Recycling Directory

Michigan Recycling Raccoons

County & City Resources

Clinton County

Eaton County

Genesee County

Ingham County

Kent County

Livingston County

Oakland County

RRRASOC

Serving the communities of Farmington, Farmington Hills, Milford, Milford Township, Novi, South Lyon, Southfield, Walled Lake, Wixom

SOCRRA

Serving the communities of Berkley, Beverly Hills, Birmingham, Clawson, Ferndale, Hazel Park, Huntington Woods, Lathrup Village, Oak Park, Pleasant Ridge, Royal Oak and Troy

Shiawassee County

Saginaw County

Tuscola County

Wayne County

Have Questions?

OUR BATTERY EXPERTS CAN HELP YOU ALIGN YOUR PROGRAM WITH YOUR SUSTAINABILITY GOALS.

EMAIL OUR TEAM

KEEP IN TOUCH

Contact Us

800.852.8127

customerservice@cirbasolutions.com

media@cirbasolutions.com

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Payment & Return Policy

Resources

Customer Account

Recycling Information

FAQ

Damaged Battery Safety

Shipping Documents

Battery Identification

Careers

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