2007 topic: Energy storage

Advanced storage to unlock power of renewables

Project details	
Project title	A Facile Method for Storing and Rapid Release of Renewable Energy to an Electrical Grid
Participant	Center for Applied Research, University of Kentucky, USA

A breakthrough in storing renewables energy on high voltage networks is the aim of a project being funded by E.ON's International Research Initiative (IRI).

Finding a solution would help overcome the intermittent nature of renewables energy, so that off peak generation can be stored and released rapidly to cover demand at peak times.

The project was submitted by Dr Stephen Lipka, Principal Investigator in the Center for Applied Energy Research at the University of Kentucky.

It is investigating ways in which one type of a group of storage devices known as 'supercapacitors' could be developed to hold more energy, and charge and discharge faster than the technologies allow at the moment.

The electrochemical double-layer capacitor (EDLC) is capable of storing and returning energy at higher rates than most batteries and could exceed the performance of the electrochemical capacitors that are in use at present. EDLCs also offer low maintenance and a long life span.

The University of Kentucky has been researching and developing EDLC technology for some years. Under the IRI funding it is investigating how two types of carbon material – porous and graphite – could be further developed for electrochemical capacitors.

The university's work will look at the production of porous carbon, its characteristics and ability to store energy, known as energy density.

Graphite carbons are being assessed as electrode materials for a new type of electrochemical cell based on lithium-ion. These could achieve an energy density that is three times as high as the electrochemical capacitors now being used.

This project will feed into the development of a simple storage system to manage high volumes of renewable energy. Achieving it is central to using the world's vast natural energy resources, such as wind and solar power to reduce our dependence on fossil-fuels.

A storage system of this kind would also support the expansion of embedded generation – such as combined heat and power units – enabling off peak generation to be stored for use later.

Other potential roles are providing protection against power cuts, voltage support on networks and smoothing out power fluctuations.

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