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Dear Sir/Madam,

**Response to Consultation on Electricity Market Reform – form of a capacity mechanism**

Thank you for the opportunity to respond to Annex C of the Electricity Market Reform (EMR): *Consultation on possible models for a Capacity Mechanism*.

RLtec is a UK based company operating unique smart grid technology and is the world's first dynamic demand frequency response technology. RLtec's dynamic demand technology provides an energy balancing service to National Grid. The UK government estimates that the technology could reduce the UK's CO<sub>2</sub> emissions by around 2m tonnes per year.

We have replied to questions posed in the consultation which we feel are appropriate to our business and the service we provide to National Grid. We have also offered some general comments on the consultation as a whole. Particular areas we feel need consideration are:

- Impact of the Capacity Mechanism on the Balancing Mechanism and Frequency Response markets
- Role of Demand Side Response in fulfilling National Grid's short-term balancing needs
- Impact of changes in legislation on new, innovative technologies

If you are interested in understanding more about our technology and the role of dynamic demand frequency response technology in providing an energy balancing service we would welcome the opportunity to meet with you. In the meantime, please do not hesitate to contact us if you have any queries regarding our consultation response.

Yours faithfully,



Managing Director



## About RLtec

RLtec is a UK based company operating unique smart grid technology and is the world's first dynamic demand frequency response technology. RLtec's dynamic demand technology provides an energy balancing service to National Grid, whose role it is to ensure that supply of electricity always matches demand. This is traditionally done with power stations set to continuously adjust supply to match demand. In contrast to this, dynamic demand makes subtle adjustments to electricity consumption in response to electrical imbalances which are detected by measuring the "grid frequency".

RLtec has been providing balancing services to National Grid since March 2011, by using its dynamic demand technology installed into 200 Sainsbury's supermarkets. RLtec is also conducting the largest domestic fridge trial in Europe with 1,200+ Indesit domestic fridges fitted with the RLtec technology. The UK government estimates that dynamic demand could reduce greenhouse gas emissions by approximately 2 million tonnes of CO<sub>2</sub> from electricity generation.

## Dynamic Demand Frequency Response – an overview

The target frequency range of the alternating current on the National Grid in the UK (which is to say, the rotational frequency of the generating turbines which feed the grid) is 50 Hz  $\pm$ 0.5 Hz. National Grid is mandated to keep the frequency within this band and employs many mechanisms to balance the grid frequency. Electric loads which can be enabled to shift their power consumption patterns without adversely affecting the mechanism of the load or impinging on the overall service provided by the load can be utilised to help balance the National Grid.

- If the frequency goes below 50 Hz (a Low frequency event) then demand for electricity has exceeded supply. **Frequency responsive loads switch off** to reduce overall demand. For instance, a portfolio of supermarket air conditioning fans may be switched off while a low frequency event persists.
- If the frequency goes above 50 Hz (a High frequency event) then supply of electricity had exceeded demand. **Frequency responsive loads switch on** to absorb the excess energy and increase overall demand. For instance, a domestic fridge may switch its compressor on if it was otherwise off and the fridge cavity was not too cold as to go outside operational limits.

National Grid historically gets frequency response services from large generators (i.e. adjustments to the supply side). RLtec delivers these balancing services from the demand side by aggregating the response of energy storage devices.

## **General comments**

RLtec is concerned that the consultation does not outline any effects that the Capacity Mechanism (CM) may have on the form or operation of the Balancing Mechanism (BM) and has not considered knock-on effects of the CM in related markets such as the Frequency Response markets run by National Grid. Because of the definition given for Demand Side Response (DSR) in the consultation it is unclear whether the CM will affect dynamic demand. It is not clear how the CM will affect other DSR not mentioned explicitly.

RLtec believes that the demand side is well-suited to providing short term balancing services to meet National Grid's technical balancing needs, rather than meeting longer timescale generation-style energy services. We are concerned that markets for demand response currently run by National Grid could be disrupted by the CM.

RLtec asks that DECC consider the following points:

- The CM should not impact the frequency response markets and, in particular, the DSR input into the frequency response markets.
- Care should be taken to ensure that there is a level playing field for DSR participants and that the CM does not accidentally create an un-level playing field either directly or indirectly as the result of adverse unanticipated consequences from changes outside the frequency response market.
- There should be an acknowledgement that DSR is best suited to being used by National Grid for short term balancing services rather than as a supplement to long term generation.
- RLtec believes that National Grid is best suited to manage the CM, if implemented and its interactions with the Balancing Mechanism.

## **Concerns about the frequency response market**

RLtec believes that broadly speaking, DSR is more suited to fulfilling National Grid's short term balancing needs rather than supplying services which are equivalent to generation, supplying energy for long periods of time.

However, the consultation does not seem to indicate that DSR can be provided in different forms. For example, National Grid procures both Response and Reserve from the demand side:

- **Response** - fast-acting, bi-directional changes in the power consumption of loads to assist National Grid in returning instantaneous grid frequency back to 50Hz (frequency response services), or;
- **Reserve** - slower-responding service, such as STOR, designed to provide power when needed most in order to correct grid imbalances within a number of hours.

The consultation does not acknowledge the role that the demand side can play in providing response, nor does it acknowledge that dynamic demand, a form of demand response, can balance both switching loads on and off for short periods of time to stabilise grid frequency and to balance supply and demand of electricity.<sup>1</sup>

The benefits of providing short term DSR include stabilising the electricity network, facilitating the introduction of renewable energy and making a disproportionate reduction in CO<sub>2</sub> emissions from the electricity network (estimated by the UK government at more than 2 million tonne per year).

To ensure that these considerable benefits are not disrupted, RLtec requests that the CM brought in as part of the Electricity Market Reform (EMR) does not disrupt the frequency response market and that a further consultation takes place before any changes are made to the form and operation of the frequency response market or the Balancing Mechanism.

### **Development of innovative technologies**

RLtec asks that legislation passed under the EMR regarding the CM does not hinder the development and access to market of new and innovative technologies. Unfair revenue opportunities for non-DSR services could lead to stagnation in the development of new and innovative technologies. As mentioned above, the current suggested models for the CM are not clear on the integration of the frequency response markets and the electricity market. This could lead to increased difficulties in finding investment opportunities for DSR technology.

As the Government continues to mandate the growth of the renewable energy sector within the electricity market the need for non-fossil fuel plant for balancing will increase and DSR technologies will be able to provide useful proportions of this requirement. This should be encouraged and not hindered by legislation.

### **Management of a Capacity Mechanism**

RLtec believes that the National Grid should manage the CM. As manager of the GB grid, it already understands the interplay between electricity supply and demand. It is therefore well placed to understand both the long term and the second by second balancing needs of the GB grid and to judge how much supply, or capacity, is needed to meet projected demand. National Grid also understands the frequency response market and the role of various technologies in powering and balancing the GB grid. As a result it is well placed to avoid introducing mechanisms with unintended consequences.

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<sup>1</sup> The Consultation defines DSR services in paragraph C2.13 as being “... an active, short-term reduction in consumption whereby an energy user or aggregator guarantees to reduce demand at a particular time.” Paragraph C3.74 suggests that “...forgone consumption [of active power] can be treated as equivalent to generation”

## *Targeted Capacity Mechanism*

**Question 1:** Does this table capture all of your major concerns with a targeted Capacity Mechanism? Do you think the mitigation approach described will be effective?

The 'Eligibility and innovation' section of the table does not make clear the following:

- Whether DSR services providing frequency response (both high and low frequency response over a continuous frequency range through 50Hz) will be directly included in the Strategic Reserve;
- What impact the Strategic Reserve would have on the existing balancing markets which deal with these technical needs.

Even if the CM does not directly change the arrangements in short term balancing markets run by National Grid (e.g. frequency response and reserve markets), the introduction of a CM could undermine the existing participation in these markets by DSR, for example, by subsidising or encouraging the construction of generation assets which could bid into these markets in addition to a CM, or by preferentially favouring DSR participating in some markets (e.g. STOR) over others (e.g. frequency response). RLtec therefore request extremely careful consideration of the implementation of the CM to avoid damaging existing market arrangements in which DSR compete.

**Question 2:** How long should the lead time for Strategic Reserve capacity procurement be and why?

**Question 3:** Should the length and nature of contracts procured by the Strategic Reserve procurement function be constrained in any way?

**Question 4:** Which criteria should providers of Strategic Reserve be required to meet?

**Question 5:** How can a Strategic Reserve be designed to encourage the cost effective participation of DSR, storage and other forms of non-generation technologies and approaches?

RLtec believes that DSR services are predominantly suited to providing short term balancing services rather than acting as the equivalent to generation i.e. providing energy. Even if the CM does not directly change the arrangements in short term balancing markets run by National Grid (e.g. frequency response and reserve markets), the introduction of a CM could undermine the existing participation in these markets by DSR, for example, by subsidising or encouraging the construction of generation assets which could bid into these markets in addition to a CM, or by preferentially favouring DSR participating in some markets (e.g. STOR) over others (e.g. frequency response). RLtec therefore request extremely careful consideration of the implementation of the CM to avoid damaging existing market arrangements in which DSR compete.

**Question 6:** Government prefers the form of economic despatch described here. Which of the proposed despatch models do you prefer and why?

**Question 7:** How would the Strategic Reserve methodology and despatch price best be kept independent from short-term pressures?

**Question 8:** Do you agree that a Strategic Reserve should be periodically reviewed? If so, who would be best placed to carry out the review and how often should it be reviewed?

**Question 9:** Into which market should Strategic Reserve be sold and why?

**Question 10:** Do you have any comments on the functional arrangements proposed for managing a Strategic Reserve?

We believe that National Grid should run any Strategic Reserve that is created.

**Question 11:** Given the design proposed here and your answers to the above questions, do you think a Strategic Reserve is a workable model of Capacity Mechanism for the GB market?

We note your proposal that a Strategic Reserve is not intended to cover short term balancing currently procured by National Grid, but may interact with these short term balancing services (C2.39, C2.10). RLtec is concerned that the implementation of the CM could result in unintended consequences for DSR.

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#### *Market-wide Capacity Mechanism*

**Question 12:** How and by whom should capacity in a GB market be bought and why?

**Question 13:** What contract durations would you recommend for a Capacity Market?

**Question 14:** How long should the lead time for capacity procurement be? Should there be special arrangements for plants with long construction times?

**Question 15:** Should there be a secondary market for capacity? Should there be any restrictions on participants or products traded?

**Question 16:** What are the advantages and disadvantages of making a central, administrative determination of

- i) the capacity that can be offered into the market by each generator;
- ii) the criteria for being available; and
- iii) the penalties for non-availability?

In outline, how would you suggest making these determinations?

**Question 17:** How should the reference market for reliability contracts be determined and what would be an appropriate reference market if it is set by the regulator? How could any adverse effects of choosing a particular option be mitigated?

**Question 18:** For a Reliability Market, how should the strike price be determined? If using an indexed strike price, which index should be used?

**Question 19:** For a Reliability Market, what level of physical back up (if any) should be required for reliability contracts and how should it be monitored?

**Question 20:** Do you agree that a vertically integrated market potentially raises issues for the effectiveness of a Reliability Market? If so, how should these issues be addressed?

**Question 21:** What could we do to mitigate interactions between a Capacity Market (especially if a Reliability Market) and Feed-in Tariff with Contract for Difference without diluting the effectiveness of either?

**Question 22:** How can a Capacity Market be designed to encourage the cost effective participation of DSR, storage and other non-generation technologies and approaches?

RLtec believes that DSR services are predominantly suited to providing short term balancing services rather than acting as the equivalent to generation i.e. providing energy. Even if the CM does not directly change the arrangements in short term balancing markets run by National Grid (e.g. frequency response and reserve markets), the introduction of a CM could undermine the existing participation in these markets by DSR, for example, by subsidising or encouraging the construction of generation assets which could bid into these markets in addition to a CM, or by preferentially favouring DSR participating in some markets (e.g. STOR) over others (e.g. frequency response). RLtec therefore request extremely careful consideration of the implementation of the CM to avoid damaging existing market arrangements in which DSR compete.

**Question 23:** Do you have any comments on the functional arrangements proposed for managing a Capacity Market?

**Question 24:** Do you think that a trigger should be set for the introduction of a Capacity Market? If so, how do you think the trigger should be established, and how should it be activated?



**Question 25:** What is the most appropriate design of Capacity Market for GB and why?

*Capacity Mechanism Assessment*

**Question 26:** What are your views on the costs and benefits of a Capacity Mechanism to industry and consumers?

**Question 27:** Which Capacity Mechanism should the Government choose for the GB market and why?