

1 October 2018

## **Capacity Market and Emissions Performance Standard Review: call for evidence**

We welcome the opportunity to respond to the Department for Business, Energy and Industrial Strategy's (BEIS) Call for Evidence (CfE) on the Capacity Market and Emissions Performance Standard Review.

National Grid Electricity System Operator (NGESO) becomes a legally separate entity on 1 April 2019. As the ESO we use our unique perspective and independent position to facilitate market based solutions which deliver value for consumers. The ESO fulfils the role of EMR Delivery Body for the Capacity Market (CM) and is responsible for pre-qualifying auction participants, running the capacity auctions and issuing and monitoring agreements, and for issuing CM notices. It is also responsible for proving security of supply analysis and for setting de-rating factors for most technology types. Our response to this call for evidence provides the views of the ESO and is not confidential.

The ESO believes that the CM has met its core objective to ensure security of supply during times of winter peak demand at the lowest cost to consumers and agree that there is a need for the continuation of the CM. However, we also observe that the CM has undergone significant change since 2014 and is now operating in a very different context. The CM's framework has not evolved at the same pace and cannot adequately support the efficient and effective delivery of the CM, in its current guise. We consider that the Five Year Review provides a valuable opportunity to consider whether changes to the CM might be required either now or in the future to ensure that it remains fit for purpose. The key areas that we have identified are: the interplay between security of supply and system operability requirements; the participation of renewables; interconnector participation; and improvements to the CM's existing framework and governance arrangements.

### Security of supply and system operability

The intermittent nature of solar and wind generation drives the need for appropriate incentives for investment and continued operation of capacity which is available to generate when the wind does not blow or the sun does not shine. In an energy only market the income for this capacity is highly uncertain. The continuation of the CM can help provide the income certainty required to promote sufficient investment in capacity to ensure security of supply.

We believe that BEIS should reflect on how the security of supply challenge differs now (and in the future) compared with 2014 and whether in future it will be sufficient to focus solely on winter peak or whether wider system operability challenges, which present throughout the year and not only in the winter peak, should be considered. For example, security of supply during the Summer is now more challenging as demand profiles change considerably depending on the levels of renewable generation, and this increased variability creates challenges when managing system operability. A focus on lowest cost security of supply at winter peak may not result in lowest cost to consumers for year round security of supply.

### Participation of renewables

When considering unintended consequences (Objective 3), we believe that it is important to think about the types of plant participating in the CM and how this aligns to, and complements, the decarbonisation agenda. We agree that provision should be made for the participation of renewables, not in receipt of a low carbon subsidy, in the CM. Additionally, we emphasise the importance of ensuring that the de-rating factors for each technology type reflect the contribution to security of supply of that technology at winter peak. With the inclusion of renewables, the growth of interconnectors and the growth in Distributed Energy Resources this becomes challenging. As the EMR Delivery Body we have a central role, with support from the PTE, in developing the methodologies for derating factors and we are committed to sharing our methodologies and results of the modelling with stakeholders in a transparent manner.

### Interconnector participation

Interconnectors play an important role in delivering security of supply and consumer value. However, it is important that interconnectors' contribution to security of supply (and that of each technology type) is appropriately calculated to maintain the technology neutral principle of the CM. Currently both historic flows and forward looking models are used in the calculation of interconnector de-rating factors. It is our view that the role of historical data in setting final de-rating factors should be a supporting one because with significantly more interconnection and rapidly changing generation mixes in European markets such data may provide a less reliable guide to what might happen in the future.

There is ongoing debate and a range of views in the industry regarding the participation of interconnectors in the CM, with a number of GB transmission connected generators in particular questioning whether they are competing on equal terms. We believe that the underlying issues are complex and that further debate and analysis is required. As the ESO, we can plan an important part in this process.

### Improvements to governance arrangements

The CM has undergone significant change on a yearly basis since 2014. These changes have removed barriers for new technologies and furthered the overall purpose of the scheme. However, it has been impossible to evolve the CM's framework and the IT systems which support the process at the same pace. As a result, these cannot adequately support efficient and effective delivery of the CM now and in the future if the current incremental approach to change is continued. We believe that significant changes to the framework and IT systems are required to deliver an efficient CM process and that these changes need to be underpinned by appropriate funding arrangements; this could be achieved by way of the uncertainty mechanism for EMR.

We also stress the potential to make certain tactical improvements to lessen the burden of pre-qualification on the Delivery Body and participants. The current process is complicated and incremental change has served to make it even more so. The complexity of the rules and regulations is highlighted by the fact that the latest CM pre-qualification guidance document (v13.0 September 2018) has 242 pages and suggests that there is significant effort required to participate in the CM which may create unnecessary barriers to entry. We believe that the Five Year Review is an opportunity to consolidate some of the piecemeal changes made to date and to rationalise the information that is required for pre-qualification. In our role as Delivery Body, we want to ensure that all data is required and collected from customers at the appropriate time (i.e. not all information is submitted during the six-week pre-qualification window). Further, we consider that the complexity of the current CM Rules in part reflects concerns of non-delivery from CM participants and thus suggest that simplification of the rules, coupled with a stronger penalty regime could mitigate this risk more efficiently and effectively.

We believe there are efficiencies to be gained around CM governance arrangements, notably in the administration of the CM Rules Change process. As such, we see that there is potential merit in having a panel that appropriately takes in to account stakeholder views and co-ordinates and prioritises issues associated with the future development and implementation of CM Rules Changes. The panel would be representative of diverse organisations across industry.

We welcome the opportunity to further discuss the points raised within this response. Should you require any further information or would like clarity on any of the points outlined in this paper then please contact Julian Ross in the first instance at [julian.ross@nationalgrid.com](mailto:julian.ross@nationalgrid.com).

Yours sincerely

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## Appendix 1

### **Q1. Do you believe there is a need to maintain the Capacity Market? What conditions would be necessary for the Capacity Market to be withdrawn?**

We agree that there is a need to maintain the Capacity Market (CM). We believe that maintaining the CM through the next few years, as we start to see an increase in the closure of large generating plants, is the best way to continue delivering security of supply at the lowest cost to consumers. We consider that sustained low clearing prices in the auctions is a good indication that it may be timely to withdraw the CM but have yet to evidence this. Therefore, at this time maintaining the CM remains a sensible approach.

### **Q2. Do you believe the current objectives of the Capacity Market remain appropriate?**

Yes, we feel that the current objectives of the CM are appropriate. Delivering security of supply at the most efficient cost to consumers remains a critical objective as ultimately all market arrangements should, in our view, be designed and developed to optimise consumer benefits. Similarly, avoiding unintended consequences also remains an important objective for all market arrangements as these can result in inefficiencies or ultimately distortions. However, we also consider that the Five Year Review provides a valuable opportunity to consider whether changes to the CM might be required either now or in the future to ensure that it remains fit for purpose. We believe that BEIS should reflect on how the security of supply challenge differs now (and in the future) compared with 2014 and whether in the future it will be sufficient to focus solely on winter peak or whether wider system operability challenges, which present throughout the year and not only in the winter peak, should be considered. For example, security of supply during the Summer is now more challenging as demand profiles change considerably depending on the levels of renewable generation, and this increased variability creates challenges when managing system operability. A focus on lowest cost of security of supply at winter peak may not result in lowest cost to consumers for year round security of supply.

### **Q3. Do you think arrangements outlined in section 3.1 are adequate to ensure efficient capacity is secured through the auctions to deliver security of supply?**

We are content that the reliability standard and the target setting process remain adequate to ensure security of supply.

### **Q4. What are your views on the split between T-4 and T-1 auctions and the amount of set aside?**

The Secretary of State originally set aside 2.5GW for the first and second T-1 auctions, with the intention that DSR (based on industry feedback) was better placed to enter the T-1 auction than the T-4 auction. However, the market has since evolved and DSR now actively participates in the T-4 auction, which means this principle is no longer a driver and, when coupled with a desire to “buy more capacity early”, the amount set aside consequently fell to around 0.5GW. Given that liquidity is so far good for the T-4 auction (as shown in Table 3) this limits any cost increases while also increasing the liquidity in the T-1 auction, thus in theory reducing the cost of the auction. The main driver now for T-1 auctions is to adjust for any market, capacity or demand changes since the T-4 auction, thereby ensuring the correct amount of capacity is secured.

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

The T-4 CM auction for 2021/22 saw a small amount of new build capacity, while existing generation won 92% of the capacity. The acceptance of lower prices by existing gas CCGTs and nuclear generation contributed to a low clearing price and this may prove challenging for those looking to invest in new build generation, given their potentially low running hours. New Build Generating Capacity Market Units (CMUs) made up the largest group of capacity to exit the auction by classification. However, 84% of the new build capacity that was successful was awarded long-term contracts, which are likely to provide some level of certainty.

Many of the applicants awarded a Capacity Agreement in the T-4 auction for 2021/22 also hold contracts, or are participating in tenders, for ESO balancing services. Amongst demand side participants, revenue stacking (i.e. seeking revenue from participation in multiple markets/services) is commonly seen as necessary to create a sustainable business case. While the CM has been successful in bringing forward smaller scale generation, ultimately its success in this area will be unclear until the first delivery year and any apparent barriers to new investment for all players, irrespective of capacity and size, will need to be addressed.

**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?**

We understand that no large capex project has been brought forward by a 15 year agreement. Moreover, some customers have expressed an opinion that 15 year agreements are too long and 10 year agreements may instead suffice for some parties, particularly if the price is low.

**Q7. Should penalties be adjusted to strengthen incentives for delivery during stress events? If so, how should penalties be adjusted? Please provide a view on the methodology and factors to consider when settling penalties?**

The current system for penalties displays an unfair bias in favour of larger Capacity Providers (CPs). We believe that the CM would benefit from a robust system for issuing penalties, with a focus on raising charges to encourage CP adherence to the rules and timescales. The current penalty charges fail to act as an adequate deterrent, with many CPs increasingly displaying an appetite for risk due to the low penalties. However, it is important to ensure that penalties are not too penal and therefore become a barrier to entry. Currently, GB has the least penal CM in the world and this could potentially impact security of supply as CPs may decide to take more risk and be less likely to respond during a stress event. Furthermore, previous analysis suggests that some applicants may increase connection entry capacity (CEC) to increase their connection agreement. CMUs may also fail to respond to a Capacity Market Notice as there is little disincentive.

There is also the question of secondary trading which is less likely to receive a liquid market if penalty charges continue at the current rate. The risk of CM stress events has been reduced by secondary trading and volume reallocation (and to a lesser degree DSR component reallocation). To further reduce the risk by creating penalties so low an applicant can never lose money by entering the CM and for that to happen a CMU would have to produce nothing during 24 separate stress events over numerous months (a very unlikely scenario). A progressive penalty charging mechanism may need to be explored if the aim is to reduce the gap in terms of fairness between large and small CMUs. Linking penalties with Value of Lost Load (VoLL) is one option but this may be excessively penal and increase barriers to entry to the extent that CM clearing prices are not delivering best value for the consumer.

We believe that retaining the link between penalties and clearing price (as is current practice) is a sensible and straightforward approach, should penalties be increased in future. There is the potential that if a CMU provided no capacity during a stress event there would be harsher penalties than for a CMU that responded but did not reach its full de-rated value. An alternative option would be to penalise more heavily against the percentage of stress events missed. If a CMU missed 100% of stress events they would fail to provide the function for which the capacity was procured. Equally if a CMU missed 10% of stress events they should receive less penalties. To fully ensure that higher penalties work successfully there needs to be some work done on making secondary trading clearer within the CM rules, noting that additional resource to the Delivery Body will be required to help facilitate this.

**Q8. Do the current arrangements relating to credit cover and delivery milestones provide sufficient incentives / assurance that capacity will be delivered, with particular reference to DSR?**

Credit cover for new build CMUs is returned long before they are built, meaning their incentive for delivery is to avoid termination fees. It is likely that milestones for new builds provide information on how the site is progressing but this does not provide any incentive to actually deliver.

Credit cover remains an incentive for delivery for DSR units. Unless they meet 90% of their de-rated capacity they lose all their credit cover (and proportionally between 90-100%). This is the only example in Rules and Regulations where a capacity agreement stays in place whilst the credit cover is drawn down. In spite of this, for every Delivery Year to date (both Transitional and Early Auctions) there has been DSR capacity that was awarded an agreement which has then not become proved. Year on year the percentage of pre-qualified capacity which has then become proven has increased; this implies that capacity providers are getting used to the unique CM proving technique.

One possible way to increase DSR providers ability to deliver (not just in EMR but also across the wider energy industry) is to create a register of DSR components. This would align the DSR components across all service types and allow them the opportunity to formalise the information needed. We foresee the best way to run this register would be under an industry framework that would allow the CM to use data from the register and other services.

**Q9. Do the termination events and fees need to be adjusted to create the right incentives for delivery? If so, how? Please provide a view on the methodology and factors to be considered.**

When first written the CM Rules allowed for a number of termination events to occur without termination fees. With these 'loopholes' closed it means that once an applicant commits to an agreement there is no way of delivering without incurring a financial penalty. As these loopholes were closed after the first delivery year it may be advisable to first observe how capacity delivers in forthcoming delivery years before reaching a decision based on limited data, which may subsequently prove to be incorrect.

**Q.10 Do any other changes need to be made to ensure delivery of capacity by the different types of technology?**

Similar to question 9, we suggest that it may be premature to determine precisely how effective the termination events and fees have been in ensuring delivery of capacity. Equally, the differences between technology types may be less of an issue if penalty fees were higher. Higher penalty fees would mean applicants build an increased level of contingency in to their applications and this would deter speculative applications which are unlikely to deliver capacity. Both factors result in increased delivery of capacity for technology types as a whole.

**Q.11 To what extent does the Capacity Market design ensure capacity resources are used in the most effective manner during stress events? Do you have any ideas on how it can further be improved?**

We believe that conventional plant will be utilised appropriately within the CM to ensure stress events are minimised. However, the CfE document articulates well the issues around the effective operation of limited duration technologies like storage. The main area of concern we have relates to the potentially sub-optimal operation of the limited duration technologies which, in the case of storage, could lead to storage operators discharging outside a stress event and, therefore, prolonging the stress event beyond the time it would have lasted if the storage fleet's discharge had been co-ordinated.

When the de-rating factors for limited duration storage were calculated earlier this year we considered several alternative operational patterns (4 in total) for storage which gave four different de-rating factors, depending on how much storage delivered during a stress event. Of these alternatives, the optimal operation was chosen thus giving the highest de-rating factors for storage. Consequently, if storage is operated sub-optimally then the consumer is not receiving the level of capacity it paid for and thus value for money. A co-ordinated approach (i.e. in line with that assumed when setting the de-rating factor) would deliver the best value for the consumer. The approach to implementation of any such co-ordination process will require further thought on how best to make the stress event visible to storage operators to ensure they discharge in line with that assumed when setting their de-rating factor. This would not mean removing the storage operator's commercial decision to discharge or not and/or their exposure to penalties, instead it would mean that they are given a clear signal as to when a stress event would likely occur, for instance, via a new notice like a Capacity Market Notice or Demand Reduction Instruction. This would, as much as possible, ensure that they are discharged in a co-ordinated manner to best mitigate the stress event, give greater visibility to the storage operators of a stress event and give consumers value for money. Should such a notice be implemented, then further thought would be required in relation to the CM penalty regime and how this could be linked to the notice from the ESO as well as what was delivered rather than simply what was delivered in a stress event.

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

While the current approach to calculating de-rating factors has worked well, in the future, as the generation mix changes, a more appropriate approach to calculating de-rating factors for distribution network connected generation is required. The current approach utilises the closest transmission network connected generation technology de-rating factors mainly due to the lack of equivalent data for distribution connected generation. However, with the procurement of historical output data per distribution connected site we should be able to create the equivalent availability based de-rating factors. This is particularly important as the market changes because small scale generation will most likely behave more flexibly than larger scale plant and will, therefore, have a different operational pattern and potentially different contribution to security of supply, and thus appropriate de-rating factors are required to ensure value of money for consumers. During this process, the ESO will engage with the Panel of Technical Experts (PTE) to ensure our analysis is robust and fit for purpose ahead of any industry consultation and submission to Ofgem's rules consultation.

We also believe that it is necessary to change the implementation of de-rating factors and the level of capacity they are applied to. As the CfE points out, Ofgem have already reviewed this but were unable to reach a conclusion. De-rating factors for stations are currently modelled against the Transmission Exit Capacity (TEC) which is also the level of

capacity on which transmission charges are based. However, CMUs are often quoted as sub sets of the station which when aggregated up are at a level greater than their TEC. This discrepancy for the T-4 auction can be corrected for in the T-1 auction but it is not fully rectified, as any successful station in the T-1 auction can overstate their capacity and consequently consumers are not receiving the level of security of supply they are paying for. To ensure consumers receive value for money aggregated CMUs by station should not be able to exceed their TEC.

Regarding limited duration technology de-rating factors, we agree that they should be based on the Equivalent Firm Capacity method to ensure their contribution is correctly modelled. Hence, we are supportive that the 5-year review considers an approach to verifying the duration of any technologies that could be limited but should also consider the applicability of the performance/penalty and testing regimes for these technologies as their operation will be different to conventional plant.

**Q13. Do you think there are sufficient safeguards in place to reduce the risk of over-procurement? If not, what changes could be made to further reduce the risk of over-procurement?**

Yes, as the modelling process that generates the recommended level of capacity to secure through the auction is closely scrutinised by BEIS, Ofgem and the PTE, and delivers value to the consumer. Evidence to support this view is that the market is delivering more capacity than is secured through the auction (as seen in 17/18 and 18/19) as stations without CM agreements are staying open because they believe there is value in the wholesale market.

**Q14. Do you believe that the auctions have been sufficiently liquid to date and to ensure strong competition? If not, how could we improve liquidity and competition?**

As shown in Table 3 in the CfE document, the level of capacity that has pre-qualified has been well in excess of the target capacity and this has likely contributed to the low clearing prices. However, care needs to be taken within this assessment as to the number of participating companies which could potentially limit the perceived liquidity. To date there has been only one auction - the 2017/18 Early Auction - with lower liquidity due in part to only very limited new capacity participating, but nonetheless the auction cleared at a low price. In future, as coal plant close and nuclear plant approach their planned closure dates, liquidity should begin to reduce and clearing prices will, in theory, start to rise which should bring forward the additional new capacity or DSR required to replace this closing capacity.

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

New technologies have a higher unit cost of energy than traditional technologies because they are less proven and do not benefit from economies of scale in production; this means that stacking services with CM contracts is seen as essential for non-traditional technologies. However, the requirement to provide bulk energy for a long duration across a CM Event means that a lot of non-traditional technologies (e.g. batteries) are de-rated or cannot participate at all (e.g. intermittent). This is because new innovative technologies generally involve using energy more intelligently and flexibly, rather than creating a lot of energy to be used. To bring more new flexible technologies into the CM, the requirements they would have to meet in a CM Event would have to be relaxed, or an additional reduced duration CM product would have to be introduced, both of which could dilute the intent of the CM itself.

In terms of process, the simplification of DSR pre-qualification would assist with lowering barriers to smaller, non-traditional parties. This would result in an administrative cost reduction up front, but this would have to be balanced against potential lower quality service. Other areas of administration that could be simplified include contract terms, as there is insufficient flexibility in contract terms for non-traditional technologies and business models, and streamlining the application process based on customer experience (e.g. drawing on best practice model such as the HMRC tax return system). A further option would be to consider what other technical characteristics it is worth including as necessary in a stress event above and beyond simple MW capacity, and whether it is economic and efficient to procure these through the CM. One example would be 'grid synchronicity', i.e. a combination of inertia and instantaneous reactive capability, the provision of which would reduce the severity and duration of a stress event.

**Q16. How could we go about allowing augmentation of batteries?**

We understand that the augmentation of batteries, i.e. the inclusion of additional cells and the extension of battery capacity, might in some circumstances be an efficient investment in technology but there remain some concerns that the existing arrangements to allow for CM participation might be considered onerous. We feel, however, that for optimal consumer outcomes (and avoidance of the risk of non-delivery) the augmented battery would need to participate in an

additional auction and would require a separate CMU and potentially separate metering arrangements. Complex allocation rules to allow for CM settlement might be developed without metering arrangements but, when applied to multiple parties, this would introduce complexity and further risk that delivery cannot be robustly met. Our response to question 24 should also be considered in this context.

**Q17. Please provide any other ideas on how to improve cost effectiveness of the Capacity Market?**

The CM has undergone significant change on a yearly basis since 2014. These changes have removed barriers for new technologies and furthered the overall objectives of the scheme. However, it has been impossible to evolve the CM's framework and the IT systems which support the process at the same pace. As a result, these cannot adequately support efficient and effective delivery of the CM now and in the future if the current incremental approach to change is continued. We believe that significant changes to the framework and IT systems are required to deliver an efficient CM process and that these changes need to be underpinned by appropriate funding arrangements.

The current pre-qualification process is complicated and incremental change has served to make the process even more so. The complexity of the rules and regulations is highlighted by the fact that the latest CM pre-qualification guidance document (September 2018) has 242 pages and suggests that there is significant effort required to participate in the CM which may create unnecessary barriers to entry. We believe that this review provides an opportunity to consolidate some of the piecemeal changes made to date and to rationalise the administration process and information that is required for pre-qualification. For example, ensuring that all data is required and collected from customers at the appropriate time rather than all information being submitted during the six-week pre-qualification window as is current practice. Simplification of the CM Rules to ease the burden on participants is also one of the priority areas in Ofgem's open letter on the Five Year Review, which we support. Further, we consider that the complexity of the current CM Rules in part reflects concerns of non-delivery from CM participants and thus suggest that simplification of the rules, coupled with a stronger penalty regime could mitigate the risk more efficiently and effectively.

**Q18. What are the main distortions in competition that need to be addressed to ensure a level playing field in the CM auctions?**

The fast-changing energy landscape has resulted in several distortions in the CM. While efforts have been made to update the CM Rules accordingly to ensure that the CM remains a level playing field for all participants, this has had the effect of creating unintentional distortions. Addressing a small number of distortions in isolation risks creating smaller, less visible distortions. For example, the distinct rules for DSR and interconnectors create distortions with the CM. Yet if DSRs and interconnectors were to be treated in accordance with the same rules then the fundamental differences between the two technology types would be unaccounted for. Thus, there is a need to accept that market distortions will occur where different technology types are moulded to fit disparate functions.

**Q19. Are there distortions in the interaction of the various markets (wholesale, ancillary, CM) or their charging arrangements which impact the effectiveness of the CM?**

Aside from the entry of over 2GW of new build interconnectors into the CM auction, one of the drivers for a low auction clearing price was the introduction of a large volume of reciprocating engines. Although reciprocating engines are highly flexible (and more flexible than coal plant) they have relatively high marginal costs. Having such a low clearing price in the last CM auction puts projects of this kind at risk, particularly as income from Embedded Benefits (Triad payments) is reducing and the economics of building embedded generation projects becomes more challenging as a consequence. The T-4 Capacity Market Auction for 2021/22 saw a small amount of new build capacity; existing generation won ~92% of the capacity. The acceptance of lower prices by existing gas CCGTs and nuclear generation contributed to the low clearing price; this may prove challenging for those looking to invest in new building generation, given their potentially low running hours. Further, we note that work we are undertaking to increase competition and reduce the costs of provision of ancillary services will make the economics of new projects even more challenging with an increase in competition but this is down to market interactions rather than distortions.

Many of the Applicants to be awarded a Capacity Agreement in the T-4 Auction for 2021/22 also hold contracts for, or are participating in tenders for, ESO Balancing Services. Amongst demand side participants, revenue stacking - seeking revenue from the participation in multiple markets/services - is commonly seen as necessary to create a sustainable business case.

**Q.20 How could the Capacity Market better complement the decarbonisation agenda, whilst still ensuring technology neutrality?**

When considering unintended consequences (objective 3), we believe it is important to think about the types of plant participating in the CM and how this aligns to and complements the decarbonisation agenda. We agree that provision should be made for the participation of renewables, not in receipt of a low carbon subsidy, in the CM. Additionally, we acknowledge the importance of ensuring that the de-rating factors for each technology type reflect the contribution to security of supply of that technology at winter peak. With the inclusion of renewables, the growth of interconnectors and the growth in DSR this becomes especially challenging. As the EMR Delivery Body we have a central role, with support from the PTE, in developing the methodologies for de-rating factors and we are committed to sharing our methodologies and results of the modelling with stakeholders in a transparent manner.

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

Yes, we believe that wind and solar should participate in the CM to ensure a diverse energy mix, but note that it would be necessary to develop de-rating methodologies and modelling to establish de-rating factors (likely to be very low; refer to question 24) and appropriate performance measures for these specific plant types.

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

The EMR Delivery Body supports the idea of enabling renewables to participate in the CM although there are practical limitations that need to be considered. These are unlikely to cause any significant problems if clear rules are established in advance and the correct resource is made available. The main factor that needs to be considered in relation to the participation of renewables is the de-rating of wind and solar technologies and appropriate performance measures (please refer to questions 20 and 21).

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

In our role as EMR Delivery Body we appreciate the advantages of including hybrid projects, both for applicants and operability of the system. However, the practical implications of such a change would require careful consideration before new technologies are welcomed into the CM. The question of how to de-rate hybrid technologies poses an obvious challenge as it would be necessary for technologies to be defined prior to the publication of the Electricity Capacity Report (ECR), thereby allowing proper modelling of the technology types in joint use. Moreover, robust metering and metering assessment would also need to be in place to accurately establish the source of the capacity to ensure capacity payments are going to generators with correct agreements.

**Q24. What factors need to be considered when developing the de-rating methodology for wind and solar? What approach could be taken to de-rating hybrid CMUs?**

By their very nature wind and solar technologies are intermittent and are not always in control of their output and consequently their contribution to security of supply needs to be modelled differently to that of conventional plant. An internationally recognised approach to modelling intermittent generation involves the contribution to security of supply being based on an Equivalent Firm Capacity (EFC). An EFC is defined, for a given penetration of that resource, as what is the amount of perfectly reliable firm capacity it can displace while maintaining the exact same risk level (as defined by a suitable statistical metric e.g. LOLE). This approach has recently been utilised in the development of de-rating factors for limited duration storage and to utilise it again for wind and solar ensures consistency of application, technology neutrality and cost effectiveness.

To deliver EFC based de-rating factors a time sequential model will be required to model the impact on security of supply not only of the average of the wind or solar fleet but also the contribution of the next MW of wind or solar. It is this incremental MW that should be used to calculate de-rating factors for wind and solar in any subsequent auctions. However, care will need to be taken to check for any potential interaction between wind, solar and storage effecting de-rating factors. In addition, further thought needs to be given to how these technologies will be expected to perform under a stress event to ensure a level playing field with conventional plant.

Hybrid CMUs could provide an important contribution to security of supply in future and consequently will need their own de-rating factors. There are potentially a myriad of different combinations involving wind, solar and batteries plus their network connection contracts and associated network integrity constraints which would mean no single de-rating factor fits all. Though impractical to calculate de-rating factors for individual sites, it would be possible to develop a small



number of hybrid categories which sites could then prequalify against. The workload to deliver these hybrid categories would be large and would need to be planned for well in advance of any implementation.

**Q25. For co-located projects, do you think that all components of the site (both the CM eligible and non-CM eligible) will be able to provide their full capacity during the system stress event due to local distribution or transmission network constraints?**

There are very few hybrid sites currently in existence, meaning these would not necessarily provide a solid guide to future developments. Several DNOs have already stated that for sites where the aggregated capacity of the two technologies is greater than the connection capacity they would only be allowed to export to the level of capacity in the connection agreement to ensure the integrity of the network. Hence, both could not operate at full output unless the connection agreement allowed it, but that withstanding the business case for a hybrid site is to share the use/cost of the equipment to deliver continuous generation when the wind does not blow or the sun does not shine. Consequently, we would anticipate the need to identify which technology is generating to correctly allocate the CM eligible or renewable support output and the relevant payments and/or penalties, whether this is via separate metering or an allocation process to again ensure value for the consumer.

**Q26. What lessons can be learnt from the participation of renewables in other overseas capacity markets?**

Across the world several countries allow renewables to participate in CMs. However, their contribution to security of supply is calculated in different ways. This varies from an EFC approach to historical output at peak demand although the latter is applied generally when wind or solar are only a small proportion of the total generation mix. Another lesson relates to the potential use of penalties to influence the amount of capacity to participate in the CM. This was recently seen in Ireland where only 0.2GW of wind was successful, with most wind (4.5GW) not entering a bid due to concerns over the penalty regime and the impact on other support mechanisms. Hence, to encourage participation of wind and solar in the CM it is vital that an appropriate penalty regime, which is fair both to the developer and the consumer, is designed.

**Q27. Is the current de-rating factor methodology for interconnectors appropriate for assessing their contribution to security of supply? Are there any particular challenges or risks you wish to highlight?**

The method we currently use (as outlined in our Electricity Capacity Report) has been developed over several years, with support from the PTE to ensure it is fit for purpose. Advancements made during this time include: improved European weather data, the procurement and use of a pan-European model and the development of European scenarios in collaboration with TSOs, industry stakeholders and academia.

There are many factors which affect the flow and availability of interconnectors to support security of supply at times of system stress in the UK and across Europe, and this makes modelling such situations extremely complex. The current approach to modelling will need to evolve over time, as new information and techniques become available, while remaining flexible enough to accommodate how the market is changing. We look forward to working with industry to deliver further process enhancements in the future. It is our view that the role of historical data in setting final de-rating factors should be a supporting one because with significantly more interconnection and rapidly changing generation mixes in European markets such data may provide a less reliable guide to what might happen in the future.

**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 play an important role in delivering security of supply at a cost benefit to consumers. However, it is important that interconnectors contribution to security of supply (and that of each technology type) is calculated in a fair way to maintain the technology neutral principle of the CM. The modelling work we undertake endeavours to do this and has been developed over several years with both scrutiny and support from the PTE to ensure it is fit for purpose. This modelling process will continue to evolve over time as more information becomes available.

The factors to be considered in determining whether there is a level playing field for interconnectors to participate are extremely complex because many interactive elements are at play. However, those which might be explored relate to the risk and reward of operation and we understand from our customers that they have some concerns about these matters. For example, consideration of whether risk and reward balance one another out in comparison between the interconnector cap and floor regime versus conventional plant in the wholesale market. Similarly, the proportion and importance of CM revenues to the total revenue of the interconnector and/or conventional plant could be investigated.

There is ongoing debate and a range of views in the industry regarding the participation of interconnectors in the CM, with a number of GB transmission connected generators in particular questioning whether they are competing on equal terms. We believe that the underlying issues are complex and that further debate and analysis is required. As the ESO, we can play an important part in this process.

**Q29. How could we facilitate direct participation of overseas capacity in the future?**

EU regulations mean that overseas capacity must be allowed to enter the GB CM and this is currently achieved by allowing interconnectors to participate. To facilitate the direct participation of overseas assets in the CM it would be necessary for interconnectors to be treated differently to how they are at present. If a distinction is not made then any capacity coming from overseas is at risk of being double counted, as the interconnector may also have a capacity agreement in place.

Allowing direct overseas participation, rather than interconnection participation, may make the auctions more liquid but any savings made from those auctions would likely be negated by the impacts of allowing this participation. For example, the complexity of having two countries with differing market arrangements increases the numbers of rules and regulations, along with the possibility of market distortions, and the general scarcity of capacity could post a risk in terms of prioritisation should two stress events occur simultaneously in two different countries linked by an interconnector. Further, the modelling of multiple markets creates risks associated with increased parameters and the chance to under / over procure capacity, and where the border of the CM ends, as ultimately the interconnectors would be the limiting factors in terms of capacity. Hence, it is important to further consider how this arrangement would work when a CM provider has an agreement in two countries, particularly in the event of simultaneous stress events.

The current model of interconnector participation ensures foreign participation whilst limiting the complexity (outlined above) of allowing direct participation. With an already complex set of rules and regulations, we suggest that any solution must balance the benefits with the possible additional complexity.

**Q30. To what extent do the current institutional arrangements support an effective change process? Please provide suggestions on how issues can be addressed.**

The timelines involved in the current change process introduce a number of operational risks which relate to the development of subsequent changes in EMR systems. Typically, the time periods between CM Rules being laid and the requirement for system changes associated with the new rules going 'live' is very short. To account for this eventuality, much of the system development takes place alongside the consultation process, which is before a final outcome has been confirmed. This approach introduces significant risk since expenditure can be wasted in developing functionality that is subsequently not required or needs to be amended. It is also difficult to accommodate large scale system changes as the limited time scales are not conducive to major development work.

To address this problem, we recommend that the timing for implementation of rules and regulation changes is adjusted. Sufficient time is required to develop the system before the relevant functionality is required and system development can then commence after the final rules and/or regulations have been laid. For example, we propose that where rule changes are published in the month of June and an update of the EMR portal for pre-qualification is required then the rule change should only come in to effect for the pre-qualification period in the following year. We appreciate that there are some circumstances where system changes will be required within a shorter timescale and therefore suggest that a mechanism for handling urgent changes is introduced. Further, there should be very strict criteria to determine whether a change is categorised as urgent. We suggest that only changes relating to significant inconsistencies in the rules or regulations, that could result in a major deviation from the policy intent of the CM scheme, should be considered as an urgent change. For example, a change to remove a barrier to entry that otherwise prevents participation. A shorter implementation timeline can be agreed for changes deemed to be urgent, potentially before the start of the pre-qualification period in the same year. However, it would be important for firm rule or regulation drafting to be received before development begins to reduce the potential risk of financial waste linked to developments which subsequently require revision.

We also believe there are efficiencies to be gained around CM governance arrangements. As such, we see that there is potential merit in having a panel that appropriately takes in to account stakeholder views and co-ordinates and prioritises issues associated with the future development and implementation of CM Rules Changes. The panel would be representative of diverse organisations across industry.

**Q31. To what extent do the defined and allocated roles and responsibilities support effective administration and delivery of the annual processes related to pre-qualification, delivery and payments? Please provide suggestions on how issues can be addressed.**

The CM works well in its current form for several reasons. For example, the effective relationships between Delivery Partners as the outcome of open and honest communication and collaboration. We also believe that running the majority of key processes under one organisation has helped to reduce the duplication of work and minimise time lost, which has ultimately contributed to a smooth transition between processes.

Although the CM works well at present, rule changes and their impact on the CM timeline has proved to be challenging from the perspective of both the EMR Delivery Body and the Applicant/Provider. From first-hand experience, the Delivery Body has observed that the inclusion of additional stages in a process, as a direct result of rules changes, leads to an unwelcomed interruption in the ordinarily linear CM timeline. Data inefficiencies between Delivery Partners is another area for potential improvement, in particular the manner in which data is shared and stored.

**Q32. Please provide any suggestions you have for improving the management of fraud and error risk.**

We suggest that a robust way to address the risk of fraud and error in the CM would be to review the operational process that applicants and participants are required to follow, with a view to building fraud and error checks in at the appropriate stages. A review of this type is already underway with the Fraud and Error Working Group, and several risk areas have been identified. These include, the level of cross-checking undertaken to ensure that applicants are not in receipt of low carbon subsidies and additional checks on the financial sources when credit cover is received in cash. It would also be beneficial to formalise Delivery Partner roles and responsibilities in relation to the management of fraud and error, thereby enabling information to be shared more readily between Delivery Partners, and to adequately resource and structure those organisations responsible for monitoring fraud and error risk.

**Q33. Are there any lessons from overseas capacity mechanisms that could be useful in improving the GB Capacity Market?**

No two capacity mechanisms are the same as is evident in the variances that currently exist between overseas CMs. The primary differences between CMs are linked to different energy market models, ownership of the TSO and a reliance on overseas capacity resources to ensure security of supply. The initial design for GB's CM was based upon international benchmarking in 2013, with particular reference to the PJM model. In 2017, the EMR data handling modelling team undertook an international review of capacity margins and security of supply standards. Based on analysis of over 20 power systems, the study concluded (at that time) that no changes should be made to security of supply as a response to the review findings.

**Emissions Performance Standard Review**

**Q34. To what extent has the EPS been achieving its objective? Please provide evidence to support your views?**

**Q35. Is this current objective of the EPS still appropriate? Could it be achieved in a way that imposes less regulation?**

**Q36. Have any issues arisen in the operation of the EPS which should be considered?**

We are supportive of the EPS and its objectives, and believe that it serves to be an effective mechanism to ensure that new fossil fuel-fired electricity generation contributes to security of supply and to ensure that the CM moves to support decarbonisation.