Advanced Research Projects Agency • ENERGY

GRIDS PROJECT

PRIMUS POWER

ADVANCED FLOW BATTERY ELECTRODES

PROJECT TITLE:	Low-cost, High-Performance 50-Year Electrode		
ORGANIZATION:	Primus Power	LOCATION:	Hayward, CA
PROGRAM:	GRIDS	ARPA-E AWARD:	$2,000,000
TECH TOPIC:	Energy Storage: Stationary	PROJECT TERM:	9/1/10 – 8/31/12
WEBSITE:	www.primuspower.com/index.html		

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 make them incapable of delivering the power on-demand necessary to operate today's grid. The U.S. needs technologies that can cost-effectively 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

Primus Power is developing zinc-based, rechargeable liquid flow batteries that could produce substantially more energy at lower cost than conventional batteries. A flow battery is similar to a conventional battery, except instead of storing its energy inside the cell it stores that energy for future use in chemicals that are kept in tanks that sit outside the cell. One of the most costly components in a flow battery is the electrode, where the electrochemical reactions actually occur. Primus Power is investigating and developing mixed-metal materials for their electrodes that could ultimately reduce the lifetime cost of flow batteries because they are more durable and long-lasting than electrodes found in traditional batteries. Using these electrodes, Primus Power's flow batteries can be grouped together into robust, containerized storage pods for use by utilities, renewable energy developers, businesses, and campuses.

IMPACT

If successful, Primus Power's highly durable advanced metal electrodes would reduce the cost of flow batteries while providing greater lifetime and energy density than current-generation technologies, enabling rapid deployment of stored energy to the electric grid.

- SECURITY: A more efficient and reliable grid would be more 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.
- JOBS: Advances in energy storage could result in new high-paying jobs in supporting sectors such as manufacturing, engineering, construction, transportation, and finance.

CONTACTS

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