National Infrastructure Commission: Call for evidence

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Electricity interconnection and storage

4.1 What changes may need to be made to the electricity market to ensure that supply and demand are balanced, whilst minimising cost to consumers, over the long-term?

The electricity market in the UK would benefit from the introduction of flexibility in how and when energy is produced and consumed. By modifying generation and consumption patterns in reaction to changing prices, the energy system can make sure the power being generated matches more efficiently the amount of energy used. This can result in a smarter electricity market that reduces energy generation and supply costs and satisfies its commitment to lower carbon emissions. Innovative ways to introduce flexibility into the electricity market include: implementing demand-side response (DSR), energy storage, and distributed generation. DSR is based on flexible tariff schemes for consumers in which electricity prices vary at different hours of the day. Flexible tariff schemes would encourage users to avoid the use of appliances during critical hours, thus shifting the peak demand of energy and balancing it with generation. Energy storage systems can help to save the surplus of energy when generation is abundant. This excess of energy can then be used at times when it is needed, thereby balancing the demand. Several technologies are available for this purpose including, but not limited to, battery banks and hydrogen storage systems. Distributed generation can produce clean energy locally at home or work premises and in this way contribute to the reduction of the cost of transmission.

4.2 What are the barriers to the deployment of energy storage capacity?

Because energy storage is a novel technology, it lacks tried-and-tested business models, the lack of which leads to a high level of risk aversion when it comes to procurement and initiation of energy storage projects. Another factor is that such projects face rapidly diminishing technology costs, which makes the timing of the investment decision important. In addition, the cash flows of energy storage projects would be heavily influenced by the price of energy and resultant policies around the capacity markets. One tool that can be useful in assessing capex-heavy investment in times of high uncertainty is real options analysis. Traditional

project valuation potentially undervalues the worth of projects that have long payback and high upfront costs, like energy storage. Real options analysis can be used as a tool to model energy price uncertainty, and possibly policy risk, with regard to how energy storage systems would be treated in capacity markets in terms of compensation for offtake. Such models could be used to optimise time of investment and also to best examine the potential value of energy storage projects.

http://www.mdpi.com/1996-1073/7/4/2701/pdf

C. Partridge and F. Medda (2014) "Fuzzy Real Options Analysis Applied to Urban Renewable Energy Projects", Regional Studies Association Winter Conference 2014, London.