



Project update

Intelligent system for energy storage

Project details							
<table border="1"> <tr> <td>Project title</td> <td>Innovative Energy Storage Systems - Multi-Agent Implementation and Economic Operation of Distribution Networks</td> </tr> <tr> <td>Participant</td> <td>University of Dortmund, Germany</td> </tr> <tr> <td>Start date</td> <td>2007</td> </tr> </table>	Project title	Innovative Energy Storage Systems - Multi-Agent Implementation and Economic Operation of Distribution Networks	Participant	University of Dortmund, Germany	Start date	2007	<p>Key aims</p> <ul style="list-style-type: none"> • Development of an autonomous control system for managing multiple energy storage devices in distribution networks • Use of renewable energy for balancing services and reserve power • Reduced reliance on large, centralized power generation • Improved exploitation of network capacity.
Project title	Innovative Energy Storage Systems - Multi-Agent Implementation and Economic Operation of Distribution Networks						
Participant	University of Dortmund, Germany						
Start date	2007						
Project summary							
<p>E.ON's International Research Initiative is funding studies on innovative distribution networks for integrating a large number of energy storage devices, such as electric vehicles, into network operation.</p> <p>The concept envisions networks where energy demands are co-ordinated with large- and small-scale storage devices using an autonomous real-time system.</p> <p>Integrating storage capacity into network operation will help to operate networks</p>	<p>more efficiently, reduce energy losses and allow for an increased use of renewables generation, resulting in reduced CO₂ emissions.</p> <p>This inter-disciplinary project is realized within a co-operation between the Institute of Power Systems and Power Economics and the Chair for Operating Systems and Computer Architecture at the TU Dortmund.</p> <p>The key objective of the project is the creation of an intelligent system for the</p>						

co-ordination of separate, but interconnected, energy storage devices. Research covers two areas. The first one focuses on the optimal integration of decentralized energy resources into the operation of distribution networks. It hereby follows a 'bottom up' rather than a traditional 'top down' approach. The second research area is the development of novel algorithms to provide real-time control and operation of multiple distributed energy storage devices.

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The range of storage devices which is available now, and others which are near to market, were examined at the start of this project.

These technologies were assessed for their potential to make significant contributions to the operation of distribution networks as well as for possible technical limitations.

The project team compiled information about the performance and technical constraints of different technologies and possible modes of operation of storage devices. Alongside, an analysis was carried out of the capabilities of different types and sizes of device.

The devices identified to be the most promising were then further

investigated to understand the roles that each could play in a decentralized energy system.

Five technologies were evaluated for their ability to provide either storage of heat and cold, or electricity.

These were:

- Combined heat and power (CHP) units
- Electric vehicles
- Domestic refrigerators and freezers
- Industrial cold storage facilities
- Electric heating.

The project envisages electric vehicle technologies as having a dual role. Cars and commercial vehicles would operate as both a means of transport and, through a grid connection, as mobile energy storage.

As their pattern of usage would be a key factor, the impact of their movements and locations, when being used for commuting and private purposes, was also examined.

The next step was to develop modeling techniques to simulate how the storage devices would actually operate as part of a distribution network.

This work was carried out from two perspectives. One part examined the functioning of the devices on a time basis, while the other involved stochastic modeling with random and variable factors being included in the calculations.

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