



Innovative

Lead battery technology has advanced significantly over the past 20 years and leads the way as the most innovative, reliable, scalable and affordable solution for energy storage.

Exceeding Performance Limits

Lead battery technology has long been proven and reliable for traditional applications. Now, today's advanced lead batteries have made significant, innovative advances that stretch the boundaries of peak performance and power for exciting future applications.

- + Performance improvements in lead batteries are transforming the transportation industry by **reducing fuel consumption and CO₂ emissions and powering next-generation (xEVs) vehicles** while meeting their increasing electrical demands.
- + Ongoing, advanced research driven by **partnerships between companies, universities and national laboratories is yielding new findings** that have launched new applications in energy storage and transportation.
 - Battery Council International member companies have more than **10 active partnerships** with U.S. universities to continue improving lead battery manufacturing processes and performance.
- + The Advanced Lead Acid Battery Consortium **has invested millions of dollars** to further improve the life, performance and reliability of lead batteries.

Innovative and Scalable

Lead battery innovation, coupled with a well-established supply chain, positions lead batteries to meet transportation's compelling need for greener technology.

- + New lead battery advancements have **extended the life of traditional batteries by 30 to 35 percent** in the last 20 years. This enables low-cost, large-scale deployment of micro- and mild hybrids, with significant fuel economy and reduced emissions.
- + By 2020, it is predicted that the use of start-stop **lead batteries will eliminate two million tons of vehicle greenhouse gas emissions** annually. This is the equivalent to the annual energy usage of 211,000 U.S. households.¹
- + **Significant potential remains** for further advancements in lead battery performance, applications, cost reduction and supply security.



Lead batteries provide **auxiliary power for more than one billion vehicles** globally including virtually all plug-in hybrid and full-electric vehicles.²



Innovative and Affordable

The lead battery industry's solid manufacturing base and coast-to-coast recycling network are models of efficiency. This helps make lead batteries more affordable than other storage options.

- + Alternative chemistries, such as **lithium**, are up to **three times the cost of lead** and do not have lead's intrinsic end-of-life value.
- + Estimates show **fewer than three percent of lithium ion batteries** used in transportation and energy storage are recycled.³
- + A new lead battery is comprised of **more than 80 percent recycled lead**.⁴
- + The World Economic Forum and MIT's Center for Transportation and Logistics have **praised the circular economy and recycling system** of lead batteries.



More than 99%

- More than 99 percent of lead batteries are recycled,⁵ making them the most recycled consumer product in the U.S.⁶

Vital Power: Advanced Lead Batteries



Innovative



Sustainable



Essential



Safe

Learn more at EssentialEnergyEveryday.com



Essential Energy Everyday exists to increase awareness of the critical importance of lead batteries in powering our daily lives. We encourage continued investment in sustainable lead battery technology to store and provide energy on demand. Our initiative is supported by the two global trade associations that represent the lead battery and lead industries, **Battery Council International** and the **International Lead Association**.

¹ International Lead Association, 2017

² World Vehicle Population Tops 1 Billion Units, *WardsAuto*, Aug. 2011

³ "Opportunities to Improve Recycling of Automotive Lithium Ion Batteries," The 22nd CIRP Conference on Life Cycle Engineering, 2015

⁴ "Environmental Impact and Life Cycle Assessment of Lead Battery and Architectural Sheet Production," *The International Journal of Life Cycle Assessment*, 2016

⁵ *National Recycling Rate Study*, Battery Council International, 2017

⁶ *Advancing Sustainable Materials Management: 2014 Fact Sheet*, Environmental Protection Agency, Nov. 2016