LCN Fund Full Submission

Supplementary Answer Form

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Project code:	Smarter Network Storage	Question Number	UKPN018
Question date	06 September 2012	Answer date	10 September 2012
Submission section question relates to	Section 3 Appendix G		
Topic	Project Business Case Cost Benefit Analysis		
Question	Please provide the basis for the calculations quoted on p.12 of the Full Submission Pro-forma that give Future Storage Value Streams of £3.8M in revenue over 10 years and operating cost savings of £1.9M. What assumptions are being made about the value of volume of grid support services being provided and what, in detail, are the sources of the claimed "System Operation Cost Savings".		
Notes on question			
Answer	As described in the submission, the SNS project aims to demonstrate the means in which the economics of storage can be improved by leveraging a portfolio of applications. Efficiency of flexible assets is only maximised when value is optimised across the full system, supporting least-cost decarbonisation for customers. '**Future Storage Value Streams**' represent the potential revenue that a storage facility may generate from the provision of a range of system-wide services to a range of different parties. For the purposes of the business case we conservatively accounted only for the potential revenues from participation in current ancillary services of STOR and Frequency Response, and assumed the storage was available to provide these services for c.60% of the year (as described in answer UKPN001). The assumptions for income from these support services are enumerated in our response to UKPN024 and we refer you to that document for further detail on this aspect.		

'**System Operation Cost Savings**' represent the system-cost savings that are unlocked through the use of storage which serve to further close the gap between the costs of conventional reinforcement and the use of more flexible alternatives. This £1.9m relates to the savings in OCGTs and CCGTs CAPEX in addition to reduced carbon emissions anticipated through the deployment of the method, which accrue to all end consumers on the electricity system. The calculation of these is described further below:

This benefit accumulates site-by-site, as increasing numbers of storage facilities are commissioned and offer services to market participants, and ultimately reach a critical mass at which a number of OCGT or CCGT plants are not renewed when it reaches end-of-life.

Our assumptions in this case are based on a published study conducted by Pöyry for DECC in April 2011 using the Zephyr modelling platform. The study modelled a scenario containing a hypothetical storage facility and compared it with a baseline scenario where no such facility existed. The original study concerned a 7.2GW storage facility in the context of a single year (2030). For the purposes of the present analysis we have scaled down these figures to represent a 6MW facility, likewise, we assume that 2030 is representative annual figure for any given year.

We used this DECC study to estimate the value of the system operation savings. We have assumed that the storage facility behaves like pump storage in reducing the need for OCGTs and CCGTs as peaking plant. This will also contribute to reducing carbon emissions in the system.

The modelling showed that total emissions in the baseline scenario, without the storage, were 54.2mtCO2, from a total of 202.6TWh generation (from emitting plants).

The scenario including storage, on the other hand, registered emissions of 52.2 mtCO2 from 200.4TWh of emitting generation.

With 6MW of Storage, 0.9MW of CCGTs and 3.2MW of OCGTs are displaced from the system. This results in approximately £300,000 of capex savings per annum. The Zephyr model optimises the use of the storage facility and displaces the OCGT and CCGT capacity from the system in the baseline scenario. This is because the merit order ensures that in a world of high wind intermittency with relatively high carbon prices, storage facilities will be cheaper to run than thermal generation such as OCGTs and CCGTs. The annual capex savings were discounted to the present value to deliver a savings value of £1.8m.

In addition, the cost savings as a result of the reduction in carbon emissions was calculated using carbon price projections generated by Poyry's carbon model. The carbon price used in 2015 was £10.7/ tCO2, real 2011 money while the carbon price in 2022 is £14.1/ tCO2, real 2011 money. The carbon savings accruing to 6MW of storage on the network was calculated as 1.7k.tonnes, as further described in UKPN017. Multiplying this 1.7 ktonnes by the carbon price in 2015 and 2022 deliver savings of £18,207 and £22,253 in 2015 and 2022 respectively. The annual savings were discounted to the present value to deliver a total of £130,000.

	The total reduction in cost in the storage scenario across these two areas, relative to the baseline was then £1.8m + £0.13m = £1.9m.
Attachments	
Verbal Clarifications (Consultants)	