Advanced Research Projects Agency • ENERGY

GRIDS PROJECT

LAWRENCE BERKELEY NATIONAL LAB

HYDROGEN-BROMINE FLOW BATTERY

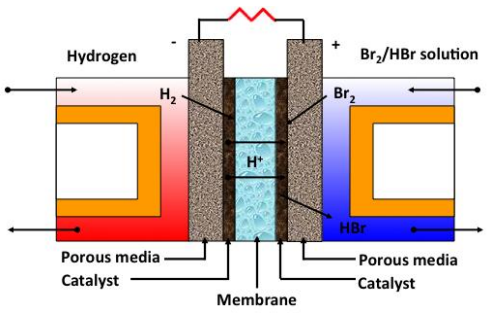
PROJECT TITLE:	Hydrogen Bromine Flow Batteries for Grid Scale Energy Storage		
ORGANIZATION:	Lawrence Berkeley National Laboratory (LBNL)	LOCATION:	Berkeley, CA
PROGRAM:	GRIDS	ARPA-E AWARD:	$1,642,508
TECH TOPIC:	Energy Storage: Stationary	PROJECT TERM:	10/1/10 - 9/31/12
WEBSITE:	www.lbl.gov		

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 robust electric grid by enabling renewables to contribute to reliable power generation.

PROJECT INNOVATION + ADVANTAGES

LBNL is designing a flow battery for grid storage that relies on a hydrogen-bromine chemistry which could be more efficient, last longer and cost less than today's lead-acid batteries. Flow batteries are fundamentally different from traditional lead-acid batteries because the chemical reactants that provide their energy are stored in external tanks instead of inside the battery. A flow battery can provide more energy because all that is required to increase its storage capacity is to increase the size of the external tanks. The hydrogen-bromine reactants used by LBNL in its flow battery are inexpensive, long lasting, and provide power quickly. The cost of the design could be well below $100 per kilowatt hour, which would rival conventional grid-scale battery technologies.



IMPACT

If successful, LBNL's flow battery would provide an affordable, long-life, grid-storage device that can encourage the widespread use of wind and solar power.

- SECURITY: Grid-scale storage would create a more efficient and reliable grid that is resilient to potential disruptions.
- ENVIRONMENT: Electricity generation accounts for over 40% of U.S. carbon dioxide (CO_2) emissions. Enabling large-scale contributions of wind and solar power for our electricity generation would result in a substantial decrease in CO_2 emissions.
- ECONOMY: Increases in the availability of wind and solar power would reduce fossil fuel demand, resulting in reduced fuel prices and more stable electricity rates for consumers.
- JOBS: Advances in energy storage could result in new jobs in supporting sectors such as manufacturing, engineering, construction, transportation, and finance.

CONTACTS

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Partner Organizations:
Robert Bosch, DuPont, 3M, Proton Energy