

Battery Innovation System of USA



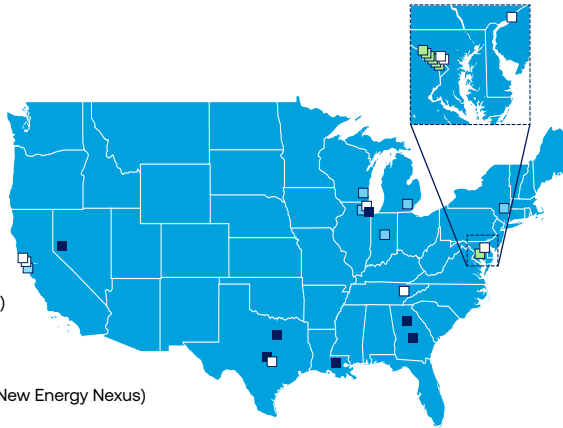
Main Players

POLITICAL ORGANISATIONS

- Federal Consortium for Advanced Batteries (FCAB): Collaboration of DOA, DOC, DOS and DOD
- Funding: Department of Energy (DOE)
 - Office of Energy Efficiency and Renewable Energy (EERE)
 - Vehicle Technologies Office (VTO)
 - Advanced Research Projects Agency-Energy (ARPA-E)
 - Office of Basic Energy Sciences (BES)
 - Department of Energy's Loan Programs Office (LPO)
 - Office of Electricity (OE)

INDUSTRY ASSOCIATIONS

- Li-Bridge Alliance (NAATBatt International / NY-BEST / New Energy Nexus)
- United States Advanced Battery Consortium (USABC)
- Responsible Battery Coalition



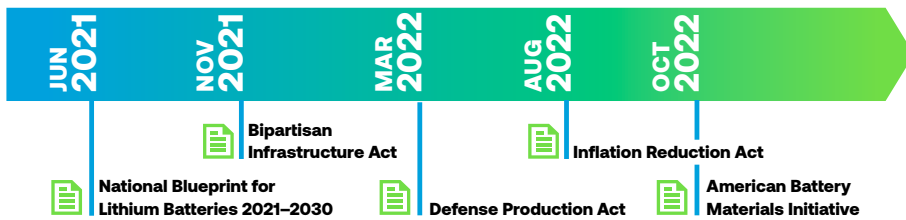
RESEARCH ORGANISATIONS

- National Laboratories:
 - Joint Center for Energy Storage Research (JCESR)
 - Battery500 Consortium
 - Berkeley Lab Energy Storage Center
 - Oak Ridge (ORNL)
 - ReCell Center
- Universities:
 - UT Austin
 - Drexel University
 - UC Berkeley

COMPANIES

- Albemarle (Refining)
- BlueOvalSK (Batteries)
- Ecobat (Recycling)
- GM General Motors (Batteries)
- SK Battery America (Batteries)
- Tesla (Batteries)
- Redwood Materials (Recycling)

Strategic Documents



Policy Goals

2030

- **Domestic supply chain:** A secure domestic battery materials and technology supply chain that supports long-term US economic competitiveness and job creation, enables decarbonisation, meets national security requirements, and is capable of meeting its own demand for energy storage capacities
- **Critical materials:** Independence on critical materials such as cobalt, nickel, and graphite, reducing battery supply chain vulnerability
- **Recycling:** Re-introducing 90% of key materials into the battery supply chain
- **KPIs for battery technologies** (incl. solid-state and Li-metal): Achieve a production cell cost by 50% to < \$60/kWh, 500 Wh/kg, 1,000 charge/discharge cycles and cobalt- and nickel-free by 2030 (almost no specific KPIs on energy densities and technologies)
- **Carbon emissions** reduced by 40%
- **Electrified vehicles:** 30% ZEV sales for all new medium- and heavy-duty commercial vehicles

2050

- **Climate neutrality**
- **Electrified vehicles:** 100% ZEV sales for all new medium- and heavy-duty commercial vehicles

Country Specific Information

Fighting climate change is one of the main priorities for the Biden administration. The goal of creating a sustainable and competitive battery value chain is motivated not only by economics, but also by national defence, which requires reliable, secure and advanced energy storage technologies. The US is heavily dependent on imports of critical minerals, including rare earths. With the IRA, which is a forceful response to China's dominance, the US aims to both stimulate its economic goals and increase its resilience. The IRA offers enormous incentives and encourages to relocate battery production to the US. In addition, the Biden administration is strengthening US end-of-life reuse and recycling of critical materials, domestic battery materials, electrode, cell and pack

manufacturing, and investing in the next generation of EV batteries to advance US battery technology leadership. The US has adopted a more technology-open strategy in its R&D funding programmes. The strategy focuses on functional parameters and objectives rather than on a specific cell chemistry.

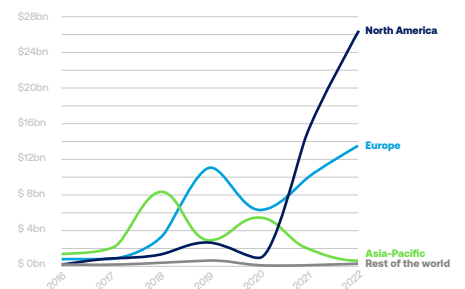
Research Priorities

First-generation or advanced lithium-ion batteries
 + elimination of cobalt and nickel in Li-ion battery cathodes
 + aqueous batteries (alternative batteries such as a Fe-air battery), non-aqueous batteries, solid-state batteries and multifunctional batteries
 + high-performance separators and electrodes built with solid-ion-conductors for LIB and fuel cell use
 + dry coating of electrodes
 + sodium-ion batteries

Main Funding Instruments

FUND	FOCUS AND BUDGET
Clean Energy Investment Plan	Historically high public investments in clean technologies (\$2 billion)
Bipartisan Infrastructure Act	Investments in a domestic battery supply chain (over \$6 billion)
DOEs Loan Programs Office (LPO)	Loans to manufacturers of advanced technology vehicle battery cells and packs for re-equipping, expanding or establishing manufacturing facilities in the US (\$17 billion in ATVM Program)
DOEs Funding Programs	e.g. "Battery Materials Processing and Battery Manufacturing" and "Electric Drive Vehicle Battery Recycling and Second Life Applications" (\$3.1 billion)
Inflation Reduction Act (IRA)	A major climate bill that aims to curb inflation while advancing clean energy solutions (\$369 billion)
Investing in America Agenda	Investments to strengthen American supply chains, and help ensure coal, oil, and gas workers benefit from the new clean energy economy (\$14 billion)

Announced foreign investment projects* in battery manufacturing by region



Source: IRI Markets
 *Including US interstate projects

Effective: May 31, 2023 / 1 US-Dollar=0,9 EUR

