Advanced Research Projects Agency • ENERGY

FIRST OPEN SOLICITATION

MIT

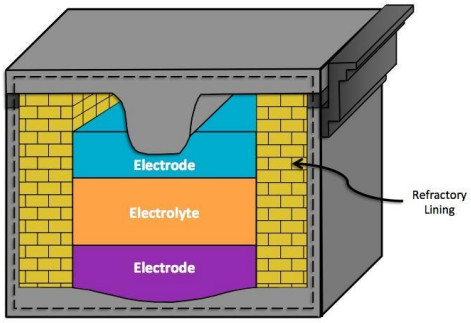
ELECTROVILLE: GRID-SCALE BATTERIES

PROJECT TITLE:	Electroville: High Amperage Energy Storage Device—Energy for the Neighborhood		
ORGANIZATION:	Massachusetts Institute of Technology (MIT)	LOCATION:	Boston, MA
PROGRAM:	FOA1	ARPA-E AWARD:	$6,949,584
TECH TOPIC:	Energy Storage	PROJECT TERM:	1/15/10 – 1/14/13
WEBSITE:	sadoway.mit.edu		

CRITICAL NEED

Our national electric grid has limited ability to store excess energy, so electricity must constantly be generated to perfectly match demand. Though wind and solar power are promising clean alternatives to fossil fuels, their natural unpredictability and intermittency present major challenges to delivery of the consistent power that is necessary to operate today's grid. The U.S. needs technologies that can store renewable energy for future grid use at any location. Flexible, large-scale storage would create a stronger and more reliable electric grid by enabling renewables to contribute to baseload power generation.

PROJECT INNOVATION + ADVANTAGES



Led by MIT professor Donald Sadoway, the Electroville project team is creating a community-scale electricity storage device using new materials and a battery design inspired by the aluminum production process known as smelting. A conventional battery includes a liquid electrolyte and a solid separator between its 2 solid electrodes. MIT's battery contains liquid metal electrodes and a molten salt electrolyte. Because metals and salt don't mix, these 3 liquids of different densities naturally separate into layers, eliminating the need for a solid separator. This efficient design significantly reduces packaging materials, which reduces cost and allows more space for storing energy than conventional batteries offer. MIT's battery also uses cheap, earth-abundant, domestically available materials and is more scalable. By using all liquids, the design can also easily be resized according to the changing needs of local communities.

IMPACT

If successful, MIT's affordable, large-scale battery technology would enable the low-cost storage of vast amounts of electricity and facilitate the widespread use of wind and solar energy to power the grid.

- SECURITY: Grid-scale batteries could reduce the need for fossil fuels and provide a buffer against supply disruptions.
- ENVIRONMENT: Grid-scale storage could increase renewable energy production and, in turn, decrease harmful emissions.
- ECONOMY: Energy storage would help reduce fuel prices and stabilize electricity rates, and it would offer new tax revenues to communities in solar and wind development areas.
- JOBS: Grid-scale batteries would provide rural landowners with new income sources and support the creation of U.S. jobs in industries like construction and manufacturing.

CONTACTS

ARPA-E Program Director:
Dr. Mark Johnson,
mark.a.johnson@hq.doe.gov

MIT Contact:
Dr. Donald Sadoway,
dsadoway@mit.edu

Partner Organization:
Liquid Metal Battery Corporation