LCN Fund Full Submission

Supplementary Answer Form

Tick if this answer is Confidential: ☐

Tick if this answer has been provided verbally: ☒

Project code:	SNS	Question Number	UKPN032
Question date	27 September 2012	Answer date	02 October 2012
Submission section question relates to	Section 2		
Topic	Project Description		
Question	What is the operating strategy for the battery? How do you plan to prioritise its different uses?		
Notes on question			
Answer	The operating strategy for the storage will be primarily driven by the requirement to peak shave at the trial site in times of high peak demand when an outage occurs. This will ensure capacity constraints are not breached in the event of a fault that causes a circuit or transformer outage (N-1 scenario). This will require forecasting of periods when peak demand may reach a level at which, in the event of a fault, network support from the storage will be required. In advance of these periods, the storage device will therefore need to be charged to hold sufficient energy to be able to cover the expected energy at risk. In construction of the business case, in order to ensure a conservative approach to estimating the potential income and system-wide benefits of the storage, we performed simple modelling of the demand profile at the trial site to estimate the approximate time which the storage capacity might be unavailable for other services. We assumed a granularity of whole days on which the storage capacity would be fully reserved whenever network headroom fell below that necessary to perform a full power import (6MW) at peak time. This led to the previously described conservative assumption of 40% of time when the storage would be exclusively used for DNO. In practice, it is unlikely that power would be imported at peak time, and the granularity of time in which services could be provided is smaller than a day. Therefore the proportion of time a fully commercialised deployment would be reserved exclusively for network support may be much lower than 40%, which serves to increase the potential future income stream benefits.		

The storage will be primarily used to provide network support. Beyond this, the operating strategy will then be to optimise the provision of a range of secondary services in order to maximise the overall economic return on the asset. This optimisation will therefore take account of the following factors:

- The overall income or commercial fees for providing the service (availability and utilisation payments)
- The energy costs incurred in preparing or providing the service
- The estimated cost of incremental degradation on battery life
- The timescales for commitment to the service (both whether it is too late to participate, and whether it involves a long-term commitment which locks us out of alternatives in future)

The various secondary value streams that will be trialled within the project lifetime are:

- Short-term operating reserve (STOR), through KiwiPower
- Frequency Response (Commercial FR, both positive and negative), directly with National Grid, or through KiwiPower or SmartestEnergy
- Energy arbitrage, with SmartestEnergy

It should be noted that there are significant changes expected in the GB market over the coming decades in order to accommodate increases in wind generating capacity. This will increase the requirement for a range of balancing services, and it is expected new value streams and market services appropriate for alternative flexibility, such as storage and DSR, may be available as EMR and other industry evolution occurs.

There is also currently an approximate order of pricing associated with these services, which was used as the basis of our future benefits calculations. (This is further described in our answer to Question UKPN033). However, a straight hierarchy or prioritisation of these services based on price alone is sub-optimal due to the different timescales on which they are procured, changing network conditions and the potential to combine multiple value streams that may lead to a return greater than any single service.

As described in Section 2.3 of the submission, initially a period of sequential trials of each service, including services to the distribution network, will be performed in order to gain operating confidence and understand the capabilities of the storage. These will involve the implementation of standard commercial terms for the STOR and FR services in advance of the commissioning of the plant, for which there is appropriate resource allocated within the project. The periods of these trials have been planned to coincide with expected service tendering timescales. In particular for STOR, where there are three tendering rounds per year, SNS will participate in Tender Round 25 (expected in Jan 2015), and/or earlier Tender Rounds where possible, in order to be able to demonstrate provision of the STOR service for select windows within STOR seasons 1, 2 or 3 between April and August 2015. These STOR seasons and dates were included in the Project Plan in Appendix C on line 380 but not expanded for clarity of presentation. Our aggregator partner KiwiPower will operate as the reserve agent in managing and participating in the tenders. For commercial frequency response, tenders are run on a monthly basis and hence there is flexibility in the timing of these specific trials.

Following the period of sequential trials, the operating strategy will shift to a

	more optimised arrangement in order to explore how the economic return can be maximised. Increased operational confidence in the storage will allow more granular operating decisions to be made, and synergistic modes of operation will be identified and demonstrated. Innovative new service structures will be designed and tested collaboratively with National Grid, allowing the storage to provide a range of benefits simultaneously in a more flexible fashion. For example, utilisation and return will be maximised by planning arbitrage opportunities that coincide with periods of requirement for network support – a scheduled discharge during peak demand serves to support the network, regardless of whether a circuit outage occurs. Studies undertaken within the project by Imperial College, planned across the early stages of the project, and further refined in light of operating experience in latter stages, will further support the development of commercial strategies that will allow aggregation of multiple revenue streams.
Attachments	
Verbal Clarifications (Consultants)	