

Department for Business, Energy and Industrial Strategy  
Energy Security Team

1 October 2018

Dear BEIS,

Thank you for the opportunity to respond to the call for evidence regarding the Capacity Market and Emissions Performance Standard review.

Regen is an independent, not-for-profit centre of expertise on sustainable energy with 15 years frontline experience of working in the renewable energy sector. As a membership organisation, we form our response from our 200 business, local authority and community energy members that support our mission to transform the energy system. We have extensive experience of guiding the sector through shifts in the energy system over the last decade and influencing change at the heart of government. Our experience is also drawn from our work on innovation projects such as an [energy storage prospectus for Cornwall Council](#) and in-depth advisory work for utility companies and public bodies such as the Welsh Government.

We also manage the Electricity Storage Network and a separate response has been sent on behalf of the Network.

Please find attached Regen's response to the call for evidence.

Yours faithfully,



Merlin Hyman  
Chief Executive, Regen

## Response to the Capacity Market and Emissions Performance Standard Review Call for Evidence

Smart technology, flexibility and renewables have important roles to play in an increasingly decentralised and decarbonised energy system, including playing their part in system balancing and energy security.

The UK Electricity System Operator (ESO), National Grid, has a fundamental responsibility to keep the lights on, balancing the variability of electricity supply and demand. The Capacity Market is one suite of measures and contingencies that the ESO can utilise to maintain supply during a period of system stress. The Capacity Market performs two main functions;

- i) it provides an additional revenue stream/incentive for asset owners to invest in new capacity or keep existing capacity available in order to maintain an acceptable capacity margin within the energy system;
- ii) it provides a contractual arrangement by which the ESO can call upon capacity to be available during a notified stress event.

### Evolving the Capacity Market

As the GB energy system continues to transition towards a low carbon future with an ever increasing role for renewable energy technologies<sup>1</sup>, it is important that measures that ensure security of supply, such as the Capacity Market, adapt and evolve to enable renewable, flexible and smart technologies to participate effectively.

Historically, the energy security strategy of maintaining capacity margins, with sufficient back-up capacity to manage stress events, has relied on having sufficient dispatchable fossil-fuel generation within the energy system. However, as the proportion of fossil fuel generation is reduced in the energy mix it will become increasingly expensive and impractical to rely on outmoded fossil assets to be on standby to maintain capacity margins.

The nature of future stress events is also likely to change. The current approach envisages a stress event with a sufficient lead-time warning (at least 4 hours) to enable large scale generation plant to ramp-up supply. In the future, in a more integrated and decarbonised energy system, stress events could come from a variety of sources with varying lead-time and duration.

Strategies to maintain energy security therefore need to evolve.

- a) **Diversity of supply will be essential.** A lesson from the recent “beast from the east” is that the GB energy system cannot overly rely on any given technology or supply source. Although electricity supply was in fact maintained, a Europe-wide stress event caused by extreme cold weather had the effect of drawing down gas supplies for heating and very nearly caused a critical loss of gas power generation. Likewise, while interconnectors will form an increasing important part of an integrated energy market, diversity within the interconnector fleet will also be important.
- b) **Smarter, more flexible and more responsive technologies will be required.** A better understanding of the nature and circumstance of future stress events will enable the ESO to better plan for and respond to future stress events and to give due value to new technology solutions including electricity storage and demand side response (DSR).

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<sup>1</sup> Renewable technologies accounted for just over 20% of GB electricity generation in Q1 2018, see BEIS Energy Trends, July 2018: <https://www.ofgem.gov.uk/data-portal/electricity-generation-mix-quarter-and-fuel-source-gb>

### **Flexibility should be valued alongside duration**

The de-rating of battery storage technology has placed a significant focus on the duration of energy security solutions. Regen believes that the responsiveness and flexibility of assets needs to be recognised and valued within the Capacity Market. Specifically, the ability of assets to provide bridging capacity to enable larger scale generators to ramp up (and ramp down), and to provide balancing capacity within a stress event to maintain energy supply/demand balancing.

As described above, it's possible that such an event will not be as straightforward as a simple loss of capacity over a 4 hour period. This is a more complex system than the Capacity Market is currently designed to address. The valuation of certain technologies needs to recognise their inherent flexibility and the value that can bring to an event.

In order for the market to respond and provide the appropriate types of capacity needed, there needs to be greater transparency around the visibility and management of a stress event. Better understanding of the modelling and planning of such an event would help the market to understand the level of flexibility that is needed and the Capacity Market should be designed to reflect this.

### **Energy security and technology neutrality**

The Capacity Market has been designed to be technology neutral. While this is sensible from a short term energy security perspective, it has the risk of producing outcomes that run counter to the UK's longer term energy strategy. In particular it risks an outcome where future energy security is reliant on propping up the business case of outmoded and increasingly expensive high carbon technologies. This can already be seen in the support that is still being given to coal, diesel and OCGT gas generation.

The consultation asks how the Capacity Market can better complement the decarbonisation agenda whilst maintaining technology neutrality, but if the Capacity Market is to sufficiently change and open up to renewables and other smart technologies, it must be acknowledged that technology neutrality has its limits. To meet decarbonisation targets, certain types of generation will be taken offline in the next 10 years and it will not be sensible to award long term Capacity Market contracts to such technologies and still maintain security of supply. A plan for phasing these technologies out of the Capacity Market should be in place and we make suggestions for this in our responses below. Under the current system, many existing fossil fuel generation plants have been sustained by the Capacity Market and it has also supported new gas OCGT plants and diesel generators whilst disadvantaging shorter duration electricity storage through the recent changes to de-rating factors<sup>2</sup>.

This review is an excellent opportunity to address these imbalances and allow renewable and smart technology to participate. Our recommendations are set out below and we expand on these in responses to specific questions.

Recommendations:

1. Long term contracts should not be offered to technologies that have do not have a role to play in the future energy system and coal should be removed from the T-4 Capacity Market immediately. (Question 6)
2. Speed of response and flexibility should be valued within the Capacity Market alongside duration. (Question 10)

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<sup>2</sup> See Energy Storage News summary of short-duration storage de-rating in the Capacity Market, Dec 2017: <https://www.energy-storage.news/news/major-blow-for-uk-energy-storage-in-capacity-market-following-de-rating-rul>

3. Transparency and clarity should be given about the co-ordination of dispatching other ancillary services and the Capacity Market during times of system stress. (Question 10)
4. Better modelling of system stress events should be made available. (Question 15)
5. Overhaul the Capacity Market auction/register available on the EMR Delivery Body website. (Question 15)
6. Alternative methods outlined in question 20 should be explored to strengthen the extent to which the Capacity Market supports the decarbonisation agenda. (Question 20)
7. Inclusion of renewables in the Capacity Market must be in the context of an acceleration of renewable energy deployments and widening access to the Capacity Market, rather than the creation of additional barriers. (Question 21)
8. The review should carefully consider, with input from industry, how a secondary market for renewables might function and what rules it should follow. (Question 22)
9. The review should determine how hybrid projects should be defined through close consultation with industry. (Question 23)

### Response to call for evidence questions

*Q5. Has the Capacity Market been successful in supporting investment in capacity (new and existing), both directly and indirectly? If not, please identify any changes that need to be made.*

The Capacity Market has been successful in supporting fossil fuel generation, but less so in supporting smart technologies such as storage and DSR. The consultation cites two large gas CCGT plants that have been supported by the Capacity Market and diesel generation has benefited significantly; the 2016 and 2018 T-4 auction awarded contracts for 1.12GW of diesel generation (data on diesel is not available for 2014 and 2015 auctions, but OCGT and Reciprocating Engines totalled 4.5GW of capacity)<sup>3</sup>. We welcome the introduction of tighter emissions controls through the UK enactment of the Medium Combustion Plant Directive which should limit the ongoing participation of diesel generation in the Capacity Market when it comes into force<sup>4</sup>.

The volume of storage projects bidding into the Capacity Market had increased, but despite a large amount of storage pre-qualifying, the 2018 T-4 auction saw a significant decrease in contracts awarded to storage projects (other than pumped storage) due to the change to the de-rating method. In the case of storage, the Capacity Market has not therefore not been successfully supporting new investment and has actively discouraged it through the changes to de-rating. The downward trend in prices from the last two auctions, combined with the current de-rating methodology, will not provide adequate support for deployment of storage assets.

*Q6. Do the current 1,3- and 15-year agreement lengths support investment in capacity and do they deliver against the objective of cost-effectiveness?*

Long term agreements should be prioritised for technologies that have a role to play in the future energy system. It does not provide security of supply or value to the consumer to give 15 year contracts to generation that is incompatible with decarbonisation targets and therefore likely to be phased out within the lifetime of the contract. For example, gas assets should only be provided long term contracts on the provision that they use Carbon Capture and Storage or are driven by biogas.

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<sup>3</sup> Source: EMR website, Capacity Market Document Library (2018 provisional results only).

<sup>4</sup> Enacted in UK law under the Environmental Permitting (England and Wales) Regulations

**Recommendation: long term contracts should not be offered to technologies that have do not have a role to play in the future energy system and coal should be removed from the T-4 Capacity Market immediately**

*Q10. Do any other changes need to be made to ensure delivery of capacity by the different types of technology?*

Yes. Duration is considered the most significant factor in the present rules, but, as mentioned above, duration is only one of many elements that are needed during what will likely be a complex system stress event requiring rapid response at different times during the event. It is possible that the need for generation will fluctuate during the event; excess generation may occur as more plant comes online and the ability to store said excess or adjust demand should be recognised. As demand again exceeds generation at a later point in the stress event, flexible response will again be of value. Speed of response and flexibility should be given the appropriate credence and may need to be included in de-rating methodologies. Although speed of response is addressed through other markets such as Frequency Response, these markets do not provide the necessary levels of energy security on their own and do not provide the long term contracts needs to secure capital investment for new capacity. It is unclear how these ancillary services will complement each other or will be coordinated during system stress events and greater transparency and clarity should be given

**Recommendation: speed of response and flexibility should be valued within the Capacity Market alongside duration.**

**Recommendation: transparency and clarity should be given about the co-ordination of dispatching other ancillary services and the Capacity Market during times of system stress**

*Q12. Do the de-rating factors correctly recognise the contribution made by different technologies to security of supply? What changes need to be made?*

The de-rating methodology values duration highly, but, as referenced several times in this response, this is not the only factor that should be considered. Speed of response and flexibility have an increasingly important role to play in ensuring security of supply, particularly in stress events that do not follow the simple pattern of a long term drop in capacity. Allowing hybrid CMUs (such as wind generation and storage) to compete in the Capacity Market could be an important enabling factor for renewables and storage business models, but de-rating must be considered carefully in such circumstances and should reflect the high value that combining different technologies can offer.

*Q15. What further changes are needed to better facilitate the participation of new, innovative or smart technologies, including from DSR, in the Capacity Market?*

As laid out in response to question 10, the inherent value of smart technologies such as storage and DSR are in their speed of response and flexibility. It should be recognised by the ESO that a system stress event is unlikely to be a straightforward event that requires a simple, steady increase in capacity. In reality, there will many other factors affecting demand and generation at different points throughout the stress event. Smart technologies will be important components in aiding a flexible response and that value should be reflected to encourage participation in the Capacity Market.

Unfortunately, there is little analysis available on the modelling of system stress events. Modelling should be improved by the ESO to reflect the likely varied nature of future stress events and made publicly available to allow asset owners and developers to better understand the capacity and flexibility needed as they develop new and existing projects. We appreciate that the amount of information released about the response to a system stress event may be limited due to national security considerations, but it should still be possible for some level of information to be available. Additionally, the data available on the Capacity Market needs to be improved – at present it is

difficult to find adequate historic data on Capacity Market auctions for industry to analyse and inform business models.

**Recommendation: better modelling of system stress events should be made available**

**Recommendation: overhaul the Capacity Market auction/register available on the EMR Delivery Body website**

*Q20. How could the Capacity Market better complement the decarbonisation agenda, whilst still ensuring technology neutrality?*

It is recognised that it is not the primary role of the Capacity Market to drive the decarbonisation of the GB energy system, there are other policy levers including carbon price, emissions regulations and subsidy support that are better suited to encourage low carbon investment.

It is important however that the Capacity Market does not work against the UK’s energy transformation by unnecessarily propping up outmoded high carbon technologies or encouraging investment in technology which does not have a long term future in the energy mix. Even from a security perspective it would be folly if future energy security was reliant on technology that will not feature in the future energy mix.

It is disappointing therefore that the Capacity Market continues to encourage investment in diesel and high carbon OCGT generation. Likewise, it would seem illogical to offer long term contracts to CCGT without a requirement to implement carbon capture and storage (CCS).

There are several approaches that could be taken and should be the subject of further investigation as part of the Capacity Market review;

- We agree with the EU proposal in the internal market for electricity regulations proposing a carbon emissions intensity limit<sup>5</sup>, but we would suggest initial maximum limit of 450gCO<sub>2</sub>e/kWh should be enacted to participate in future Capacity Market auctions that reduces over time in line with the UK’s carbon budget;
- The award of long term (15 year) contracts for any fossil fuel technology (including CCGT) should be dependent on the adoption of CCS technology;
- The [Cost of Energy](#) review, conducted for government by Dieter Helm in 2017, suggests that in the event that Carbon Price Support is ineffective, a two stage auction process would be required to meet carbon targets. After the initial auction, conducted as normal, the ESO would assess whether the power supplied in the bids would meet carbon targets and hold further auctions as appropriate until the target is met;
- The US has seen an increase in proposals for a Clean Peak Standard (CPS) with one state enacting it into law earlier this year<sup>6</sup>. A CPS requires that a minimum of power provided at peak times comes from low-carbon sources;
- We welcome the UK enactment of the EU Medium Combustion Plant Directive which should limit further diesel generation in the Capacity Market. If this and other methods to reduce reliance on fossil fuel generation are not successful, then these carbon intensive technologies should be excluded from the Capacity Market;
- We welcome proposals to allow renewable energy technologies to participate in the Capacity Market – see questions 21 and 22.

<sup>5</sup> Proposal for a Regulation of the European Parliament and of the Council on the internal market for electricity COM (2016) 861: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2016:861:FIN>

<sup>6</sup> Law and The Environment: “Massachusetts Passes “Minibus” Clean Energy Bill”. <https://www.lawandenvironment.com/2018/08/01/massachusetts-passes-minibus-clean-energy-bill/>

Further exploration of the methods above should be undertaken as part of the Capacity Market review to improve the alignment of the Capacity Market with the decarbonisation agenda.

**Recommendation: alternative methods outlined in question 20 should be explored to strengthen the extent to which the Capacity Market supports the decarbonisation agenda**

*Q21 Should wind and solar be allowed to participate in the Capacity Market? Why?*

Yes, renewables should be given the opportunity to participate in the Capacity Market. A future Capacity Market needs to reflect the changing influences and requirements of the energy system. Energy security must go hand in hand with flexibility and decarbonisation; many innovative technologies need to work in combination to create the security required. Renewables provide diversity of supply for the Capacity Market to respond effectively at times of system stress.

The potential to allow non-dispatchable renewable generation such as solar and wind to participate in the Capacity Market, provided they are not in receipt of subsidies, has been under discussion for some time. This move would follow the lead taken in other capacity markets in the EU and beyond and would be consistent with the European Commission’s Capacity Market State Aid clearance.

The devil is in the detail however and there are a number of points for further consideration including;

- The methodology to de-rate variable generation technologies and how that methodology may need to change over time, as renewable energy market share grows, to ensure security of supply;
- How renewable energy generators may be encouraged to enter the Capacity Market as part of “hybrid projects” including, for example, use of storage to deliver security of supply;
- Conversely, how the penalties imposed for non-supply may need to be made more robust in order to further encourage non-dispatchable renewable generators to look at hybrid models and secondary trading strategies. It is unclear how secondary trading might work for variable renewable generation, but potentially this could open a further market opportunity for storage providers, DSR and aggregators.

There is therefore a risk that while post-subsidy renewable energy generators may be allowed to participate in the Capacity Market, they may be effectively prevented by unfair de-rating factor incentives and/or non-supply penalties, to provide their own back-up/flexibility strategy through storage or secondary trading.

**Recommendation: inclusion of renewables in the Capacity Market must be in the context of an acceleration of renewable energy deployments and widening access to the Capacity Market, rather than the creation of additional barriers**

*Q22. What factors need to be considered to enable renewables to participate in the Capacity Market whilst ensuring security of supply?*

The intermittent nature of renewable energy can be offset by working closely with other renewable generation sites and storage. The Capacity Market needs to encourage and value these combinations to ensure renewables are able to participate effectively and we welcome the proposal for hybrid sites.

Secondary trading could provide the back-up required to allow renewables to provide secure supply in the Capacity Market, but it is unclear how the market for secondary trading would function and there are many questions which need to be addressed to create a secondary market that provides adequate back-up and security at a reasonable cost.

**Recommendation: the review should carefully consider, with input from industry, how a secondary market for renewables might function and what rules it should follow**

*Q23. What factors need to be considered to enable the participation of hybrid projects in the Capacity Market?*

Hybrid projects (for example combining storage and/or DSR with generation) are likely to become an important way of ensuring security of supply and will encourage the participation of smart technologies. The definition of hybrid projects will need to be set out clearly and should be done in close consultation with industry. Specific questions that need to be addressed include how capacity in a hybrid unit would be valued and de-rated. De-rating each unit separately may not take into account the value of the capacity when it is combined, for example.

**Recommendation: the review should determine how hybrid projects should be defined through close consultation with industry**

*Q28. What other factors need to be considered to ensure that interconnectors and domestic capacity providers compete on a level playing field? Please provide ideas on how any issues you have identified can be addressed.*

Interconnectors are an important source of energy for the UK and Europe and have many benefits to the energy system including a market for surplus generation, reduction of price volatility and greater energy security. Interconnectors therefore have a vital role in the Capacity Market, but consideration should be given to the advantages they receive over other technologies and that they are a factor in reducing the Capacity Market auction price down to a cost that will be untenable for renewable and storage assets.

Interconnector capacity needs to increase to allow the effective trade in energy between the GB and EU. Regen estimates that 12-14 GW will be needed by 2030. Overreliance on interconnection could however be a risk during extreme EU wide stress events.

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