



Project update

Ranking the merits of battery technologies

Project details		Key aims	
Project title	BEST - BEnefits of STorage systems for stationary grid-connected and advanced vehicle applications	Key aims	<ul style="list-style-type: none"> • Evaluation of the best existing technologies for energy storage • Support for scientific work to enhance storage technologies • Creation of models to match storage technologies and applications.
Participants	National Institute for Solar Energy, France, Atomic Energy Commission, France, RWTH Aachen University, Germany		
Start date	2007		
Project summary			
<p>A scientific analysis of the through-life benefits and costs of the leading, commercially-available battery storage technologies is being made with funding from E.ON's International Research Initiative. The study will identify which technologies offer the best solutions for storing electricity to increase the contribution renewables and distributed generation can make to CO₂-saving measures. Electric and hybrid vehicle research should also benefit because the study results could</p>		<p>provide technological answers to speed up their development. The BEST project - its names comes from BEnefits of Storage - is a French and German research collaboration. The French National Institute for Solar Energy (INES) and the French Atomic Energy Commission (CEA) are represented by Dr Florence Mattera. The RWTH Aachen University is taking part through Professor Dirk Uwe Sauer from the Institute for Power Electronics and Electrical Drives. BEST is believed to be the first development</p>	
		<p>of a simple system that could be used across the world for evaluating and comparing stationary storage technologies and those in advanced electric vehicles. Four key areas of performance are being investigated: Time taken to discharge, energy and power density, efficiency and working life. The project results will be used to accelerate wider studies into the life-cycle of storage technologies. The findings will also help to identify the most suitable sizes at which to operate storage technologies.</p>	

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The project team's first task was to create a complete, technical database which would be used to help to evaluate energy storage technologies. These included: lead acid, nickel metal hydride and lithium batteries, high temperature sodium-beta batteries, redox-flow cell batteries and supercapacitors.

Reviews were produced of the performance and functions needed from energy storage systems which are connected to power grids or used in electric vehicles.

The second aim was to test and benchmark storage technologies for their costs, energy properties and life span. Test procedures were also defined for each of the applications where an energy storage technology might be used.

The project team also performed experimental laboratory studies on the five types of battery storage technologies. The results serve to support the wider evaluation of each technology and also to contribute to the building of models that will be used later in the project to optimize the benefits of storage systems.

The main focus of the third area for study is modeling storage systems based on different technologies to show how batteries perform under a wide range of operating regimes. Base models created for this activity reflect the behavior of new batteries operating at constant temperatures.

Later modeling work will investigate the effects of battery ageing and temperature changes.

Other work in progress includes an investigation into an occurrence known as 'self-discharge' which affects supercapacitors.

Finally, comparisons will be made of the costs and merits of the six storage options for different applications, which will allow the overall optimization of the system benefits.

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