DS3 System Services Consultation – Volume Capped Procurement

This questionnaire has been prepared to facilitate responses to the consultation. Respondents are not restricted to this template and can provide supplementary material if desired.

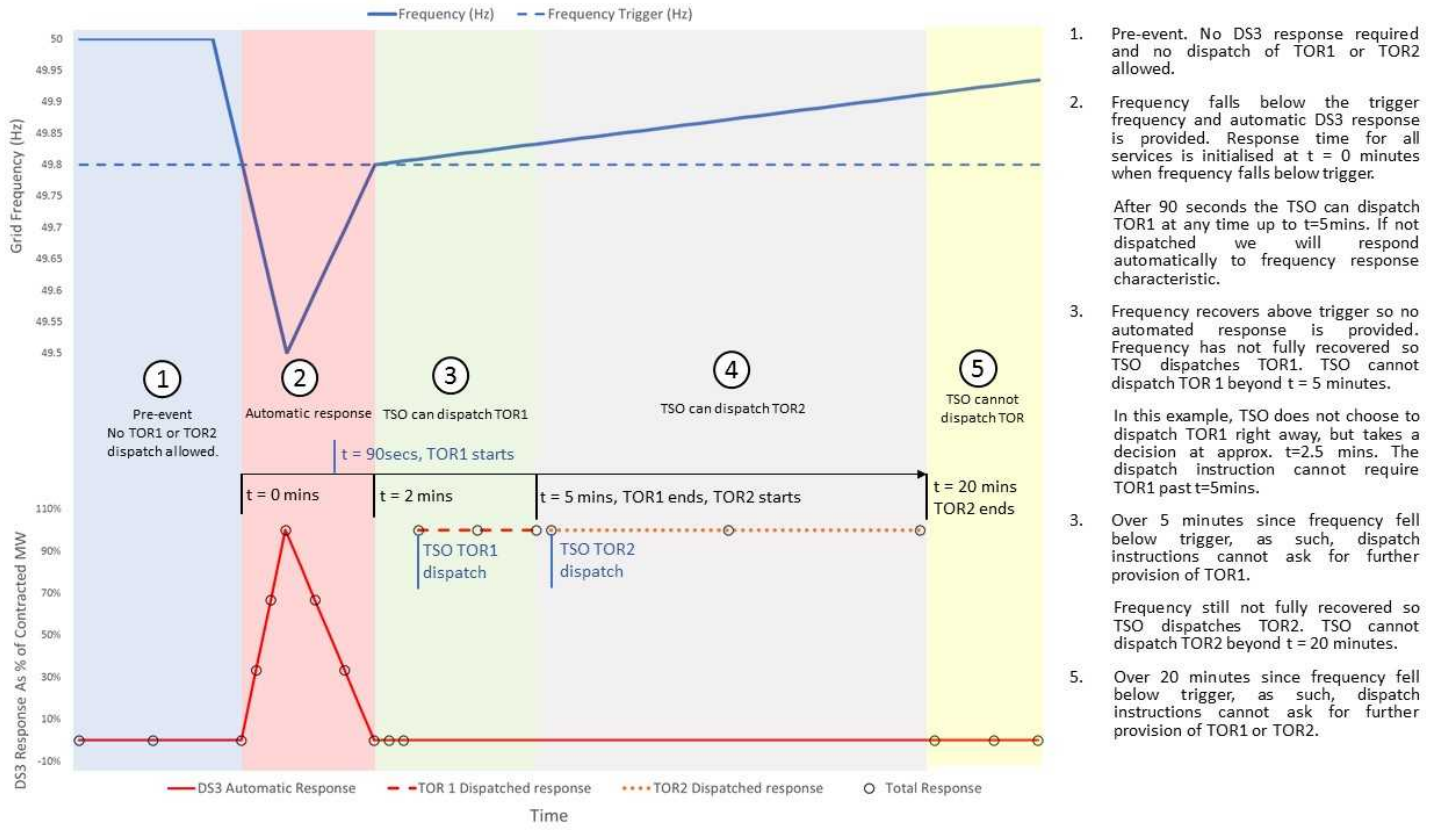
Please send responses in electronic format to DS3@eirgrid.com or DS3@soni.ltd.uk

Respondent Name	*Edd Kenney-Herbert*
Contact telephone number	*+44 (0) 7810 711 626*
Respondent Company	*Renewable Energy Systems Limited (RES)*

Note: It is the TSOs' intention to publish all responses. If your response is confidential, please indicate this by marking the following box with an "x". Please note that, in any event, all responses will be shared with the Regulatory Authorities.

Response ☐ **confidential**

Question	*Response*
Proposed Market Ruleset	
Question 1: Do you have any comments on the two options for service bundling proposed and the TSO's preferred option?	RES agrees in principle with the TSO proposal that providing units should provide all five DS3 services (FFR, POR, SOR, TOR1 and TOR2). We also agree that all should be contracted to the same volume level. One point that requires additional clarification is how the TSO can dispatch TOR1 and TOR2 (these services being dispatchable by nature). In order to design a cost-effective system, providers will need details and assurances regarding how and when dispatch instructions can be issued. Specifically, it is a concern for providers that the TSO may dispatch units in such a way that they are then positioned poorly to respond to a future frequency event, and could be penalised for unavailability. Where such ambiguities exist, providers will necessarily make overly conservative design choices and deliver a costlier than necessary service to the TSO as a result. In the public consultation, it is implied that the TSO may want to dispatch these services after a major frequency event where frequency has recovered above the trigger (and so automatic response will not be delivered) but has not recovered fully to a nominal range. As such, RES propose that the TSO agree to the following pre-requisite condition for dispatch of TOR1 and TOR2: • The TSO can dispatch TOR1 and TOR2 post-event, but cannot ask for the service provision to continue past the service duration (5 minutes for TOR1, 20 minutes for TOR2) where t=0 is defined as the time the frequency first falls through the trigger This concept is illustrated in Figure 1. This solution would mean providers have some certainty on the potential timing and nature of dispatch instructions, whilst enabling the TSO to dispatch available units adequately to maintain system stability post-event.

Question 1 continued	 Figure 1: Illustration showing time periods in which TOR1 and TOR2 services can be dispatched according the RES' proposal. At each point in time total response is the sum of automatic response, TOR1 dispatched response, and TOR2 dispatched response.

RES comments on section 3.1.2 of the consultation

TSO Proposal: The technical requirements laid out in this document must be met by a providing unit. The provision of the service must follow the FFR Dynamic Capability Frequency Response Curve laid out in the DS3 System Services Contracts for Regulated Arrangements Recommendations.

The specific proposals are summarised in the following table which is taken directly from the consultation document:

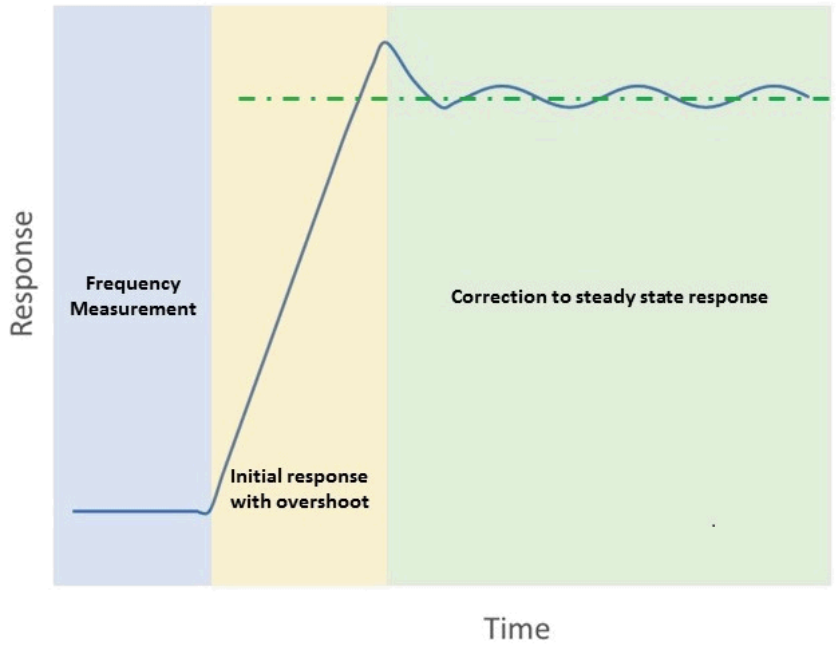
Characteristic	Requirements
Dynamic response	Dynamic capability in response to a Reserve Trigger
Required minimum speed of response	150-300ms
Trajectory	0.3Hz
Required reserve trigger capability	49.8 Hz
Recharge limitations	Trickle recharge allowed post-event provided frequency has returned to within ±0.05Hz and remained there for 5 minutes

Table 1: Summary of TSO proposed technical requirements for DS3 participants. This is Table 3 in the consultation document.

Regarding the requirement for dynamic capability in response to a reserve trigger RES find this to be a reasonable requirement.

Regarding the trajectory and trigger values proposed (0.3 Hz and 49.8 Hz respectively) RES would find these values to be reasonable. It is, however, not clear from the consultation that these values have been fixed and represent the final response characteristic for the volume capped participants. It is extremely important that the TSO provides clarification on the values of trigger frequency and trajectory as soon as possible to provide certainty for market participants and enable appropriate detailed system design activities. It is also critical that to ensure a fair auction process all participants are held to the same requirements regarding frequency trigger and trajectory.

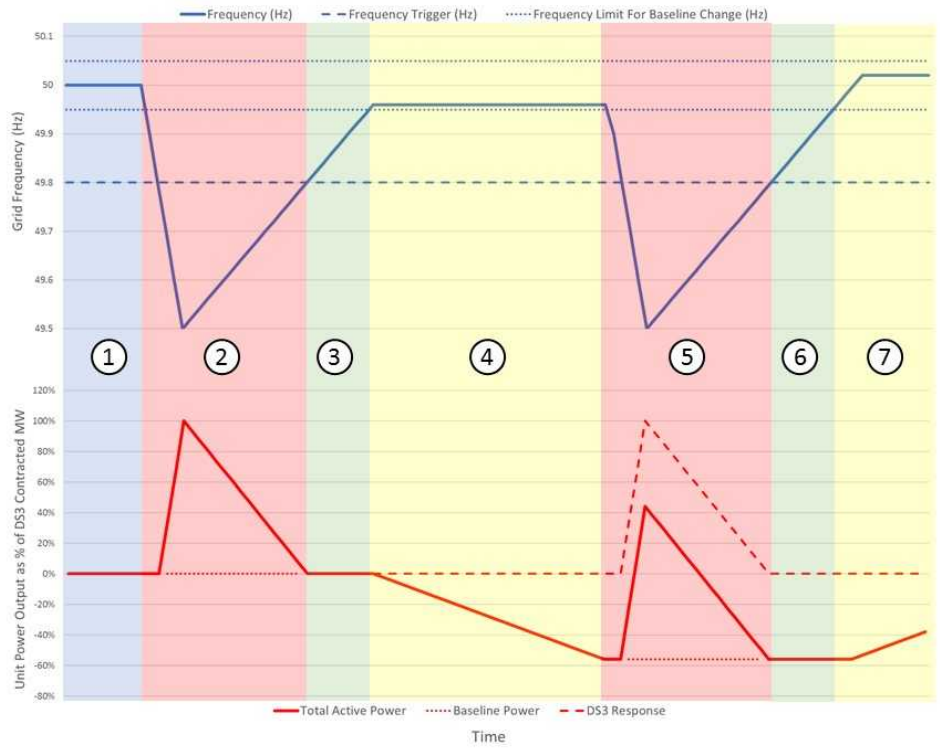
RES comments on section 3.1.2 of the consultation continued	**Regarding the required minimum speed of response** RES consider that this requirement is unprecedented and is much more demanding than the speed of response requirements for similar services in other markets. For example, the Enhanced Frequency Response (EFR) service procured by National Grid Electricity Transmission plc (NGET, grid operator for Great Britain) represents a very fast frequency response service by international standards and requires response speeds of less than 1 second. Faster response time requirements, such as the 150 – 300 ms proposed for DS3, represent a significant technical challenge, and therefore cost implication, for service providers which will likely result in increased bid prices. In light of this, RES encourages the TSO to consider what speed of response is needed to guarantee system stability before finalising the service design.
	
	Furthermore, in view of such demanding speed of response requirements, a careful and precise definition of response time is required, including consideration of the following points:
	• Is the response time inclusive of system frequency measurement?
	  ○ If the response time includes frequency measurement, the TSO needs to provide compliance guidelines regarding frequency measurement systems that fulfil the DS3 requirements and also consider that faster frequency measurement may result in reduced fidelity of measurement
	• Is the response time defined as the first time the system achieves the frequency setpoint subject to subsequent overshoot, or is a steady state response required? See
	  ○ RES consider that first achieving the set point is adequate for these purposes and ensures the response has been delivered within the time frame proposed
	  ○ If steady state response is required (RES recommend it should not be), the tolerance within which the response must be maintained needs to be defined.
	
	For reference, a simple response characteristic is illustrated in Figure 2 below:

RES comments on section 3.1.2 of the consultation continued	 Figure 2: Illustration of time dependent response after a frequency disturbance illustrating the process of frequency measurement, initial response ramp up, and achievement of steady state response within a tolerance. The response set point is shown as a dashed green line. Actual response is the blue line. The TSO need to define where t=0 occurs for the purposes of speed of response requirement; RES recommend t=0 occurs after the "Frequency Measurement" phase in Figure 2. Furthermore, the point at which response is considered achieved for the purposes of the speed of response requirement needs to be explicitly defined; RES recommend the response is considered achieved when the actual response (solid blue line in Figure 2) first meets the required response (dashed green line in Figure 2). In personal communications with EirGrid, it has been indicated by EirGrid that the response time requirement may begin from the time the TSO, rather than participating unit, measures frequency. This is not deemed acceptable as the TSO and

RES comments on section 3.1.2 of the consultation continued	providing units will in reality measure frequency at slightly different times. As such, the providing unit could meet the speed of response requirement with respect to its own frequency measurement, but not that of the TSO's measurement. Also, the TSOs frequency measurement specification would have to be followed but it has not been published. **Regarding recharge limitations proposed ("trickle charge" allowed when frequency deviation has been below 0.05 Hz for 5 minutes),** RES consider that the proposal is not sufficiently detailed to allow participants to suitably design their systems and associated control logic. This aspect of the service design needs considerable clarification and careful consideration on the part of the TSO. This is discussed in further detail in the following paragraphs. The term "trickle charge" in the consultation document is not well defined. The TSO needs to provide precise quantitative instructions on how participating units can manage available energy resource to ensure high availability to provide the services. Additionally, the concept of using a "trickle charge" to manage energy resource seems inconsistent with previous communications that imply the response is measured relative to a baseline position. As such, it should be possible for a unit to manage its availability to provide the service by altering this baseline position. For example, consider the following: • If the baseline position of a unit is 0 MW (no demand or generation), changing output to provide 10 MW of generation to the grid of 10 MW is equivalent to providing a 10 MW response • If the baseline position of a unit is 5 MW of demand, changing output to provide 5 MW of generation to the grid is equivalent to providing a 10 MW response • If the baseline position of a unit is 20 MW of demand, changing output to provide 10 MW of demand is equivalent to providing a 10 MW response RES proposes that the best method for enabling participants to ensure high availability is to provide a mechanism whereby they can alter the unit's baseline in real time with constraints on how baseline can be changed defined to ensure that the overall system stability is not adversely effected. With this in mind, RES would propose the following potential solutions that could enable units to realise high availability, competitive bid prices and ensure no adverse effect on system stability: • The baseline power of a unit can be changed in real time when the frequency is within a pre-determined acceptable range (e.g. within the frequency trigger or, more conservatively, ±0.05Hz). o A ramp rate restriction on system power should be applied in this zone to ensure that no sudden changes of load on the grid occur as a result of units trying to change their position suddenly. Ramp rate restrictions for similar services in other markets are of the order of 1% of contracted service MW per second (see EFR for

RES comments on section 3.1.2 of the consultation continued	example). There is already precedent for limiting ramp rates in the EirGrid Grid Code under section WFPS1.5.4 Ramp Rates. • The baseline cannot be changed when frequency is outside of the pre-determined zone. As such, the response delivered at an instant of time during a frequency event is easily determined as the difference between a unit's active power measured directly before the event, and active power during the event. The illustrations of Figure 3 demonstrate this concept by means of simple example for the case of a unit providing response to under frequency events. The frequency events are simplified for demonstration purposes only. Upper and lower limits of 49.95 Hz and 50.05 Hz have been used for the frequency range in which state of charge management is allowed for this example for demonstration purposes only. The general concept for energy resource/state of charge management proposed by RES here is sufficient to cover the case in which participants provide both under- and over-frequency response (as currently proposed by the TSO subject to consultation). If over-frequency response is required, the TSO must consider that not only may energy recovery be necessary to ensure availability after extended periods of under-frequency, but also discharge of excess energy would be required after extended provision of over frequency response. It is noted that a participant could try to manage their state of charge by changing their physical notification into the market, however, as the current ISEM design would require declaring this position one hour ahead of time, this is not considered a suitable method of state of charge management and would have a significant cost implication for providing the service. This is due to the fact that a unit's state of charge position 1 hour ahead of time may be very different from its actual position at the time of delivery; the longest service duration is 20 minutes for TOR2. As such, a system designed to meet this requirement, even if vastly oversized, could be completely depleted of energy resource in the hour that passes between declaration of physical notification in the market, and actual deliver of that energy. As such, it is felt that a real time mechanism for actively managing state of charge will prove more appropriate, and ultimately result in more proportionally designed systems that can deliver the service at reasonable cost to the TSO. Such real-time state of charge management systems are in line with the proposals being designed by other TSOs to cater for fast-acting providers that necessarily must manage state of charge/available energy resource (e.g. UK FFR with real time baseline changes, UK EFR providing an envelope for response giving participants freedom to manage state of charge in real time). Furthermore, the requirement to only recharge/manage energy resource when frequency deviation has been < 0.05 Hz for a period 5 minutes seems unnecessary. Rather, imposing a ramp rate restriction on changing baseline power would seem

RES comments on section 3.1.2 of the consultation continued	preferable. It is not clear what logic has been used by the TSO to propose the “5 minute” time frame, and it is not apparent that the TSO has considered whether this would indeed provide participants with sufficient scope to recover lost energy resource/manage state of charge adequately.

RES comments on section 3.1.2 of the consultation continued	 1. Frequency in acceptable range. Unit energy resource is at ideal position so unit is not recharging or discharging energy to manage resource. 2. Frequency event occurs. When frequency falls through trigger response is required. The baseline for this response is 0 MW as that is the power directly before frequency falls through trigger. Unit provides response. 3. Frequency recovers above trigger but not above the limit required to allow state of charge management. As such, unit does not provide response but is also not allowed to change baseline position to manage state of charge. Unit must return to previous baseline of 0 MW. 4. Frequency moves above the limit allowed for state of charge management so the unit starts to decrease generation/increase demand at a rate defined by the TSO ramp rate constraint on state of charge management (no sudden change in demand/generation). 5. Another frequency event occurs. As frequency falls below the limit for state of charge management, the unit is no longer allowed to change baseline position to manage state of charge. When frequency falls through the trigger the unit provides DS3 response. The baseline is lower than for the previous event as the unit has changed its position to manage state of charge and ensure availability. The same response is provided, but relative to a different baseline power. 6. Frequency recovers above trigger, but not above the limit for state of charge management so the unit cannot change it's baseline position. As such it returns to the previous baseline power. 7. Frequency recovers above limit for state of charge management so unit can change its baseline power to ensure availability. Figure 3: Simple illustration of real time state of charge management concept for battery storage systems operating in DS3. In the example it is assumed participants can change baseline power (subject to a constraint on ramp rate) to manage state of charge when frequency lies between 49.95Hz and 50.05Hz (example values for demonstration). Response is defined as a change relative to a baseline power measured as power immediately before frequency passes through the trigger.

Question 2: Do you have any view on the technical requirements proposed, including the requirement for over-frequency response?	The TSO proposal **regarding the requirement for over-frequency response** is summarised below with further detail available in Section 3.1.3 of the consultation: *Option 1: Technical ability to provide over-frequency response is required from applicants* *Option 2: Ability to provide over-frequency response is not required from applicants* *TSO Proposal: Technical ability to provide over-frequency response is required from applicants.* RES is comfortable that they can deliver over- and under-frequency services simultaneously, however the TSO should understand that this could have a significant cost implication, driving up the cost of the DS3 services. (We note that this additional cost could be reduced, possibly to zero, if the addition of over-frequency is matched by a reduction of under-frequency.) Assuming the MW volume of service remains constant, a battery storage system will have to double in capacity to provide both over-frequency and under-frequency response relative to the case where only under-frequency response is provided. The consultation document implies that over-frequency response is not a current requirement for the Irish grid, but the requirement to provide this is being proposed to guard against a future hypothetical need. In view of the cost implications RES would encourage the TSO to consider alternative methods to fulfil the future requirement. If the TSO is to proceed with the proposal to require over-frequency response, it is important that the over-frequency response characteristic is well defined and fixed for all participants. The TSO should also carefully consider how the requirement for over-frequency response will affect the appropriate methods for state of charge management. Participants would need freedom to discharge excess energy after a period of over-frequency response to ensure availability to respond to future frequency evens. Also, if over-frequency response is required, a band of a battery storage system's available MW power would need to be reserved for state of charge management meaning the full power may not be available to provide DS3 services similar to the UK's FFR service; such a restriction would not apply in the case that only under frequency response is required. Lastly providers should not be required to reserve MIC and should not be penalised if they cannot obtain MIC at a later date at no Capex.

Question 3: Do you have any comments on the availability obligation proposed?	RES agrees in principle with the proposal of 97% availability. We note that there needs to be detail provided as to what happens if the system is unavailable due to TOR1/ TOR2 dispatch by the TSO. Clearly under this circumstance it is not fair to penalise the service provider. Please also see our response to Question 1.
Question 4: Do you have any comments on pre-requisites with respect to Connection Offers?	RES proposes that Option 3 is adopted, allowing applicants to provide a valid legally binding connection agreement(s)/offer(s) or be in receipt of a connection offer for the site(s) in question suitable for a contract go-live date of 31st May 2021, or be in the connection offer process with their connection request deemed complete. We note that this should only apply to MEC for the under-frequency service as no specification has been provided for the MIC requirement for the over-frequency service. RES notes that the best way to deliver best value to the consumer from the volume capped DS3 process is to increase competition. Clearly the value to the consumer needs to be balanced against the potential risk of non-delivery. The ideal scenario for the RoI would be alignment between the ECP-1 process and the volume capped DS3 process. This would allow more participants in the DS3 tender without the risk of failure to deliver due to gird non-delivery. It is understood that the alignment between DS3 and ECP-1 may not occur. RES proposes that, in RoI, all applicants that have a registered ECP-1 application should be eligible for unrestricted participation in the volume capped DS3 tender. We note that there is already a bond of €12,000/MW proposed in section 4.2.3. This bond gives applicants a significant fiscal penalty for non-delivery.
Question 5: Do you have a view on the two options provided with respect to managing network limitations?	RES proposes that Option 1 is the best alternative: *Connecting providers would need to provide confirmation from the TSO/ DSO that network limitations will not prohibit service availability. Providers will be remunerated if unavailable due to network limitations.* We note that this appears to be the only option that reduces the revenue uncertainty for providers. Revenue uncertainty makes it challenging for an applicant to achieve financing, so removing uncertainty will help to provide best value to the consumer.

Question 6: Do you have a view on the staged approach proposed under the volume capped arrangements?	RES notes however that there is no precedent for the TSO/ DSO providing confirmation that network limitations will not prohibit service availability. If RES' preference of Option 1 is adopted for the tender then the TSOs and DSOs in both jurisdictions need to be willing to provide such confirmation. RES agrees in principle with the staged approach, but would like the TSOs to give more certainty about future auctions. In GB, the decision not to re-run the EFR tender has led to great market uncertainty for the Energy storage industry. We do however have comments on both the 100MW hard cap, and the 30MW pre-connection. Please see our answers to Questions 7 and 8 below.
Question 7: Do you have a view on the proposed bid pricing requirements and the mechanism for assessing bids and determining price?	We have answered this section using the section numbers in the consultation document: **4.2.2** RES supports the TSO proposal that contracts should start no later than 31st May 2021 and will end no later than 31st May 2027 so long as the proposed schedule for the tender does not move significantly. **4.2.3** RES accepts the TSO proposal in principle but suggests that possibly the bond of €12,000/MW is set at too high a level. By way of comparison the EFR bond was £5,000/MW. **4.2.4** RES accepts the TSO proposal that prices should be submitted for each System Service within the bundle. RES agrees with the TSO proposal to assess bids based on the calculated remuneration for each System Service for a typical wind year. We also agree that ongoing remuneration should be based on a typical wind year at contract award stage. This is RES' preferred option as it provides more certainty to investors on remuneration. We would like to have detail on the SNSP levels that will be used as soon as possible to allow us to complete economic modelling work. **4.2.5** RES accepts the tariff cap for bids and, as per our answer to 4.2.4 above, does not see the need for a floor as payment should be made at the calculated value based on a typical wind year at contract award stage. **4.2.6** RES agrees that pay-as-bid pricing should be used for the volume capped procurement exercise. This prevents

	manipulation by participants bidding unfeasibly low to ensure that they win a contract at the pay-as-clear pricing. **4.2.7** RES does not agree with the proposed hard cap of 100MW for this tender round. RES proposes that a minimum of four tenderers are accepted, and between 91MW and 120MW of tendered capacity. The reason for this is that, assuming that only whole tenders are accepted, there is a possibility that the first three tenders total 71MW. If the next bid was 30MW, this would not be accepted. 71MW is obviously significantly short of the desired 100MW. As expressed above we propose that a minimum of four tenders are accepted with a total accepted capacity in the tender being between 91MW and 120MW.
Question 8: Do you agree with the proposed maximum volume proposed per separate grid connection?	RES is happy with the limit of 30MW, but disagrees that this should be per connection, we propose that this should be per applicant. In the consultation, it mentions *"risk related to non-delivery and/or unavailability of a single site is sufficiently reduced"*. This is correct but ignores the risk of a single provider winning more than one connection and failing to deliver. We propose that there is a 30MW limit per applicant (rather than per connection) to mitigate against the risk that one applicant wins with multiple connections but fails to deliver. There is precedent for this in other countries. In National Grid's EFR tender each applicant (rather than connection) had a maximum capacity (50MW) of enhanced frequency response. An "applicant" included any SPV or other related company in which it has any direct or indirect interest.

Question 9: Do you have a view on the proposed application of performance, scarcity, product and locational scalars?	We have answered this section using the section numbers in the consultation document: **4.3.1** RES prefers Option1. As above, RES agrees with the TSO proposal to assess bids based on the calculated remuneration for each System Service for a typical wind year. We agree that providers should be remunerated based on this, regardless of actual conditions. This is RES' preferred option as it provides more certainty to investors (and the TSO) on remuneration. We would like to have detail on the SNSP levels that will be used as soon as possible to allow us to complete economic modelling work. **4.3.2** RES agrees in principle with the Performance Scalar outlined in Table 4. We note that there needs to be detail provided as to what happens if the system is unavailable due to TOR1/ TOR2 dispatch by the TSO. Clearly under this circumstance it is not fair to penalise the service provider. Please also see our response to Question 1. **4.3.3** Product Scalar for the Faster Response of FFR: RES prefers Option 2. We note that incentivising slow response time due to the way that the tender is assessed (i.e. the slower response time would be lower cost) would be perverse. Product Scalar for the Enhanced Delivery of FFR, POR, SOR and TOR1: RES agrees with the proposal not to apply the product scalar for Enhanced Delivery. Product Scalar for the Continuous Provision of Reserve from FFR to TOR1: RES agrees with the proposal not to apply the product scalar for Continuous Provision of Reserve from FFR to TOR1. **4.3.4** RES agrees with the proposal not to apply locational incentive/scalar for delivery of services under this initial stage of volume capped procurement arrangements. **4.3.5** RES agrees with the proposal not to set a minimum volume per jurisdiction.

Question 10: Do you have a view on the market interactions outlined here and the proposed mechanism for mitigating?	We have answered this section using the section numbers in the consultation document: **5.2.1** RES agrees with the proposal that service providers must meet the applicable Grid Code or Distribution Code requirements for their connection. **5.2.2** RES agrees with the proposal that service providers will be subject to the network charges applicable to their connection. **5.3.1** RES agrees in principle that service Providers should manage their own positions in the energy market to ensure they can fulfil the service and availability outlined in their contract. We note however that providing the service means that during a frequency event the service provider is paid the imbalance price. The service provider has no control over the imbalance price so this could be perceived as a risk to investors. We note that if the scheme is only delivering under-frequency response then the service provider is given flexibility (depending on scheme sizing and system frequency) to recharge at a time that is commercially optimal. However, if the service is also to provide over-frequency response then, at times of over-frequency, the scheme must import at the imbalance price too. In the GB market, there is a correction methodology, that is voluntary for ancillary service contract participants, called Applicable Balancing Services Volume Data (ABSVD). The ABSVD methodology (applied by National Grid) calculates the expected frequency response based on the contracted droop curve of the service provider and the actual frequency trace across the settlement period and nets off the resultant energy volumes from the service providers imbalance position in settlement. This prevents ancillary service contract participants from being charged (or benefitting) from imbalance prices at times when they are providing the service. For EFR, as an example, the over and under-frequency response droop curve is symmetrical, and service providers are hence not exposed to imbalance for importing during a over-frequency event, nor for exporting for a under-frequency event. If the TSOs would like a symmetrical over-frequency and under-frequency response for DS3 then it would be sensible to consider a voluntary 'opt-in' imbalance offset system similar to that in GB to help investors manage their risk. Clearly if the service is for under-frequency response only then it would not be economic to require the scheme to charge in the market, but not allow the provider to recoup revenue during export. **5.3.3** RES disagrees with the proposal that service providers should manage their own positions in the capacity market to ensure they can fulfil the service and availability outlined in their contract. RES suggests that it would be undesirable to have a unit potentially exposed to Capacity Market penalties for meeting their obligations in the provision of system services. We would like a system similar to the GB Capacity Market applied to the

	CRM. In the GB Capacity Market Rules there is a list of Relevant Balancing Services. This list provides a list of systems services required for system security. At times that GB Capacity Market participants are delivering a Relevant Balancing Service they are still paid their Capacity Market payment but are exempt from delivering under a GB Capacity Market System Stress Event. The GB Capacity Market design stands to reason. The Capacity Market payment is made for security of supply and if a unit is helping with security of supply (through a stability service) it should still receive the Capacity Market payment. It also makes sense that if a unit is providing a system stability service then it would not help the system if as soon as there was a system stress event it stopped providing stability and just delivered power. We propose that a similar mechanism be applied to the CRM preventing penalisation under the CRM for provision of system services.
Question 11: Do you agree with the proposed mechanism for assessing applications?	To answer this, we have made comments on each step: Step 1: RES agrees with the proposal. Step 2: RES agrees with the proposal. Step 3: RES agrees with the proposal so long as RES' comments on Question 4 are adopted. We think that a registered ECP-1 application should be eligible for unrestricted participation (i.e. the feasibility requirements should be binary yes). Step 4: RES agrees with the proposal so long as RES' comments on Product Scalar for the Faster Response of FFR (Question 9, 4.3.3) are adopted. i.e. Product Scalar for faster response is applied after assessment i.e. in actual remuneration only. Step 5: RES agrees with the proposal except that we do not agree with the proposed hard cap of 100MW for this tender round. As per out response to Question 7, 4.2.7, we propose that a minimum of four tenders are accepted with a total accepted capacity in the tender being between 91MW and 120MW.