

# Sustainable



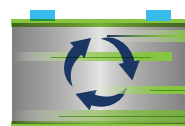
The lead battery industry is doing its part to stop climate change by reducing greenhouse gas emissions on multiple fronts. Lead batteries support key applications and technologies in next-gen transportation, renewable energy, smart cities and connectivity – while modeling a highly sustainable, closed-loop manufacturing economy.

## Leader in Circularity and Recycling

Lead batteries are one of the most environmentally sustainable battery technologies. Using smart lifecycle management, the lead battery industry operates a circular model that minimizes raw inputs, ensures a domestic supply chain, and stays economically competitive.

- + The lead battery recycling industry has an **established infrastructure to collect, transport and recycle** spent lead batteries. The lithium-ion battery industry lacks stable markets for the collection, transport and recovery of materials.
- + **99% of lead batteries are recycled**, making them the **most recycled consumer product** in the U.S. and the most recycled battery technology. (In contrast, less than 5% of lithium-ion batteries are recycled.)

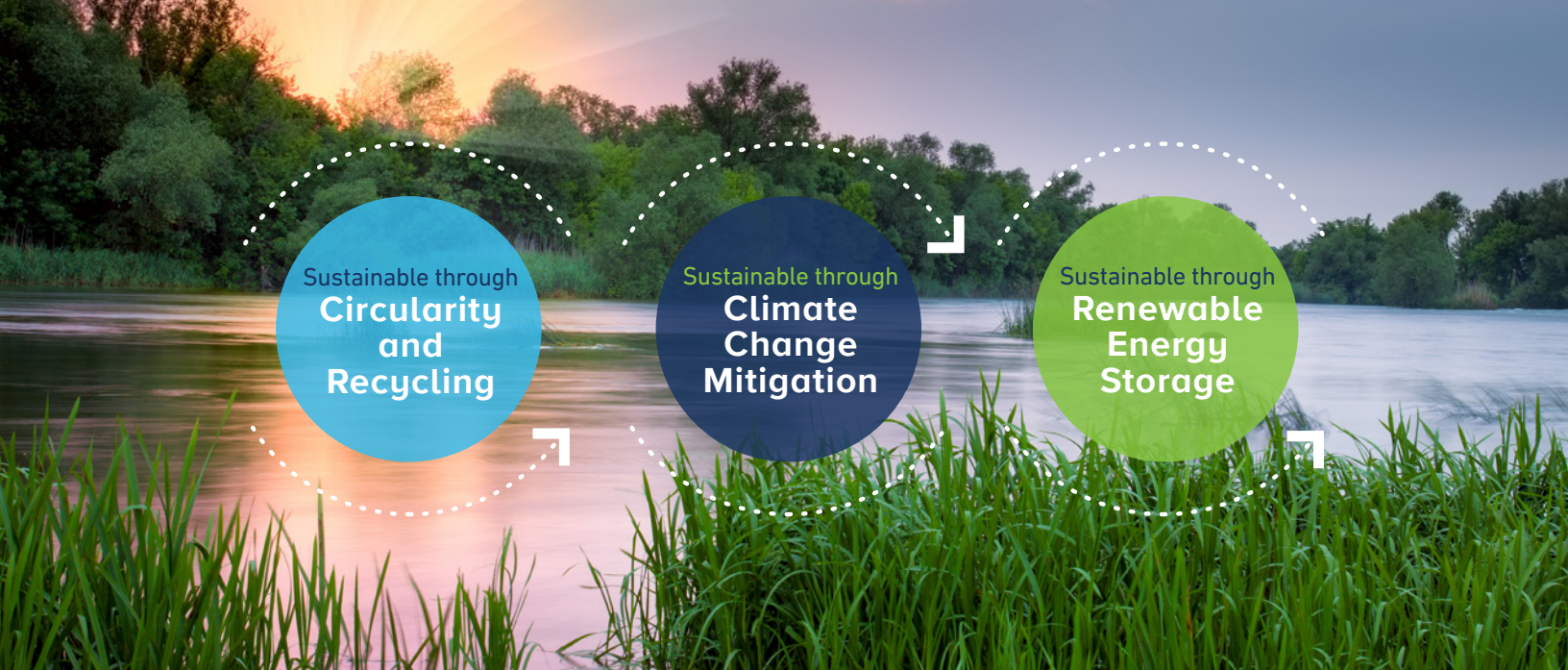
- + **Modern, closed-loop recycling** in the U.S. keeps **130 million lead batteries** from landfills each year and provides U.S. battery manufacturers a **secure domestic supply** of recycled inputs.
- + **Lead from lead batteries** can be **recycled infinitely**, with no loss of performance.
- + Lead batteries rank among the **top five consumer product categories in sustainability**.
- + The World Economic Forum and MIT's Center for Transportation and Logistics have **praised the circular economy and recycling system** of lead batteries.



A new lead battery is typically comprised of **more than 80% recycled material**, thanks to the circular model of the industry.

“We have a great partner in lead batteries. No other product ... is recycled more than them.”

— Alan French, Vice President of Engineering, QTS Data Centers



Sustainable through  
**Circularity  
and  
Recycling**

Sustainable through  
**Climate  
Change  
Mitigation**

Sustainable through  
**Renewable  
Energy  
Storage**

## Essential to Climate Change Mitigation Technologies

Lead battery technology continually innovates to support decarbonization goals of countries and smart cities, including carbon-free transportation and renewable energy storage.

- ⊕ Lead batteries are an **integral part of start-stop and micro-hybrid vehicle engine systems**, which lower fuel consumption by up to 10%. And virtually **every hybrid and electric vehicle** relies on a lead battery to power critical vehicle systems.
- ⊕ Start-stop technology using lead batteries is **eliminating 4.5 million tons of greenhouse gas emissions** annually in the U.S.
- ⊕ **Over 70% of the world's rechargeable energy storage needs** are met by lead batteries. This includes wind and solar facilities, EV charging stations, backup for renewable powered data centers and grid-scale battery storage.
- ⊕ **Smart cities rely on lead batteries** to support multi-pronged, technology-driven approaches:
  - decarbonizing electric grids
  - storing and regulating renewable energy
  - moving to electric, autonomous transportation
  - resiliency of data centers and telecommunications
  - reducing waste and meeting circular economy goals

## Powering Utility Infrastructure, Microgrids and Off-Grid Areas

In remote geographic areas or overburdened grids around the world, lead batteries help communities meet their daily electricity needs, while reducing carbon emissions.

- ⊕ **Lead batteries are key** to providing **off-grid solutions that are essential** for cleaner cooking, refrigeration to reduce food waste, education, and overall greater connectivity. [Read Case Study →](#)
- ⊕ In places with no access to a traditional power grid, **lead batteries store energy** from renewable energy sources to provide communities with continuous, 24-hour power for lighting, heat and connectivity. [Read Case Study →](#)
- ⊕ Many electric grids experience increased demand (peak loads) during certain times of the day or times of the year like tourism seasons. **Lead batteries reliably provide stored energy** for these surges so communities don't need to expand their fossil fuel infrastructure. [Read Case Study →](#)



Learn more at [EssentialEnergyEveryday.com](https://EssentialEnergyEveryday.com)

\* Visit [EssentialEnergyEveryday.com/about/sources](https://EssentialEnergyEveryday.com/about/sources) to view source information and learn about the benefits of advanced lead batteries.

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