

Long-duration energy storage with advanced lead-carbon battery system in southeastern China

Batteries provide up to 10 hours of power to local energy intensive industries and help to keep the grid stable.

ABOUT THE CASE STUDY

This long-duration energy storage (LDES) system made of advanced lead-carbon batteries is currently the largest of its kind in the world.

Connected to Huzhou's main electricity grid since March 2023, the installation is helping to reduce energy costs to industries and citizens by providing an alternative power source at peak rates. These systems bring significant advantages such as low investment cost and rapid return on investment, and low carbon footprint with long design life and material with high recycling rates.



LDES system made of advanced lead-carbon batteries in Huzhou, China. Source: China Daily

TECHNICAL SUMMARY

Project launch	March 2023
Construction time	3 months*
Size of the system	1000 MWh (1 GWh) energy, 100 MW power; 10 hour system
Battery type	3 million 2 volt advanced lead-carbon AGM batteries**
Battery provider	batteries were made in China, by Tianneng Power

* started as a 10 MWh test system in 2021, then expanded to 1000 MWh from December 2022

** AGM=Absorbent Glass Mat

MARKET OPPORTUNITY

Advanced lead-carbon batteries are well suited for applications such as this, demonstrating significant enhancements in energy density, charge acceptance, depth of discharge and cycle life¹.

The cost of advanced lead-carbon systems is competitive with other battery technologies². With a total cost of USD 140 million and an acquisition cost estimated at USD 127 per KWh, the return on investment of the Huzhou system is 18 months.

The rollout of LDES systems for commercial and industrial customers and cities is a massive opportunity with a new market to reach 150 GWh by 2030³.



140 million USD
Cost of the system



150 GWh by 2030
Market growth



18 months
Return on investment

LOCATION

Huzhou, Zhejiang Province, China



SUSTAINABILITY AND IMPACT

Advanced lead-carbon batteries have been shown to have a very low carbon footprint, being fully recyclable at end of life. In the Huzhou system, more than half of the batteries' components come from recycling streams. A recent LCA study has shown that lead batteries have up to four times lower manufacturing footprint than other technologies⁴.

The batteries reduce energy usage from the grid during periods of high demand (peak shaving) and reposition the grid's high-demand peak to low-rate periods (valley filling). This benefits local industries, lowering energy costs and making industry less energy intensive in the city. It also helps to keep the grid stable, positively impacting the local economy and the population of just over 3 million inhabitants.



80,000
Households served



Recycled content

65%



Designed life of battery

15 years

1. Consortium for Battery Innovation (2021): Technical Roadmap
2. U.S. Department of Energy (2022): Grid Energy Storage Technology Cost and Performance Assessment, Technical Report
3. KPMG (2024): Global Energy Storage Report: Executive Summary
4. Sphera Solutions (2023): Comparative Life Cycle Assessment of Batteries for Automotive Applications, Final Report



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Contact information

Dr. Matt Raiford | Technical Director
matt.raiford@batteryinnovation.org
www.batteryinnovation.org