LCN Fund Full Submission

Supplementary Answer Form

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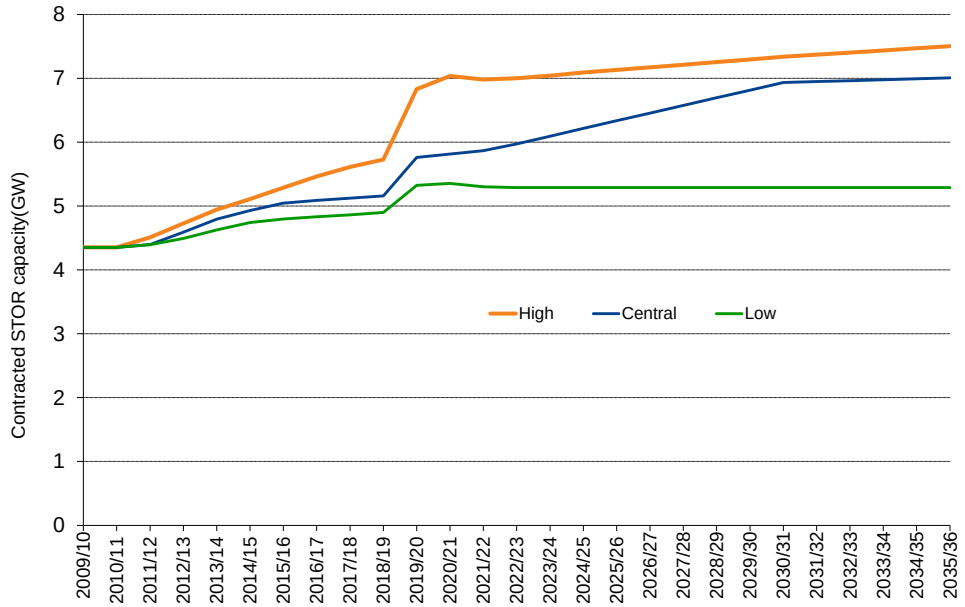
Project code:	SNS	Question Number	UKPN036
Question date	02 October 2012	Answer date	04 October 2012
Submission section question relates to	Section 3		
Topic	Project Business Case		
Question	Please provide estimates of the current market size for STOR and frequency response, and projections for the market size for STOR and frequency response up to 2030.		
Notes on question	Note this information was provided as an appendix to our response for UKPN033 prior to receiving this question, but is provided for completeness below.		
Answer	**Current Frequency Response Market Size** The 'Future Balancing Services Requirement' report from National Grid (1) provides a time-weighted average forecast of the size of FR requirement under their 'Gone Green Scenario'. Across Primary, Secondary and High response holdings (all of which can be provided by the SNS Solution), the current requirement is approximately 2,000MW. **Projected Frequency Response Market Size** The increase in intermittent generation capacity, along with an increase in the largest credible loss in generation from 1320MW to 1800MW due to the arrival of larger generating units from 2019 is set to increase the general requirements for FR. This is further described at the end of this answer for clarity. Based on National Grid's 'Gone Green' scenario; which provides projections up to 2025 only; it is forecast an additional 1GW of Frequency Response will be required by 2025, taking the requirement to approximately 3GW. With increased wind generation on the system past this timeframe, this requirement is set to grow further, (although for our modelling we assumed no further increase in market size to 2040.) Our analysis at the GB-scale assumed that approximately 2GW of storage capacity in total may be facilitated by the Method by 2040. This storage capacity is assumed to be only partially used for FR requirements along with delivering capacity to manage the distribution networks as previously described. For this analysis at the GB-scale, in 2040 between 600 to 800MW is assumed to be used in the FR market out of 2GW, whilst a further 600 to 800 MW is used for STOR purposes, and therefore represents a small		

portion of the potential need of the system in the future.
(On the 2020 timeframe, the capacity of storage rolled out was 202MW representing a very conservative portion of the requirement at this time.)

Current STOR Market Size
The current STOR market requirement is around 4GW, based on National Grid's future reserve requirements estimates (2).

Projected STOR Market Size
By 2025/2026, National Grid anticipates the wind capacity on the system to be approximately 30GW, which will increase the STOR requirements to 7 – 8GW, nearly doubling the requirements going forward. The following chart presents Pöyry's view of future STOR capacity scenarios based on a range of factors expected to increase the requirements significantly. Further information on the factors affecting the need for balancing in the future can be found at the end of the answer for clarity. The central scenario was the projection used in our analysis and are similar to those outlined by National Grid in their Gone Green scenario.



Future STOR Market Size Scenarios (Source: Poyry)

As previously described, for this analysis at the GB-scale, in 2040 between 600 to 800MW is assumed to be used in the STOR market out of 2GW, whilst a further 600 to 800 MW is used for Frequency Response purposes, and therefore represents a small portion of the potential need of the system in the future.

Factors affecting the need for balancing in the future

Wind generation capacity

The EU 2020 targets of sourcing energy from renewable sources by 2020 translates to considerably higher levels of renewable electricity generation in most countries, since the potential for using renewable heat sources and renewable transport fuels are limited.

High levels of renewables create a problem for the TSO, for two reasons: variability and unpredictability. The combinations of these two factors mean that there will be a requirement for a greater reserve margin than at present, particularly in the few hours up to real time, which implies that the higher the renewable penetration, the higher the reserve requirements in the future.

Renewable and Demand forecast errors

At present, the power output from wind and solar generation at the system level cannot be accurately predicted, with significant forecast errors, of the order of 50% (3) of output, up to four hours ahead of balancing.

The difference between predicted and outturn generation will result in the need for additional reserve. The extent of this additional reserve requirement will depend on two factors: the amount of installed wind and solar capacity and the accuracy of the forecast models.

The amount of installed renewable capacity is projected to increase across the EU which will increase reserve requirements as outlined above. However, we would also expect that there will be an improvement in the models that forecast wind and solar generation, which will reduce the impact of forecast error. Overall though, we would expect the increase in installed capacity to outweigh any improvements in forecasting techniques.

Demand forecast also has a bearing on the requirements for flexibility, especially in a scenario where the consumer is managing their own consumption through dynamic pricing which is discussed in greater detail below.

Plant sizes

The Large Combustion Plant Directive (LCPD) requires that combustion plant brought into operation after 1987 meet certain Emission Limit Values for SO_2, NO_X, and particulates.

The Industrial Emissions Directive (IED) will replace the LCPD from 2016 onwards and will further tighten emission limits. Coal plants (as well as some older CCGTs) will probably need to fit Selective Catalytic Reduction (SCR) to comply with the IED.

These two pieces of legislation have led and will further lead to closures of old OCGTs, CCGTs and coal plant, thus reducing the level of conventional capacity available across the EU for reserve purposes. Conventional capacity has historically provided most of the flexibility required by the system. The closure of these plants will mean that either new capacity will be built or new sources of flexibility will be needed such as Demand Response. The type of reserve capacity needed may also change in the future leading to a requirement for a variety of technologies and services.

In addition, looking forward to the commissioning of new nuclear plant, the unit size is likely to be considerably larger than at present – typically up to 1600-1800MW per unit in various EU countries. The anticipated connection of larger generation assets will increase the normal in-feed loss risk and the largest credible in-feed loss risk. This increases the TSOs' requirements for Frequency Response to be able to deal with unexpected outages. The flexibility characteristics of new nuclear plants are uncertain and as a result, the requirements on the remainder of generation and Demand Response may increase.

Interconnections

An increase in the number of interconnections between GB and adjacent systems also increases the probability of risk of loss of an interconnection in service. As these interconnectors are rated at high power transfer levels, the overall probability of the loss of a large load or supply increases, adding to the requirement for reserves and balancing services.

References:

(1) Primary, Secondary and High services: http://www.nationalgrid.com/NR/rdonlyres/0F82BB0B-98E9-4B02-A514-3C87A85E60D8/42696/Future_Balancing_Services_Requirements_Response1.pdf

(2) http://www.nationalgrid.com/NR/rdonlyres/55610D9A-C53A-4E28-88C6-29AE5DF72EF2/42697/Future_Balancing_Services_Requirements_Reserve1.pdf

	(3) http://www.bwea.com/pdf/responses/110916_OperatingIn2020.pdf, National Grid
Attachments	
Verbal Clarifications (Consultants)	