

**A new approach to assessing the value of demand side management and storage in reducing costs for electricity system operation and investment** – Grant awarded £49,507

Prof P Duck  
Department Mathematics,  
University of Manchester

**Summary**

The UK is committed to respond to the climate change challenge and the energy sector, and in particular electricity is expected to make a significant contribution to achieving this goal. In the last decade, the UK has supported deployment of DG (distributed generation) of various technologies (particularly renewables and CHP) to reduce carbon emissions and the need to improve system efficiency. Wind power, both on- and offshore is presently the principal commercially available and scaleable renewable energy technology and it is expected to deliver the majority of the required growth in renewable energy, and continue to be the dominant renewable technology out to 2020. One of the key challenges of this development is to ensure cost effective integration of these resources in the operation and development of the UK systems without compromising supply security. One of the primary potential operational problems is the variability of the output of wind generation and the need for increased resources to maintain balance between demand and generation. This development opens up an opportunity for demand side management (DSM) and storage in the provision of system support services, such as reserve.

The potential benefits of using demand side management (DSM) and storage technologies for such applications in the context of the UK electricity system have not been fully explored. There is a lack of rigorous methodology and tools for quantification of the effects of DSM and storage on system operation and development. This is however a very complex task, as any evaluation needs to be capable of dealing with considerable uncertainty in a number of key driving parameters. In this context, the proposed project will investigate a new approach to value DSM for alternative future development scenarios of the UK system.

The methodology to be used will be based on a radically new approach, recently developed by the PIs, in which modern financial modelling methods, coupled with sophisticated mathematical and computational techniques are employed, which can produce reliable estimates for the value of systems subject to high levels of random (stochastic) input.