LCN Fund Full Submission

Supplementary Answer Form

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Project code:	Smarter Network Storage	Question Number	UKPN016
Question date	4 Sep 2012	Answer date	7 Sep 2012
Submission section question relates to	Section 3		
Topic	Project Business Case		
Question	We understand from external sources that a facility of this type is only economically viable if it is discharged daily. Your submission suggests that it will run just a few times a year. Is this realistic proposition for designing the commercial arrangements?		
Notes on question	We apologies for the misunderstanding that the facility will run only a few times a year. It would be helpful to understand which sections the Technical Consultants, Expert Panel or Ofgem has taken this from, and where this needs to be clarified. The answer below attempts to describe further the proposition.		
Answer	It is not necessary to charge/discharge storage on a daily basis for energy storage to be economically viable or generate value. Rather, value can be generated from both availability *and* utilisation – for example, improved return on the capital investment can be generated from some services simply by being 'available'. Value is therefore maximised when the storage availability is committed to providing one or more services for as much of the time as possible. A daily charge/discharge is just one particular means of generating value. Our internal analysis shows that commercial operators wishing to develop storage will find that return from just a daily cycle to take advantage of the difference between peak and off-peak wholesale prices is too low to justify investment. Two of the SNS project partners bring direct experience of the challenges in attempting to develop storage in this way. There are other services with high availability and low utilisation needs which could provide an economic basis for storage if value structure is appropriately set and which will be explored in the project. Provision of ancillary balancing services is one example of where premium value		

currently lies, especially for fast acting providers such as battery storage.

The following section attempts to describe the different modes of operation that help to improve the economic viability.

Modes of operation and value
There are broadly three areas where storage can currently generate value or benefits to the system:

- Network support and peak shifting: Deferring or avoiding investment by the network operator, improving power factor, renewable smoothing
- Balancing system services: Current market products around this include STOR and Frequency response, but in the future there may be additional or alternative services, such as the Capacity Mechanism payments.
- Wholesale market services: Leveraging of differences between high and low wholesale market prices, or reducing imbalance risk.

Several of these areas provide value for storage, without necessarily needing to discharge the storage. The project will explore an optimum portfolio of these types of services rather than focus on a single one, which will help to maximise the overall value.

For example, the storage can provide value to the distribution network operator by supporting demand during the periods where the N-1 rating could be breached, efficiently providing sufficient capacity to prevent the need for reinforcement. The storage would only technically need to be discharged in this instance if there was a fault causing an N-1 situation.

While this would only be expected to occur very few times a year, as described in the submission; due to uncertainties in predicting the periods when demand may exceed N-1 ratings, network operators must take a conservative approach to 'reserving' the storage for this application and hold the storage in a charged state during any periods where this could be a possibility. For the purposes of the business case, and further described in our answer to question UKPN001, a very conservative figure of approximately 40% of days throughout the year was used based on a level of headroom sufficient to accommodate a full charge of the device at peak time. Please see our answer to UKPN001 for further details.

Several of these alternative services, such as frequency response to support the transmission system in the event of a loss of a large generator, generate value to improve the economics in the form of 'availability payments', as well as 'utilisation payments'.
Availability payments are made for being committed and ready to provide the service in the event of a frequency excursion, for example. Utilisation payments are only made in the event that the frequency actually falls (or rises) to a point where support is needed. Therefore, improved returns can be generated simply by holding the storage in the correct state of charge and committing to be available to provide a charge or discharge in the event it is needed.

Levels of utilisation are naturally dependent on unexpected events hence by their nature are difficult to predict. Exact returns from these types of

services are therefore also uncertain. This is part of the realistic challenge for commercial operators in understanding the proposition and full economics of storage operated in this way. Based on information provided by National Grid, an operator providing STOR services for example may get dispatched approximately 50 – 80 times per year.

Overall therefore, in order to fully maximise the value of storage a daily discharge is not required. Rather, an operator should attempt to maximise the time in which the storage is made available to a portfolio of services (whether utilised or not), whilst ensuring actual constraints on the local network can still be met. The SNS project will provide real experience of this for the first time, which forms the basis of validating genuine commercial propositions for the roll out utility-scale storage in the GB market.

Why the trials are needed and will involve real commercial arrangements

As suggested by the following extracts from recent research, the true value of storage to the system when it is used for system-wide benefit is not well understood and has not been demonstrated. A greater understanding of the potential income streams and economic viability when a portfolio of services is leveraged and optimised is a key objective of the SNS project:

"the potential value storage brings to the system, and therefore its cost targets, are poorly understood to date"
(Strategic Assessment of the Role and Value of Energy Storage Systems in the UK, Imperial College London, June 2012, pg 6)

"Numerous past reports on the general value of storage indicate that it is usually necessary to combine income streams in order to achieve a satisfactory rate of return to investors"
(IMechE, Electricity Storage paper, May 2012)

For the purposes of the project, as described in Section 2.3 of the submission, we will sequentially test the capabilities of storage in a series of trials, and it's strengths and limitations in providing the range of services and benefits described above (as well as any additional value streams that may be introduced during the duration of the project as a result of regulatory developments such as EMR). This will help the industry to understand the value that could be realised across the full system and the economic viability of business models for storage that leverages a portfolio of value streams.

For these trials the level of actual utilisation will not impede the commercial learning and will reflect the reality of commercial operation, in particular for high availability/low utilisation services. The contractual arrangements underpinning these trials will still generate learning relating to the particular value of storage for various types of service, the capabilities of storage in participating in these services and the level of value that can be achieved from 'availability' payments as would be the case in any other commercial deployment.

The second optimised and integrated phase of operational trials which will be carried out over the final year of the project, as show in the project plan, will provide a longer duration period of up to 11 months where a more

	flexible approach to provision of a range of services will be developed in conjunction with National Grid and the operational partners. This will involve maximising the period of time when storage is providing a portfolio of useful services, and involve the design of novel commercial arrangements that will be the basis for generating better value from sources of flexibility on the network than currently possible through existing market products and frameworks.
Attachments	
Verbal Clarifications (Consultants)	