LCN Fund Full Submission

Supplementary Answer Form

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Project code:	NPGT202/1	Question Number	NPG013
Question date	06/09/12	Answer date	10/09/12
Submission section question relates to	Section 4		
Topic	Evaluation Criteria		
Question	Can NPG explain the basis for the statement "there could be 70-90% potential saving from every MW of reserve that can be provided through DSR instead of through large scale plant" (page 18)?		
Notes on question			
Answer	Our analysis suggests that there could be a 70%-90% CO_2 emissions saving from every MW of reserve that can be provided through demand side response (DSR) instead of through the part-loading of large-scale plant; even when DSR is provided in what is likely to be the most emissions-intensive way – that is through the use of diesel back-up plants. We note that if DSR is provided through demand shifting, the emissions saving is likely to be even greater. Large-scale generation plant usually needs to be kept part-loaded if it is to be available for use as reserve. Part-loading large-scale plant is associated with a reduction in efficiency, relative to operating these plants at their optimal loads. This reduction in efficiency leads to an increase in emissions per kWh of power generated. We used estimates for this increase in emissions-intensity published by Government (Department of Trade and Industry, 2006, *Reducing the costs of system intermittency using demand side control measures*, http://webarchive.nationalarchives.gov.uk/20100919181607/http:/www.ensg.gov.uk/assets/kel0003460000.pdf). Diesel back-up plant is likely to be more emissions-intensive than large-		

	scale generation plant, when it is being used for generation. However, it does not need to be kept part-loaded for it to be available as reserve. Once the emissions associated with keeping large-scale plant part-loaded and available for reserve are taken into account, and assuming that reserve plant needs to be kept part-loaded for all of the short-term operating reserve (STOR) availability windows, our analysis suggests that the annual emissions associated with providing a MW of reserve through diesel back-up plant are around 70%-80% lower than the emissions from providing this reserve from part-loaded gas-fired plant and around 90% lower than providing this reserve from part-loaded coal-fired plant. The reserve analysis is based on historical utilisation rates. However, reserve may need to be utilised more in the future, for example due to extra wind or demand variability, which could improve emissions intensity for part-loaded gas sets. Diesel back-up plants are diverse and are likely to have a wide range of emissions intensities. We assumed an emissions-intensity for diesel plant of 1.1kg/kWh. However, we also tested the sensitivity of our conclusion to this assumption. The emissions intensity of diesel would have to be more than 500% that of coal for it not to represent a saving relative to using part-loaded coal and gas plants. We have attached a spreadsheet which sets out our calculations.
Attachments	 Microsoft Excel 97-2003 Worksheet
Verbal Clarifications (Consultants)	