

# Stability Pathfinder Phase 2 FAQ

Updated 29/10/21



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## Introduction

This document contains the questions submitted at the RFI stage from July 2020. We have updated some of the responses to reflect the latest information. As the EOI progresses we will update this document with EOI webinar questions and common questions we are receiving.

If you want to ask us a question, please send it to:

[box.networkdevelopment.roadmap@nationalgrideso.com](mailto:box.networkdevelopment.roadmap@nationalgrideso.com)

## General

### 1. Will the ESO be running future tenders for Stability after phase 2 completes? (updated 03/07/20)

Yes, parallel to phase 2 tender, we will be defining our stability needs for the whole of the GB system. Our ambition is to run annual GB wide procurement exercises after phase 2 completion.

### 2. What plans are already in place in relation to the comment relating to future tenders moving closer to 'real time'? Is this likely to be the last auction for longer term contracts? Does ESO believe the future requirement can then effectively be met by existing assets? (updated 03/07/20)

We see the future of stability to be managed through a mixture of long-term contracts (e.g. through stability pathfinder) and a close to real time market. Our pathfinders are 'learning by doing' approach, we will further improve and develop future process based on pathfinder learnings. The slide 13 in the RFI relates to our plans for these long-term contracts for GB. There is work ongoing with the aim of creating a short term stability market which will provide commercial opportunity for all stability products to participate. We are in the very initial stages in the thinking of stability market. When we are able to do so we will share more information on this.

### 3. Is the 132kV connection requirement going to be enduring for the future GB wide procurements or is it purely applicable to the Scottish Phase 2 tender? (updated 03/07/20)

Our position at this stage is to keep the 132 kV and above rule as lower voltage solutions are less effective to address our transmission network's stability needs. However, once we have defined our regional needs there could be a case to review this.

### 4. What is the interaction with this Pathfinder and the Constraints Management Pathfinder (CMP)? (updated 03/07/20)

There is no direct interaction between these two pathfinders. Stability pathfinder is looking to raise the overall stability characteristics of the system. CMP is looking to establish the thermal limit at which generators would go unstable and reduce the output rapidly such that its equivalent to pre-fault constraints management. Any questions related to constraints pathfinder can be sent to [box.networkdevelopment.roadmap.com](mailto:box.networkdevelopment.roadmap.com) with CMP in the email subject.

### 5. Why have there been so many delays in getting this RFI out? How will NGENSO avoid further delays? (updated 03/07/20)

We have experienced some delays in the phase 2 process, compared to our Network Development Roadmap update, due to a few factors. We had a delay to the phase 1 procurement based on providers' feedback on timescales being very tight. We also wanted to make sure we took into consideration and incorporated any learnings from phase 1 ahead of launching phase 2. With the impact of COVID 19 we also needed to consider and review how we could run this tender with most of our teams working remotely. The RFI stage of the process was added in as a direct consequence of us wanting to ensure there were no negative impacts of COVID-19 on any party's ability to tender.

**6. Will the EOI feasibility Assessment include an economic assessment? Or will that be delayed until the commercial tender process? (updated 05/10/20)**

The EOI pack contains the draft assessment methodology of how we will assess the commercial tender. This is open for consultation and a final version will be published based off the feedback we receive.

**7. What are the links between your NOA Pathfinders project and your Early Competition Plan project? (updated 05/10/20)**

In our RIIO-2 Business Plan we committed to continuing to progress and enhance our Pathfinders. Our Pathfinders seek to satisfy specified Transmission network needs through competition by exploring whether more economic alternative solutions are available. We also noted that Ofgem has asked the ESO to develop an Early Competition Plan to set out how early competition for onshore transmission could be introduced in future.

Therefore, we are progressing both our Pathfinders and our Early Competition Plan work in parallel at this point time. Both are being developed separately with engagement from stakeholders and we are using the lessons we learn through our Pathfinders to not only improve the future tender processes we have planned for our Pathfinders but also to help inform the development of the Early Competition Plan.

Whilst the Pathfinders are a form of early competition in their own right, they are not being undertaken due to (or within the scope of) the Early Competition Plan.

Our Early Competition Plan submission scheduled for February 2021 will however start to consider what the implementation of early competition could mean for the future of our Pathfinders but until such time a decision is made by Ofgem on the implementation of early competition we will be continuing to progress and enhance our Pathfinders as per the commitments within our RIIO-2 Business Plan.

We appreciate your ongoing engagement with the development of both our Pathfinders and our Early Competition Plan.

**8. Do you expect any impact to your timeline as a result of recent Covid restrictions in the UK? (added 22/10/20)**

We are not expecting the timescales set out in the EOI to change due to the recent COVID restrictions.

**9. On subsequent procurements past Stability Pathfinder Phase 2, what are the foreseeable contract lengths for the possible procurements of stability on an annual basis? (added 22/10/20)**

Details of future procurement activities will be developed base on our future needs. We are working to define these for the remaining areas in GB.

**10. How much benefit this tender process will bring compared to transmission owners build solutions? (added 01/04/21)**

The aim of the Pathfinders is to find the most cost-effective method to secure system operability needs. As part of this traditional TO build solutions will be compared alongside commercial providers, and this process will show what the benefit is (if any) of using a commercial solution instead of a TO build solution. We will not be able to quantify what that benefit without knowing the cost of the solution chosen.

**11. Please provide an update on tender timescales including contract award date. (updated 16/07/21)**

An updated timeline for Stability Pathfinder Phase 2 has been published. More specific information on the tender timeline will be included in the invitation to tender pack. This will be published at the start of the tender submission period and the deadline for submissions will be at the end of the tender submission period although tenders can be submitted at any time during the tender submission period.

**12. Does the change to the timeline for Stability Pathfinder Phase 2 impact the timeline for Stability Pathfinder Phase 3? (added 16/07/21)**

The updated timeline for Stability Pathfinder Phase 2 does not directly impact the timeline for Stability Pathfinder Phase 3 as these processes are being run in parallel.

**13. Will the tender submission proforma be available prior to the launch of the tender window? (updated 29/10/21)**

We have published a [draft](#) of the tender submission proforma on our [website](#). The final tender submission proforma will be published in the Invitation to Tender pack in early November.

## Requirement

**14. Can you clarify the calculation methodology for short-circuit current, e.g. IEC60909 as generator block, which definition in IEC60909 fits to the RFI "the fault current is defined as the minimum RMS fault current seen between 5ms after a 3-phase symmetrical fault and the fault clearance (140 ms);" (updated 05/10/20)**

We have stated a period that we propose to consider in our commercial assessment for all proposed solutions. In light of this comment and other RFI feedback, we have reviewed this and updated the text to avoid any confusion.

**15. Why has the SCL definition been changed from 5ms to 140ms? (updated 03/07/20)**

Refer to the previous question.

**16. Why has your MVA requirements changed so much since last summer? (updated 03/07/20)**

Since the last publication, we have reviewed our requirements. We have taken account of the solutions procured through Stability Pathfinder phase 1, some TO assets that are planned for other network needs drivers but will contribute to our stability needs. We have also reviewed the underlying studies to ensure we are procuring at an appropriate level.

**17. Can you provide a technical description of what 'short circuit need' is? What causes it, what is needed to rectify it. (updated 03/07/20)**

In our analysis of system stability, we considered several technical parameters that were traditionally provided by synchronous generators including short circuit current, synchronising torque, dynamic voltage support and regional inertia. With declining level of these we expect to see several operability challenges on the system including; converter instability, TOV, voltage instability, voltage dips and local frequency swings. Through our analysis, we see that sufficient short circuit level enables us to address these operability challenges. We therefore decided to require a solution to contribute to all these operability challenges through meeting our technical specification, but we would value the SCL and inertia contribution in the assessment methodology. We also note that by considering the contribution the remote nodes we are also valuing synchronising torque.

**18. Will the 90% availability need to be guaranteed? Is it a yearly evaluation? (updated 05/10/20)**

As part of contract terms in EOI, we have shared our thinking on the payment mechanism to ensure this level of availability.

**19. Does the availability requirement have a correlation with wind or renewables penetration? If that's so, would it be fair for a wind farm to offer the service just when there is windy as it's when the service is more necessary? See Eirgrid in Ireland for their ancillary services programme (DS3) increases the payments using a scalar based on non-synchronous penetration at the time of enacting the service. Higher level of non-synchronous penetration, higher the revenue for a provider. (updated 05/10/20)**

There is some correlation between wind output and the level of SCL need. However, there are times where there is a stability requirement, but we expect a low wind output. As we need solutions to contribute in all

conditions, therefore we have set a 90% availability condition. Technologies that cannot guarantee this 90% availability may need to add additional equipment (e.g. storage) to deliver the required availability. Inertia availability will be treated separately and will be a tender parameter for the provider to specify.

**20. Can you please explain the fault current after 140 ms means and how it will be evaluated? Will this be a calculation with the transformer impedance and the saturated transient value instead of the sub transient? (updated 05/10/20)**

We are considering the transient fault current contribution. We have tried to be precise in what we are requesting as different definition of SCL exist. We have provided further information in the feasibility study guidance document for simulations. Refer to Q10.

**21. Is there any value for Inertia requirements for each location? (updated 05/10/20)**

There are no location specific inertia requirements being considered for this tender. However, solutions with inertia will contribute towards our national need for inertia and so will be valued with this in mind. Detail of how this will be valued is shown in the draft assessment methodology.

**22. Will there be a definition of simultaneous injection of fault current and inertial response from VSM providers? (updated 03/07/20)**

Yes, you will be expected to support a simultaneous voltage and frequency event.

**23. Do you see the requirements, for any of the eight locations, being met from providers from outside that immediate area? (updated 03/07/20)**

Yes, it is possible. Solution at any site (outside of the 8 locations) will contribute to the identified locations as per their effectiveness value. Our tender assessment will determine what is the best combination of solutions that meet our needs at the identified locations.

**24. Which year between now and 2030 is your network model based on? (updated 03/07/20)**

Our network models take a view of expected future network upgrades.

**25. A question regarding the amount of inertia tendered: The EOI document use the term "MVAs" whereas the technical specification uses the terms "MWs" and "MJ". Do you see any difference between these terms or are they used interchangeably? (added 22/10/20)**

Yes, we consider  $1\text{MVA.s} = 1\text{MW.s} = 1\text{MJ}$  for this purpose.

**26. The procurement scope states that dynamic voltage will be procured, however the technical section was silent on this. Can you provide any information on volumes / location etc? (added 22/10/20)**

The technical specification defines a requirement to provide dynamic voltage support, however we are not specifying an amount they we will buy against in the tender assessment. This is due to our primary need being SCL. Our analysis shows that if we procure enough SCL we should also have enough dynamic voltage. It should be noted that in future phases of stability pathfinder dynamic voltage may be a primary driver in that case we would specify an amount in a similar way to how we have specified SCL in phase 2.

**27. Do we have to meet the full requirement for all 8 locations i.e. build multiple plants or can we provide requirements for some locations only? (added 22/10/20)**

No - you do not have to fulfil the whole requirement at all sites, or even the whole requirement at one site. We could meet the requirement through the combination of smaller providers if it is cost effective to do so.

**28. What would be the utilization for reactive power? Would ESO provide a forecast of utilization for each location? (added 22/10/20)**

Steady state reactive range is not valued separately in our assessment. We will not be providing utilisation forecasts though you are able to see historical utilisation data here:

<https://data.nationalgrideso.com/ancillary-services/obligatory-reactive-power-service-orps-utilisation>

**29. Do we have to meet the full requirement for at least 1 location? How would this be compared to a bid which provides the same MVA but only partial requirements at the locations. (added 22/10/20)**

No - you do not have to fulfil the whole requirement at all sites, or even the whole requirement at one site. We could meet the requirement through the combination of smaller providers.

**30. Why were these 8 locations picked? (added 06/11/20)**

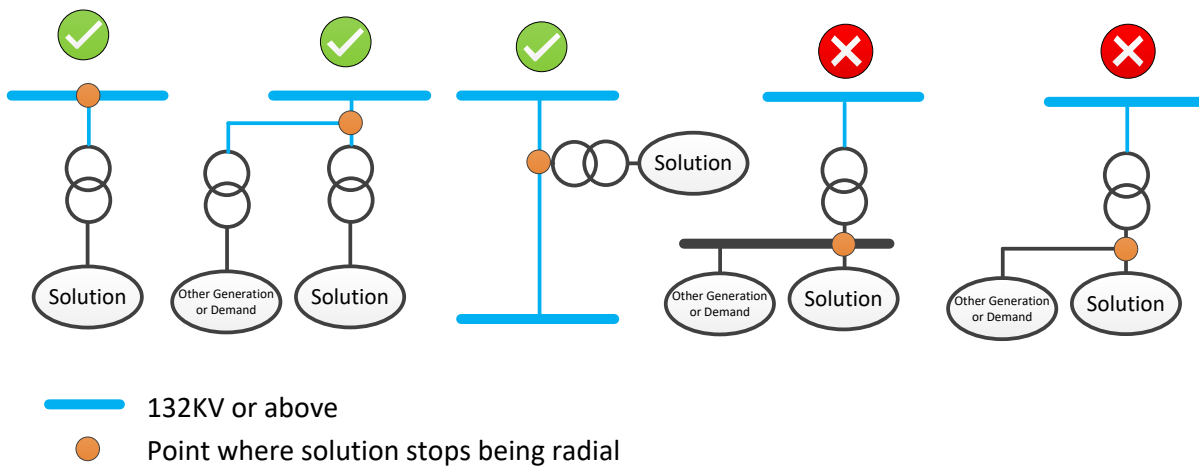
This is based on our system needs and studies. See Q13 for more information.

**Tender eligibility**

**31. Can it be clarified on voltage connection levels as in Scotland many sites connect at 33kV with SGTs provided by the TOs - will this be considered a 132kV or above connection? (updated 05/10/20)**

Solution must be 132kV or above, the reason for this requirement is that the effectiveness of solutions drop significantly with additional impedance (from transformers). We therefore set this limit to both set realistic expectation from providers and to simplify the assessment. The solution must be directly or radially connected to a point on the Scottish transmission system at 132kV or higher.

Examples of what will be allowed:



**32. Will you be expecting a minimum level of TRL for the solutions? (updated 03/07/20)**

No, however providers will be expected to demonstrate at the feasibility stage that they can meet some aspects of the technical specification. If you are considered a technology with a low TRL we would encourage you to speak to us before EOI so we can ensure there are no undue barriers to entry.

**33. Can you submit multiple technological solutions to the EOI? (updated 03/07/20)**

Yes, you can submit multiple option into the tender for different technologies and locations. You should make clear if any of your solutions submitted are mutually exclusive with each other - e.g. if you two options of size for the same asset and would only build one.

**34. Are services open for 33kV connected battery storage projects too? (updated 03/07/20)**

See answer to Q27

- 35. Will wind turbines that normally generate at 0.69kV via a step-up transformer to 33 kV and then a subsequent transformer to 132 kV or 275 kV (or 400 kV) be considered as 'transmission connected'? (updated 03/07/20)**

See answer to Q27

- 36. Battery storage sites who has secured TEC through BEGA however 33kV connected and among many other projects on 33kV side of SGT - Are these eligible to participate? (updated 03/07/20)**

BELLA and BEGA are embedded connections in the distribution networks and not eligible to participate in this tender.

- 37. Could please elaborate more regarding the need of storage (due to removal of 0MW export condition) for wind/solar facilities willing to participate? (updated 03/07/20)**

We are not requiring storage, but we have had some feedback that converter-based solutions may need some form of storage to provide some aspects of the specification (particularly inertia). It is up to each provider to consider how their designs meet our technical specification and availability.

- 38. Why was the 0MW export requirement removed and what additional technologies and capacity is expected to benefit from this move? (updated 03/07/20)**

0 MW requirement was removed to widen tender participation. However, we are still looking for additional capability to what current and future BM outlook is expected to provide. By removing 0MW requirement and defining additionality we can consider solutions who are generating a level of MWs in the BM but have changed their running modes or control systems or installed new equipment to meet the additionality criteria.

- 39. What feedback will participants received from ESO upon submission of the EOI? How strict will the pass or fail decision be? (updated 05/10/20)**

We have published pass/fail criteria in the EOI pack. EOI participation is needed to progress further in this tender exercise.

- 40. I have an existing unit that provides Stability but cannot be adapted to operate at 0MW. Can this participate in this process? (added 12/10/20)**

No, as this does not meet the criteria of additionality. However, if the unit is able to reduce its MW output while being able to provide Stability, it may be able to participate in Super SEL.

- 41. Can you explain what we need to submit for the EOI and by when? (added 22/10/20)**

A completed EOI template must be submitted by 5pm 8th January 2021.

- 42. Can a bidder submit several EOI application at different time (up to the deadline)? (added 22/10/20)**

Companies can submit projects separately. Each project can only be submitted once however the ESO may request an update following the ESO feedback on the submission. If you submit projects separately, please ensure the all or nothing sheet is completed.

- 43. Can you advise on the length of time it will take from a submission of an EOI response to being informed of the outcome? If you could provide both the "not to exceed" time period and also what you hope to achieve turnaround time. This will allow us to continue internal planning. & Once a company submit an EOI response is there an ability to change the details or add additional offers so long as the EOI window is open, or are we restricted to one submission per company in the EOI window. (added 22/10/20)**



The speed at which we are able to respond will depend on the number and complexity of the submissions we are reviewing at any one time. Following our review providers will have 5 working days to correct any minor errors identified. We will provide responses to all EOIs by the latest date of 8/02/21.

**44. If you don't have a connection offer what Delivery Date can you put on the EOI submission? (added 22/10/20)**

If you do not yet have a connection agreement, please provide the date by which you could deliver your solution assuming that connection time is not a constraint. The connection review will consider whether connection is possible before or after this date. A provider will not be able to submit a connection date earlier than the one to be provided by the outcome of the TO connections review.

**45. What do NG see as an advantage to companies in getting through the EOI stage early, other than more time to complete the 5 Feasibility reports. (added 22/10/20)**

Based off feedback we wanted to allow providers to submit the EOI early which in turn would give them more time undertake the feasibility stage.

**46. When companies submit the EOI it has to indicate the structure of the bids, mutually exclusive offers or grouped bids etc. How fixed is the part of the EOI that requires detail of this, companies can obviously choose to withdraw an option post EOI approval and not take it through the Feasibility stage. Can companies also choose to group projects that went through the EOI as independent offers. (added 22/10/20)**

Please provide the best view of information that you have now. This can be updated in the tender submission.

**47. Is holding EOI submissions to exact same tech parameters for final submission unrealistic and why can't TOs work against "greater than" etc in their assessments? (updated 02/12/20)**

The technical parameters that become fixed at the EOI stage are those that are needed for the TOs to undertake the connection review. We are asking for MVA rating, MW export/import, Connection location, Technology type, Fault/ SCL Infeed and MVAr Capability to be fixed at the EOI stage. These are consistent with the data that is submitted for a connection application as per DRC schedule. We are unable to accept values "greater than" as there could be several solutions at the same or electrically near sites. If there is uncertainty on the values used for this connection review, it could lead to overdesign of the network and additional connection costs recommended.

The DRC schedule doesn't explicitly ask for 100ms SCL infeed. Fault infeed value at 100ms can be confirmed/changed during the technical feasibility study if it doesn't impact the TO connections review and is consistent with the DRC data submission values.

Refer to Q48 for updates on this.

**48. In respect of the additionality criterion applied to an existing asset, can you confirm whether it is only (for example) any increase in inertia that the plant can provide that is eligible? (added 22/10/20)**

The amount of increased inertia above what is currently provided would be considered additional, meaning the plant could be included in the assessment but with no SCL value.

**49. Will ESO provider substation effectiveness for sites in England and Wales that could address Scotland needs? (added 28/10/20)**

No, the scope of phase 2 is limited to Scotland only.

**50. Is 'point of stability' defined in the technical specification same as point of connection for a generator? (added 28/10/20)**

No, the point of connection is not always the same. For example, for many connections it is likely to be LV end of the connection transformer which is not the same at the 'point of stability' being defined. The point of connection will be specified in an individual's connection agreement and is likely to be dependent on the TO network area.

**51. Can you provide a copy of Scottish Transmission network diagrams to cover 400kV, 275kV and 132kV? (added 28/10/20)**

GB transmission system diagrams can be found in Appendix A of our Electricity Ten Year Statement (ETYS) publication.

Website page: <https://www.nationalgrideso.com/research-publications/electricity-ten-year-statement-etys>

ETYS 2019 Appendix A: <https://www.nationalgrideso.com/document/156796/download>

**52. What technical parameters can change post EOI submission? (added 08/12/20)**

Based on the feedback received, we have reviewed technical parameters changes that will be allowed post EOI submission. We have updated this in the feasibility study guidance V2 and EOI submission template.

Data	Change after EOI	Comments
SCL	Yes within +/-10% of EOI submission but all values including changes need to be demonstrated in the feasibility study	EOI submission values will be fixed for TO connections review. The connections review assessment will not be repeated with changed parameters. The providers need to consider this risk.
Rating	Yes within +/-10% of EOI submission but all values including changes need to be demonstrated in the feasibility study	EOI submission values will be fixed for TO connections review. The connections review assessment will not be repeated with changed parameters. The providers need to consider this risk.
Location	No	Needed for TO connections review
Technology	No	Needed for TO connections review
Reactive range	Yes within +/-10% of EOI submission but needs to be demonstrated in feasibility if impacts feasibility study	EOI submission values will be fixed for TO connections review. The connections review assessment will not be repeated with changed parameters. The providers need to consider this risk.
Inertia	Yes	Needs to be fixed by commercial tender submission and demonstrated in feasibility study
Other technical design	Yes	Needs to be demonstrated in feasibility study if impacts feasibility study

**53. Do all solutions need to submit DRC data as part of the EOI submission? (added 08/12/20)**

DRC schedules are only required for solutions that require 'TO connections review.'

Any solutions that are already connected to the transmission system and do not require any modifications to their connection agreements or have a connection agreement or have applied for a connection will not be

considered for the 'TO connections review' hence DRC schedules are not required as part the EOI submission for these solutions.

Any solutions that don't have a connection offer or have not applied for a connection offer or require modification to their existing connection offers will be considered for the 'TO connections review' hence DRC schedules are required as part of the EOI submission for these solutions.

**54. What modifications to existing connection agreements would be considered for TO connections review? (updated 18/12/20)**

If your existing connection agreement requires modification that will change your location, increase your MVA rating, MW import/export, MVar range and SCL then only the solution will be considered for TO connections review. Please note that a DRC form will need to be submitted with the EOI submission in this case. If changes involve reduction in parameters and/or are within standard technical equipment tolerance values, these changes will not be considered for 'TO connections review'. If a mod-app is required for any reason other than for the changes listed above, we do not require a DRC form to be submitted with the EOI submission.

**55. How many DRC schedules should be submitted? (added 08/12/20)**

If a solution with same technical parameters is being considered for various locations, then one DRC form indicating all locations is sufficient. Otherwise, a DRC schedule per solution is required.

**56. Is there any information available on filling DRC schedule? (added 08/12/20)**

There is some guidance available on ESO website:

<https://www.nationalgrideso.com/document/34021/download>

<https://www.nationalgrideso.com/sites/eso/files/documents/Data%20Registration%20Code.pdf>

**57. How many feasibility studies are required? (added 08/12/20)**

The feasibility study requirement for each provider is following:

A feasibility study report (completed using the template provided) with simulations of all tests in Appendix A are required for each technology type/technology combination.

1. If there are multiple asset ratings being considered, all tests must be done for both minimum and maximum asset ratings for each technology type/technology combination.
2. If there are multiple network sites being considered, all tests must be done for **only one** network site with the lowest minimum SCL provided by the ESO for each technology type/technology combination.
3. Test 1-Step 3 and Test 2-all steps are required for all solutions for each site and each technology type/technology combination. This is required to establish SCL and inertia contributions ahead of the commercial tender submission stage. Any solution which doesn't demonstrate SCL and inertia contributions at the feasibility study stage will not be able to progress to the commercial tender stage.

Please refer to feasibility study guidance V2.

**58. What information on mutually exclusive options is needed at the EOI stage? (added 08/12/20)**

We require 'all or nothing' options to be submitted as part of the EOI submission for consideration in 'TO connections review'. Mutually exclusive options and/or all or nothing options can be confirmed/changed at

the commercial tender submission stage, however any impact on TO connections review will not be re-assessed. Please refer to updated notes in the EOI template V2.

**59. How will I be treated if I change technical parameters between EOI and feasibility study? (added 08/12/20)**

Any changes will not be considered for TO connections review.

Any changes impacting feasibility study must be demonstrated in the feasibility study to progress to the commercial tender stage.

**60. How will I be treated if I change technical parameters between feasibility study and contract signature? (added 08/12/20)**

SCL and inertia parameters for commercial tender must be demonstrated in the feasibility study otherwise they will not be considered for commercial tender.

Where there are changes in the SCL or Inertia capability from what was submitted in the commercial tender, we have set out in the contract terms how these will be treated from a payment perspective. We have provided examples of this in the [contracts webinar](#) (from 7m40s to 18m00s). We have included this to incentivise capability that has been tendered to be delivered.

**61. How will I be treated if I change technical parameters after contract signature? (added 08/12/20)**

After signing the contract, the tolerance and adjustments will kick in from when service delivery starts. This is explained in our contracts webinar.

**62. What information on 90% SCL availability is required for EOI form? (added 08/12/20)**

Please provide information that is best available to you at the time of EOI such as technology limitations. If you do not have a connection agreement, then you will get an indication of your solution's connection-related availability as part of the 'TO connections review'.

**63. Is it compulsory to add this "All or nothing groups" at the EOI Stage? (added 18/12/20)**

If your solutions require 'TO connections review', you must mention 'all or nothing' groups. All or nothing groups will help the TOs understand how many solutions to study together rather than treat individually.

**64. Can ranges of inertia be submitted in the EOI? (added 18/12/20)**

You can submit a range for inertia in the EOI submission per technology, but you will have to demonstrate specific inertia values at the feasibility study stage that you want to submit in the commercial tender submission.

The commercial assessment will consider specific inertia values (not a range) for each solution.

**65. How will ESO assess EOIs for pass/fail? (added 18/12/20)**

We will apply the EOI pass criteria listed in the EOI overview slide 15.

**66. If I don't have all DRC data available, what should I submit? (added 18/12/20)**

If you have not got all information at the EOI submission, you can mention this in the DRC form. We would strongly suggest that you provide the best view of the parameters of your solutions as part of the EOI submission so that the outcome of the 'TO connections review' can be most representative of your solution.

**67. Can you provide clarity as to the required content of the tenders? (added 16/07/21)**

The invitation to tender will be published at the start of the tender submission period and will explain the information required for the commercial submission. We have extended this period since the original



timeline to allow providers more time to review the documentation and to take into account the holiday season.

**68. Will NGENSO be requiring a bid bond from bidders at the point tenders are submitted? (added 16/07/21)**

We are not intending to require a bid bond from bidders at the point of tender submission.

**69. Do submitting parties have the discretion to submit their tenders at any date during the tender submission period? (added 16/07/21)**

Providers will be able to submit tenders at any date during the tender submission period.

**70. If a joint venture (JV) chooses to dissolve during the tender process, can the individual entities that formed part of the JV continue to participate? (added 04/10/21)**

For the purposes of the Stability Pathfinder Phase 2, the ESO is allowing parties to dissolve their joint ventures (JVs) during the tender period and in doing so, still submit responses as individual entities at their discretion. The caveats for this are as follows:

- a. If choosing to dissolve a JV, the parties must do so before the tender submission deadline; if parties dissolve their JV after the tender submission deadline, the tender submission shall become void.
- b. Upon dissolving the JV, parties must decide which party is taking on each individual submission. The ESO is not accepting duplicate solutions from parties that were originally JVs but chose to dissolve. For example, if Party 1 and Party 2 are a JV and have 5 solutions but decide to dissolve, the parties can still only submit a maximum of 5 solutions in total, with no duplicate solutions; the onus is on the parties in the JV to decide which solutions each shall be taken forward by each party when dissolving.
- c. The parties must still fulfil all the requirements and obligations of the tender process if they choose to dissolve their JV; no special dispensations and/or extensions shall be granted to parties that choose to dissolve their JV during the tender period.
- d. Parties must remain aware of their obligations around confidentiality and non-collusion; if a JV dissolves, the involved parties must act fairly and ethically in relation to principles of confidentiality and non-collusion.

**71. Can parties participate in the Stability Pathfinder Phase 2 both as a joint venture (JV) and as an individual entity? (added 04/10/21)**

Providers can participate both as a JV and as an individual entity. The caveats for this are as follows:

- a. There can be no duplication between the submissions; if a JV and an individual entity submit the same solution, the duplicated tender submissions shall become void.
- b. The submissions from the JV and the individual entity cannot be linked or connected in any way; if a JV and an individual entity provide submissions that are linked in any way, the duplicated tender submissions shall become void.

## Network owners related

**72. Are network upgrades with "proceed" status in the NOA assumed to go ahead when you are calculating effectiveness? (updated 03/07/20)**

Effectiveness is declared as a single number to simplify the assessment and to make the process simple and transparent for providers. Here we have used a mid-decade average view of the network. We accept that in reality the value will change within year as outage are taken and as new transmission assets are built/

changed, however we believe in this a simple and transparent process outweighs the need for complete accuracy.

**73. Are there any limitations to the technology solutions that TOs can propose? (updated 03/07/20)**

TOs can submit any solution to the tender consistent with their licence obligations, in the same manner as other parties.

**74. Can TO's compete in the RFI? (updated 03/07/20)**

TOs and commercial providers will be considered through two parallel processes through this pathfinder. Commercial participants will follow EOI submission whereas TOs will follow System Requirements Form (SRF) submission - Refer to RFI slide # 18. All stakeholders including TOs are invited to feedback to the RFI.

**75. How will you ensure the TO and commercial solution are treated equally? (updated 05/10/20)**

All commercial and TO solutions will need to be submitted to the ESO by the end of the EOI stage. After this no new solutions will be considered from commercial providers or TOs. This will be completed before we give any information to the TO as part of the connection review process so the TO will not be able to use any of this information to influence their solutions.

We have sought assurance from TOs to accommodate connections on their system according to their license obligations. The ESO has sought assurance that the TO does not have and is not perceived to have a conflict of interest with regards to this. We are also implementing any learning from Mersey Voltage pathfinder where TO solutions were compared against commercial solutions.

**76. The TOs could be direct competition with these projects. How are you going to ensure that costs are reasonable and they don't stop people connecting at 400kV or charge disproportionately more for doing so? (updated 28/10/20)**

Network owners are obligated to be fair in the treatment of those seeking a connection so they would need good reason to prevent, delay or charge more for a connection. As part of the connections process, we do also challenge connection times and costs should they seem out of line with other historical offers.

Ofgem have indicated to network owners and the wider industry that competition through the pathfinders is necessary to establish whether a network solution is really the economic way forward or if there are other solutions which would be better for the end consumer.

We are working with network owners to understand how they can prevent conflict of interest in the development of pathfinders and we have also been speaking with Ofgem about how we can ensure a level playing field. In the voltage pathfinder, we did challenge and review the network owner costs ahead of providing the results of the connection review and we expect to do this following the connection review process for the stability pathfinder.

**77. How can we ensure that the TOs don't preferentially secure grid connections over non-TO proposals? (added 06/11/20)**

See previous answer.

**78. What mechanism will NGESO use to ensure where the TO has been pre-funded under the RIIO T2 mechanism to ensure a solution that meets the pathfinder requirements can be delivered to programme in the event the competitive procurement under the pathfinder process fails to do so, has its grid connection element made available to all bidders and so that this funding at consumer cost, will not result in a complete advantage to the TO receiving the funding? (added 16/07/21)**

We will review connection dates of TO solutions in line with the connections offers and connections review outcomes and challenge TOs where needed. ESO and TOs work within their license obligations to provide best value for the end consumer.

**79. What mechanism will NGESO use to ensure that all the services a provider such as a typical stability plant can economically provide are factored in the Grid Connections review and that the local TO are not holding connection bay options back to provide additional services such as black start support or higher volumes of voltage support which are not explicitly specified in the current tender as the Inertia and Fault infeed requirements are? (added 16/07/21)**

TOs have to meet their own license obligations. Currently our stability tender and black start tender are two separate processes.

## Commercial Assessment/ Cost Benefit Analysis

**80. Given batteries and other converter technologies are welcome to participate, we would like clarification on how the short circuit level requirement is going to be technology neutral and not play in detriment of these technologies. At the moment, requirement look mostly suitable to synchronous technologies. This will then result in a very similar outcome to what NGESO had in Phase 1. (updated 05/10/20)**

We are aware that Virtual Synchronous Machine/Grid Forming converter-based technologies potentially have a current limit that can reduce their SCL contribution. However, they can also potentially provide a greater contribution for remote faults where this current limit is not hit. We have received some feedback on this in the RFI and we have accounted for this within the assessment methodology so that all plants performance is reflected in both how it contributes to local faults and to faults in the wider network. We want to ensure that there are no barriers for Grid Forming Technologies to participate.

**81. Can you repeat the point about updating the table for grid forming invertors please? (updated 03/07/20)**

Refer to the previous answer.

**82. How will you assess the short circuit contribution from a proposed supplier? Will it be the total contribution at all 8 of the identified nodes considering the effectiveness factors you have published or something else? (updated 05/10/20)**

Each solution will contribute to needs at all 8 locations. We will use the effectiveness numbers in this calculation. We have published an updated example in the effectiveness spreadsheet V3 to demonstrate how SCL contribution will be considered.

**83. From a previous question, so you are not looking for a service to provide the whole of the short circuit contribution required at a single node as the total is the contribution provided from all areas will compound to form the total service you need. (updated 03/07/20)**

See previous question.

**84. If a project is holding TEC for a connection in the future, are you assuming it will go ahead from a stability requirement perspective and also (if it submits a tender) from an additionality perspective? (updated 05/10/20)**

Please refer to additionality slide in the EOI slide-pack for an explanation of what we would consider additional for participation in this tender.

**85. Please can you clarify an earlier remark: Confirm that if you are holding or have accepted a connection offer for your project but the project is not yet built or connected that you will be assessed as providing 'New' contribution to SCL? (updated 03/07/20)**

Refer to the previous answer.

**86. Will there be a chance to comment on the methodology before it is finalised? (updated 03/07/20)**

Yes, a draft methodology will be published at the EOI stage and we will be asking for comments before it is finalised.

**87. You mention that number of years provided in the tender will form part of the economic assessment but discourage applying for grid connections. How will length of service be weighted? as surely this gives solutions already provided an unfair advantage? (updated 05/10/20)**

We are reviewing this based on the feedback so far. We understand that some parties may be applying for connections, but it is a risk for those providers to consider as the tender outcome may not be in their favour. For parties without connections, we are proposing to coordinate a connections review with the TOs and provide information to the provider to consider in their commercial tender submission. We are trying to strike a balance between someone paying for a full connections cost ahead of the tender vs a feasibility study cost which would inform their commercial tender submission. We have published scope of TO connections review process at the EOI stage.

**88. How will you value earlier delivery when perhaps the need case is less? i.e. being ready in 2021 but SCL level requirement then much less than 2030. (updated 05/10/20)**

We are reviewing this based on the feedback. We are not looking to change our latest start date of 2024 and end date of 2030. Please see our draft assessment methodology published at the EOI stage for more information.

**89. Are the assessment criteria for phase 2 aligned with Net Zero strategy? How different is it from the one adopted in phase 1? (updated 03/07/20)**

We have a license obligation to ensure safe, reliable and economic operation of the electricity system. Based on this obligation we cannot discriminate based on technology and therefore not able to directly consider CO2 emissions in selecting solutions. The procurement of cost effective stability services will allow us to operate the system with more renewable generation and limit system operation actions to intervene in the market. This aligns with our zero carbon operation 2025 ambition.

**90. Is inertia part of the requirement or assessment for phase 2? How will inertia be assessed? (updated 05/10/20)**

Inertia will be part of the assessment but will contribute to the national inertia need rather than a requirement specifically for this area. We have set a requirement of 6000 MVA.s which could be met by participants in this tender. The assessment will look to minimise the cost to meet both SCL and inertia requirements. This may involve only buying part of the inertia requirement through pathfinder solutions and meeting the remaining requirement using units in the Balancing Mechanism. Please see the draft assessment methodology for further details.

**91. Are ESO missing a trick by not giving equal weighting to infeed and inertia in phase 2? (updated 03/07/20)**

We intend to make the weighting between inertia and SCL reflect the actual value of the two parameters to the ESO based on our regional and national stability needs. We have provided details of this in our draft assessment methodology as part of the EOI. Refer to previous question.



**92. The tender is looking specifically for short circuit level; however it is acknowledged that the contribution of solutions to national inertia will be valued and more information will be given at the EOI stage. Will contribution to voltage support also be considered? (updated 03/07/20)**

See previous question.

**93. Will you be releasing any further information on how dynamic voltage support will be valued? (updated 03/07/20)**

In the tender assessment, we will only be valuing short circuit current and inertia. The stability solutions are required to meet the technical specification which asks for instantaneous reactive current injection and absorption. The static reactive range which is based on steady state reactive consumption can be declared in the contract. We are considering this in our contract payments but this will not form part of our tender assessment.

**94. Will ESO take account of the benefits of multiple small projects which are not subject to common mode failure vs large projects subject to single point of failure/tripping? (updated 05/10/20)**

We are not assigning any benefit to multiple small projects over large projects.

**95. Is electrical consumption of the proposed solution taken into account in the offer evaluation? (updated 03/07/20)**

We will not consider the volume of electrical consumption of a solution as part of the economic assessment.

**96. How will you ensure a like for like comparison with the TO bids - for example they do not have to pay TNUOS charges and energy costs are socialised. (updated 03/07/20)**

For TO solutions we will be looking at the total cost to consumers, which would mean including a calculation of socialised energy costs. We are looking to ensure consistency wherever possible, with the aim of accurately reflecting the cost to therefore consumer of options proposed by all parties.

**97. Under Draft Assessment methodology p2 it says ESO will provide Retained Voltage for each of the node substations. Why can't they give us that now for all possible substations in a table just like for the Effectiveness Factors as the retained voltages will affect our design. (added 22/10/20)**

Our original intention was to provide the retained voltage after the EOI closure so that it only needs to be given for sites providers were actively considering. Based on the feedback received, we are working to provide residual voltage values ahead of EOI closure over next few weeks.

**98. From the Availability payment split in the calculator it looks like you are valuing Inertia the same as SCL – How are you optimising between the two different parameters? (added 22/10/20)**

The assessment methodology sets out how SCL and inertia are optimised, which is different to how the availability payments will be apportioned. In the assessment, we will be seeking the lowest cost solution to meeting all eight SCL requirements and the inertia requirement.

**99. Do you optimise for SCL first and then look at residual inertia position? (added 22/10/20)**

In the assessment, we will be seeking the lowest cost solution to meeting all eight SCL requirements and the inertia requirement. This means they are optimised together rather than separately.

**100. In the Conditional tender example, it only calculates weighted price of Inertia, where is the weighted price of SCL assessment? (added 22/10/20)**

The conditional tender example was reproduced from Phase 1 and was intended only as an illustration of how to group mutually exclusive and all or nothing options. The prices and their calculations are not relevant to the Phase 2 process. Apologies for any confusion caused.

- 101. In the assessment methodology if a specific tender does not proceed to contract it seems to indicate that NG could also withdraw all other option previously accepted to find their optimal solution. This could impact companies who have committed to progressing post award and result in incurring substantial costs depending on at what stage this happens. Can NGESO give more clarity on how they see this being implemented and possibly look to remove the risk that even after being awarded a contract it can be withdrawn so easily at no fault of the provider. (added 22/10/20)**

Our aim is not to withdraw all acceptances if one project withdraws. However, to ensure that we optimise the assessment outcome, this may be considered and we will come back ahead of the tender with clear circumstances in which we would reassess all tenders.

- 102. The retained voltage aspect. Is it correct that that is only required for VSM technology and the effectiveness's provided in v2 excel from NGESO are still valid as those studies were done by ESO using Synch Machine equivalent? (added 22/10/20)**

No, this is required for all tenderers irrespective of the technology type. Your effective MVA of SCL against the 8 requirements will be the reactive current injected for a fault at the specific location (based off the retained voltage) multiplied by the effectiveness factor.

- 103. How do you compare like for like if you're allowing different start times (yrs 22-24) and tenderers not knowing how you value service provision early in say 22 versus someone arriving later 24 say, i.e. the system need from SO will probably change throughout the 2020s and we don't know the value you place on delivering earlier? (added 22/10/20)**

We will be comparing all tenders on a price per year basis and not assigning any additional value to those able to connect earlier. This is in response to feedback about the ability of potential providers to connect in early years and a wish to not disadvantage those who are not already connected or do not have connection offers.

- 104. What is the 'additional capability' compared with what NG expects to be inherently available in the energy market' - is this with respect to the generation mix projected in FES 2020? (added 22/10/20)**

Additional capability above what is already available will be determined by whether a generator appears on the July 2019 TEC register, or if they are adding extra capability to an existing asset.

- 105. Can assets be connected to the substations not highlighted and still be effective in stability? Basically would be great if you provide a table on the effectiveness at each substation. (added 22/10/20)**

You can email us which additional substations you are looking for, we can provide that information as long as it meets our 132kV and above criteria.

- 106. If a solution is technically eligible (meet all criteria), could it fail on the basis that it would have a low contribution to short circuit (as connected to a substation with low contribution to the key areas considered for SCL) (added 22/10/20)**

The technical specification must be met in order to proceed to the commercial tender stage. The commercial assessment will determine which solutions will have economic value for the end consumers. We have explained how SCL effectiveness will be considered in our draft assessment methodology.

- 107. EOI Criteria mentions that publication of key parameters (including price) - what price information is being referred to here? (added 22/10/20)**

In the interests of market transparency, we will publish cost information which would include the availability price submitted in the commercial stage of the tender. For examples of the information published following

previous tenders, refer to the results of the Stability Phase 1 or the Mersey Voltage Pathfinder tenders on our website.

- 108. How should we calculate the total availability payments for SCL and inertia given there is an option to submit a single bid price for both services while the availability and capacity for each service could be different. (added 22/10/20)**

Providers will have price this into a single value

- 109. Can you provide us with the TO Rate of Return and Cost of Capital numbers you will be using so we are all clear on them (as there are various numbers out there)? (added 22/10/20)**

We will be developing our methodology for costing TO bids and will aim to provide an indication of the rates used in the updated assessment methodology. This may be impacted by the outcome of the RII0-2 price control for TOs.

- 110. NG ESO want the Stability service as soon as possible and the tender originally had a Latest in Service Date of 2024 – surely you should value delivery before that date more than later proposals? (added 06/11/20)**

We will only be considering options connecting post April 2024 if we are unable to meet the requirements without them. Options connecting before 2024 will have a benefit over those connecting later. If we have enough options that can connect on time, then they won't be brought through to the assessment. It is only within this window of Apr 2022 to 31st Mar 2024 where we won't be distinguishing between those connecting earlier or later, and we have said this so as not to disadvantage those who don't already have connections or connection offers.

- 111. What is the service period SP in real hours? (added 06/11/20)**

A settlement period is 30 minutes. If the question was about when the service is needed, it is a 24-hour requirement so there isn't a set period of a day or year.

- 112. Is there a relationship between the retained voltages at each site and the effectiveness factors? (added 06/11/20)**

Both the retained voltage and the effectiveness are related to the system impedance between the point of stability and the 8 nodes where the need is defined. The reason we have used this approach is that it removes the need for service providers to consider the network, other than to use the retained voltage numbers provided to calculate the effective SCL MVA of their solution. We acknowledge that this approach will not be as accurate as a full system study but is simple and transparent which allows all solution providers to compete on a level playing field.

- 113. Will the introduction of short circuit current contribution factor to the effective SCL contribution calculation make a material difference to where a participant would view the best location to provide the short circuit requirement, compared to looking at the effectiveness factor table alone? (added 06/11/20)**

Generally, the retained voltage values should align with the effectiveness values and both largely reflect the system impedance between the point of stability and the 8 nodes where the need is defined. We have now published this as an update to the SCL effectiveness spreadsheet.

- 114. In a few places, the 100%-effective voltage is 275kV and 400kV. E.g. Peterhead, Denny North. Will the 400kV or 275kV location be used? Are specific substations used for retained voltages or the areas that are 100% effective? (added 06/11/20)**

As with SCL effectiveness, we will consider the 8 locations of needs when setting the retained voltages. The example table in the effectiveness spreadsheet shows which voltage to use in the table.

**115. How can we forecast the counterfactual BM costs for the future years? Would it be based on FES? (added 06/11/20)**

The counterfactual will be based off an economic dispatch and the FES scenarios. It will look at the cost for buying the same level of SCL and inertia support through the BM.

**116. Can you confirm BM counter-factual represents gen-sets of technologies available in the relevant year (or time frame)? (added 06/11/20)**

Yes, the counterfactual will look to buy the same level of support through the BM using generation that exists based off the FES scenarios and accounts for generation that would be expected to run based on the economic dispatch.

**117. I don't see how we can compare the relative merits of different sites without understanding the retained voltages. Can you confirm when these will be available (added 06/11/20)**

We have now published this as an update to the SCL effectiveness spreadsheet.

**118. How will tenders be assessed if they propose to provide slightly more short circuit MVA than the remaining requirement at a given location after other tenders have been considered. If there is a residual requirement of 1000MVA at one of the 8 locations once contributions from other accepted tenders has been considered, how will a tender offering 1200MVA be viewed? (added 06/11/20)**

The value would depend on what are the alternatives and where they exist. In this example where the offering is 200MVA more than what is needed, the options of 1200MVA would be selected if it is the cheapest way to meet that 1000MVA requirement. If there were other cheaper ways to meet the 1000MVA, they would be chosen first. But the 1200MVA might be the best option if any other way to get that 1000MVA was more expensive. There may also be some benefits to other sites based on the SCL effectiveness.

**119. Why not just ask for a fault study and then you will see what the additional fault current from each solution is at each of the 8 locations - the retained voltage and effectiveness factors together mean solutions away from these 8 sites are virtually worthless. (Your calculation shows 1600 MVA at Longannet but only 322 MVA or less at other sites). This massively favours bidders at these 8 sites. (added 06/11/20)**

The reason for using the retained voltages is that this will reflect the actual performance of the devices for faults at those 8 locations. This is the service we are procuring. The assessment methodology will select solutions that meet our needs in the most economical way.

**120. Is there a maximum SCL limit (for example Longannet has a very high effective SCL)? How will NGENSO cope with issues that far exceed the requirements? (added 06/11/20)**

There is no maximum from the assessment perspective. There may be limits on what the TO network can accommodate in certain areas, and that would be assessed in the connection review and/or in a connection application.

**121. Will NGENSO expect to purchase from a number of developers or would it prefer to deal with a single supplier for as much SCL and inertia? (added 06/11/20)**

ESO will choose what is the most economic value solution for end consumers in our CBA. There is no preference for the number of providers or individual solutions.

**122. Is unavailability of 1 or more options modelled in the optimiser? (added 06/11/20)**



It is not directly considered in the optimisation. However, we may consider additional procurement of solutions if we find the unavailability of an option has a significant impact on costs or our ability to operate the system securely.

**123. Are there indicative figures on procuring inertia from the balancing market? (added 06/11/20)**

There is a section in MBSS (Monthly balancing services summary) on RoCoF costs which may be of interest, however these are historical and will be impacted by changes to RoCoF relays. We do not publish more specific estimates on the cost to procure inertia.

**124. Will the retained voltages be issued for consultation? (added 06/11/20)**

The retained voltage values will not be consulted upon.

**125. Are you using a formal linear program to find the solution? If so, is the objective function a combination of SCL and inertia? If not, how do you do it? (added 06/11/20)**

Yes - we set all the SCL requirements and the inertia as the constraint where we must buy at least this amount, so the function optimises for the lowest cost to do that.

**126. Does your approach to start dates risk increasing cost to consumers by limiting liquidity? (added 06/11/20)**

Our start dates are driven by the system requirements. There would be also be a cost to consumers associated with not being able to meet these requirements from when they arise. We will update the assessment methodology with clearer details on how we compare those connecting before and after the end of the start date window.

**127. Is it right to scale inertia in the way you propose. If a solution provides inertia 50% of the time but that is when there is plenty of inertia that is a lot less valuable than a solution that provides inertia 50% of the time but when inertia is low? (added 06/11/20)**

In valuing inertia with reduced availability, we considered two things; the fact that in these cases the times solutions are likely to provide inertia is largely but not perfectly correlated with the need for inertia. (due to inertia availability driven by wind output). Also, the ESO control room value certainty in what inertia is available at a given time and may need to have inertia reserve if there is uncertainty. We therefore chose this approach so as to not over or under value the impact of the reduce availability.

**128. Presumably you only need the inertia at high wind conditions so 6666 at 90% availability may not be the same as 10000 MVA at 60% availability, if that inertia availability is not random. (added 06/11/20)**

See previous question.

**129. Why are contracts assessed based on £/year rather than NPV of costs between 2022 and 2030? (added 06/11/20)**

Apologies, maybe that was not a clear in way we put it. We will take the NPV over eight years, but we will be considering those who connect later to be there for the full eight years even when in reality they will not be - so effectively we are looking at them as if they arrived on the same date.

**130. Can NGESO publish a definitive list of all TO options that were considered as part of their baseline modelling of the short circuit contribution requirement and are therefore not able to participate in the tender as a TO solution? (added 06/11/20)**

All TO option considered in the baseline were published in last year's NOA and been given a proceed. All other TO option have not been considered base line and would be considered as part of this process.

**131. Will TO solution be amortised over 8 years (to 2030) to maintain comparability with third party solutions? (added 06/11/20)**

The current methodology assumes that we take the TO costs over the same eight year period as third party solutions. We are consulting on this methodology.

**132. Will you be including a cost for equivalent Network charges (which TOs do not pay) in the TO assessment as these will have to be paid by third party solutions? (added 06/11/20)**

Different solutions will face different costs, including between generation and demand, as well as transmission connections. These charges and who is and is not liable for them may change over the delivery period as a result of Ofgem's charging review. We will not be adding network charges onto the TO's cost in the assessment.

**133. Will NG ESO provide the retained voltages of the 8 concerned substation busbars when any one of them is in fault conditions? (added 06/11/20)**

Yes

**134. What assumptions you have made when calculating effectiveness factor, i.e. all fault paths considered? max or min fault levels used etc? (added 06/11/20)**

A future network with minimum conditions was considered. SCL calculating approach is explained in the effectiveness spreadsheet that is based on kA injection and short circuit fault impact.

**135. Can you please clarify that under what operating conditions the effectiveness factor published is derived from? (added 06/11/20)**

See previous answer.

**136. Tender price submissions from Commercial solutions are expected to include the energy cost of the solution as it is suggested that this is required to allow all solutions from Commercial providers to be compared on the same basis. As the risk of changes to the cost of energy will be borne by these Commercial providers, how does this allow fair comparison against TO solutions where the risk of changes to the cost of energy will be passed through to Customers? (added 06/11/20)**

As the TO are not exposed to energy prices but consumers will be, we will use prices from the four FES to forecast the cost of losses for TO options in the assessment. We will consider the differences in costs between the four scenarios when making any decisions on a solution.

**137. How would the optimiser treat larger solutions that are more expensive than the average solution on a £/year level but offers considerable savings on a £/MVA/year level? (added 06/11/20)**

So long as there was a need for the larger volume, the cheaper options on a £/MVA/year would perform better.

**138. Are solutions judged on a unit cost basis? (added 06/11/20)**

See previous answer.

**139. Will you be taking FCLs off non TO tenderers' prices as any contribution will reduce FCL paid by others therefore overall no additional cost to consumers? (added 06/11/20)**

No, we will not adjust any costs for FCLs. Note that Final Consumption Levies are only faced by demand connections, so neither TOs nor generation connections will pay FCLs.

**140. Will the ESO add final consumption levies to the energy consumed by TO options? (added 06/11/20)**

See previous answer.

**141. What is the difference between the results of the calculation near the start of the webinar and the Effectiveness table already published? (added 06/11/20)**

There should be no difference. Both are meant to illustrate the calculation but do not use real numbers.

**142. Shouldn't your retained voltage calculation be based on the voltage at the point of stability rather than the point of need given that is where the current is calculated? (added 06/11/20)**

This difference is included in the definition of the effectiveness. Effectiveness was calculated based of the current rather than the MVA. If we had used the voltage at the point of stability, we would have needed to change the effectiveness calculation to account for this which would give the same answer.

**143. Why do some sites have low retained voltage but not better SCL effectiveness? (added 06/11/20)**

Some network characteristics such as the proximity to generation or other dynamic voltage support equipment may lead to a higher retained voltage but not impact the short circuit current effectiveness. Therefore, there will not be a perfect correlation between the sites with highest SCL effectiveness and sites with lowest retained voltages.

**144. Why do sites at 132kV have low retained voltage but not better SCL effectiveness? (added 06/11/20)**

In addition to the previous answer, the definition of SCL effectiveness considers how effective an injection of current at the point of study is at the 8 points of need including the effect of any transformers which could reduce this current. This current is then accounted for in the conversion to the MVA which uses the voltage at the 8 points of need. However, as retained voltage is defined in p.u. this effect does not show in the numbers. Therefore, the total effect of the whole process will account for the actual performance of the solution at meeting the need but the effectiveness and retained voltage number may not totally align.

**145. How should I use the retained voltage to get my fault current contribution? (added 06/11/20)**

The retained voltages should be used to set up a network simulation to calculate the fault current contribution to the point of study. Set up your network with your solution and network modelled up to the point of study. The rest of the network should be modelled as an infinite bus. Then apply a three phase to earth fault with a fault impedance such that the retained voltage at the point of study is equal to the value published for your node. (The fault impedance should be set so the retained voltage is achieved without contribution from your solution). The fault contribution from your device is the instantaneous RMS current at 100ms after the fault.

**146. Please can you tell us how solutions from different companies but on the same land will be treated? (added 18/12/20)**

We will make options from different companies mutually exclusive where it would not be possible for them both to be built, we will communicate this as part of the assessment methodology and tender rules.

**147. Is there a maximum /restriction in the number of sites and/or solutions that one company can put forward and potentially be awarded with contract(s) from the tender process? (added 12/02/21)**

We have not currently set any form of limits in what can be offered in the tender, though if we do intend to, we will notify all market participants in advance of the tender.

- 148. Previously projects awarded that could not meet the longstop date of 1 April 24 would not be considered if a project prior to 1 April 24 was available, is this still the case? (added 01/04/21)**

We have revised our assessment methodology in light of the feedback received from participants through this process. We also set out how tenders will be assessed for solutions that can begin delivering after April 2024.

- 149. Would there be any additional costs for accessing the BM to supply SCL, for tenders that connect after 1<sup>st</sup> September 2022? (added 16/07/21)**

In the Assessment Methodology we take into consideration additional BM costs for solutions delivering from 1st April 2024. This will not be applied to solutions which are able to deliver between 1st September 2022 and 31st March 2024.

- 150. In accordance with the updated tender timeline issued on the 1st of June 2021 the Latest Start Date to the Service Term was removed, please confirm that the previous advice that all Tenders evaluated based on their annual fee applied over an 8-year period (even if only operational for 6 years up to 2030) is now revised and what will replace it? (added 16/07/21)**

The methodology is being updated to reflect this – tenders are evaluated on their total cost over the tender period from April 2022 to March 2034 (with options that start late having costs calculated as if they arrived in April 2022).

- 151. In accordance with the updated tender timeline issued on the 1st of June 2021 the Latest Start Date to the Service Term was removed, please confirm the application of Liquidated Damages for delay. (added 16/07/21)**

There is no change to the application of Liquidated Damages given the updated tender timeline. LADs will apply from the start date submitted by providers in their tender regardless of if this is before or after 1<sup>st</sup> April 2024.

- 152. In accordance with the updated tender timeline issued on the 1st of June 2021 the Latest Start Date to the Service Term was removed, please confirm it is expected that tenderers will nominate a start date based on their delivery programme and this is factored into the economic evaluation? (added 16/07/21)**

Yes, tenderers will submit a service start date that will be factored into the economic assessment. Start dates before April 2024 will not have any additional BM costs added, though this will apply to those intending to start after this date.

- 153. In the linear program, you are comparing the offered projects against the BM counterfactual. The offer prices are fixed but the BM counterfactual will have significant uncertainty around it. How are you dealing with this uncertainty in your modelling? Is it through scenarios, a different risk premium or some other method? I am concerned that if you are overly optimistic in what can be obtained in the BM in the future then we will not purchase enough of the service. (added 18/08/21)**

We are using four FES scenarios to manage uncertainty and take the NOA-style “least worst regrets” approach to using the counterfactual output. This approach is inherently risk-averse, so this, combined with scenarios that capture a range of realistic circumstances in the areas studied should prevent us from ending up with an overly optimistic result when it comes to the BM costs. For example if the need in one area is significantly more in one scenario due to specific plants being assumed to be closed, and BM prices are correspondingly high, this will drive us away from leaving part of the requirement to be picked up through the BM and towards choosing more pathfinder options.

**154. What stress testing are you doing to your linear program to understand the model and potential solutions? How are you assessing its sensitivity to assumptions you will make which have some uncertainty? (added 18/08/21)**

The model has been stress tested against a range of requirements and scenarios, including altering the assumptions made e.g. around costs.

**155. Will you provide transparency on your BM assumptions? (added 18/08/21)**

The assumptions are based on the FES scenarios, we cannot provide any further detail to what is already published.

**156. In the document you state that you will buy the minimum requirement in each area. Is this at any cost? (added 18/08/21)**

For the purpose of this economic assessment, we will aim to meet the minimum requirement at any cost using the commercial pathfinder options and/or the BM. There might be hours that we can't satisfy using any of these options so we wouldn't be able to meet the full requirement. For instance, if the BM is too expensive then the optimization would be able to choose a cheaper pathfinder option. However, all bids must be priced in line with the market and we may reject any tenders with costs that show a significant deviation from the other accepted tender prices.

**157. Is the 8.4 GVA the total requirement for SCL that you anticipate needing in Scotland or are you assuming existing generation will provide some as per now? (added 18/08/21)**

We included a background of existing generation in arriving at the requirement. This follows our FES background, so will include the closure of some existing generation at different dates in different scenarios.

**158. For BM options, are you only considering options that don't export MW onto the system such as pumped storage or are carbon free? (added 18/08/21)**

No, we are considering options that export MW (and the cost associated with balancing those MW elsewhere). We are also still considering carbon emitting generation as the ESO must use the most economic plant where possible in line with its license obligations.

**159. How does FES provide BM costs? (added 18/08/21)**

The FES provides us with scenarios for which generators are present or not, and estimates their dispatch to provide us with a background to inform the SCL requirements in each hour of each year. It is the availability of BM plant to be dispatched that affects the cost to rely on the BM for fulfilling our inertia/SCL needs more so than (for example) bid and offer prices.

**160. If the tender assessment only chooses new technology (e.g. GFC) would you be happy to take only that given that there are very few existing projects in the world? (added 18/08/21)**

We will accept any technology that passes the feasibility studies, so yes we could accept a solution made up of only one type of technology.

**161. Can we submit multiple bid prices based on a variety of inertia availability factors for one solution? (added 18/08/21)**

Providers will only be allowed to submit a single value for inertia availability for each project submitted and demonstrated in the feasibility study.

**162. Could we submit 0% inertia availability for a solution? (added 18/08/21)**

Yes, 0% inertia availability for a project can be submitted. The tender assessment will consider zero inertia and the contract will be based on SCL availability alone if successful.



- 163. Would the Provider be able to offer a mutually exclusive bundled option, as per 7.2 of the Assessment Methodology, comprising solutions at different connection points? (added 18/08/21)**

Yes.

- 164. As the Tender submission dates are between Nov - Jan, will sites submitted in November be reviewed ahead of those submitted in December/January? Or do they all get reviewed at the same time once the tender window closes? (added 06/09/21)**

All tenders will be reviewed together after the deadline as the assessment process/optimisation will consider all submissions together.

- 165. When do we have to submit our tender prices? Is it the start of November or the middle of January? (added 06/09/21)**

The prices can be submitted at any time during the tender submission stage which is from start of November till the middle of January. You must submit your price offer along with other information for the tender submission before the tender submission deadline in mid-January 2022 in order to be considered for the final assessment. The detailed information that is required for tender submission and the specific dates will be outlined in the ITT pack and will be shared with you before the tender submission stage starts.

- 166. Section 6.3 of the assessment methodology document refers to re-consideration of linked offers within a time period. What is that time period? (added 29/10/21)**

This will be specified as 15 days in the ITT pack.

## Connections

- 167. Will you consider planning consents as part of the feasibility of projects? (updated 03/07/20)**

We are not planning to consider planning consents as part of the feasibility study of projects. However, should a solution be successful, it will be listed as part of the Post Tender Milestones. The full list of PTMs will be shared in the EOI.

- 168. Will mod app fees be required to be paid by providers who need to modify their connection (for example if the MSA needs updating)? (updated 03/07/20)**

If changes are required to the connection agreement to be able to deliver the project, then the regular process to amend the agreement will need to be followed including fees.

- 169. Will participants be required to have legally-binding land rights when bidding? (updated 05/10/20)**

This will not be a requirement as part of participating in the tender, but as part of the tender submission, providers are required to provide an indicative set of Post Tender Milestones outlining the steps necessary to complete their build / conversion project with associated timescales. Should a solution be successful, the PTMs will be finalised in the contract. A list of possible items that will be required as part of the indicative PTMs is included in the Heads of Terms which is published as part of the EOI.

- 170. Are there any pre-requisite tender requirements around planning consent or necessary land rights? (updated 03/07/20)**

Refer to the previous question.

- 171. How will you manage the fact that connection applications are likely to be submitted by developers very soon in aid of securing their connection? (updated 05/10/20)**

We do not require a connection offer as a pre-requisite for entering the tender. We are working with the TOs to streamline any connection queries and tender interactions.

**172. Sorry, my question re phrased is developers will apply NOW with a view to secure, if this is done will it freeze out other applications and steal capacity. (updated 03/07/20)**

We understand that developers will apply now for connections, land rights and others. We cannot stop that from happening and we do not want to introduce provisions that have an inappropriate impact on prospective Users rights and obligations. However, we do not require connections as a prerequisite for the tender.

**173. It may not be a pre-requisite of the tender, but developers will press ahead to secure grid and land rights, how will NG manage this to stop developers locking up land/grid well ahead of the tender\_(updated 03/07/20)**

We are not able to stop participants to do this. We are trying to ensure that participants are not disadvantaged in the tender assessment due to not having a connection offer or land rights.

**174. What confidence does the ESO have that the Scottish TOs can deliver new connections in a timely manner? (updated 03/07/20)**

We work with the TOs in Scotland to ensure that connections can be developed and delivered as efficiently as possible. Connections will be delivered in line with the provisions of our respective licences, the CUSC and individual Bilateral Connection Agreements.

**175. Which infrastructure is referred to as infrastructure not directly borne by the tender participant? We are assuming this is any and all infrastructure that falls under the following CUSC clause 14.2.2 and 14.2.6. (added 22/10/20)**

The assets in these clauses are connection assets (not infrastructure) and are directly borne by the user (i.e. the tender participant) through connection charges. They are not infrastructures assets charged to all users. The different types of assets are:

Infrastructure assets: Assets owned by the TO that is not directly charged to a specific user. Although the costs of infrastructure assets are socialised to the industry and are not borne by the user, the latter will generally have to provide securities in case they terminate and the TO have already started designing/ purchasing/ building their assets.

Connection assets: Assets owned by the TO which are installed solely for and only capable of use by an individual User. The costs of these assets are recovered by the TO through connection charges which the users would have to pay.

User assets: Assets owned and purchased by the user.

**176. Which costs are referred to as “costs for the provision of security”? (added 22/10/20)**

Securities need to be provided by the tender participants to cover the risk of a tender participant walking away. A cost profile will be provided to tender participants to reflect the TO's spend on infrastructure. Tender participants may incur costs in providing the securities (e.g. cost of a letter of credit or cost of capital if cash security is provided) and these need to be included in the tender participant's bid.

**177. What fault level information (either RMS or peak values) TOs require to assess connection application? (added 28/10/20)**

TOs require the information specified in the DRC schedule to carry out system studies for a connection application.

In the context of fault levels, TOs we will assess against both RMS and peak fault currents as they need to assess against all limits. The purpose of this assessment is to identify any potential overload of equipment's

fault withstand capability including whole substation infrastructure. If any of these limits are breached, then TOs need to find solutions to ensure safe operation of the network in a cost effective manner.

**178. Is there any requirement to have a n-1 secure connection for any sites (for example is one bay sufficient)? (added 28/10/20)**

There is no requirement to have a specific type of connection, but the providers need to consider how their connection design may impact 90% availability which will have an impact on their payments.

**179. Is there any requirement to have SQSS compliant connection? Are design variations acceptable? (added 28/10/20)**

There is no requirement to have a specific type of connection, but the providers need to consider how their connection design may impact 90% availability which will have an impact on their payments.

**180. Will ESO accept tertiary connections? (added 28/10/20)**

There is no such requirement to have a specific type of connection, but the providers need to consider how their connection design may impact 90% availability which will have an impact on their payments.

Transmission owners in respective areas will need to determine based on their connections assessment and their policies whether tertiary connections are acceptable or not.

**181. For compliance and Grid Code what would a Synchronous Compensator be classified as? (added 28/10/20)**

A synchronous compensator does not fit neatly into either generation (which includes storage) or demand within the industry framework. Therefore, when connecting synchronous compensators to the transmission network, it is not clear which parts of the framework should be applied and the processes to follow. We note that Ofgem has determined that flywheels are a form of electricity storage ([Ofgem decision](#)). If this were to apply to synchronous compensators, it would mean that they were storage and hence should be treated as generation. We are discussing with OFGEM whether the determination applies within this context.

**182. If Synchronous Compensator machines would be classed by OFGEM as storage, does that mean TOs can't invest in these and offer them in the tender because OFGEM has decided in Dec.2018 that Network companies cannot own generation which includes storage assets? (added 28/10/20)**

As set out previously, synchronous condenser connections are not recognised in the current industry framework. The ESO notes that they might fall within the definition of storage and is discussing with Ofgem. We believe that comparing commercial solutions and TO solutions on a level playing field will give the best value to consumers. Therefore, we will consider any TO solutions that are submitted in a process similar to a commercial provider.

**183. Providers without a connection offer in place and wanting to connect before the Latest Start Date, in order to not incur additional costs, will need to have a connection agreement in place by 1st April 2023 at the latest, since this is a PTM requirement. This timeline does not seem feasible for a new connection to be delivered. Can you please clarify, as this potentially puts participants without a connection offer in place at a disadvantage? (added 16/07/21)**

The contract requires the connection agreement to be in place at least one year in advance of a providers tendered service start date. The connection review process aims to give an indication of the connection timescales that will be achievable. Services which are able to start sooner and are economic will provide savings to the end consumer and this will be factored in to the assessment.

- 184. What is the update on classification of synchronous compensators being demand or generation? (updated 29/10/21)**

Please see our [website](#) for information.

## Connections review

- 185. Will you provide the assumed cost of connection for each connection type and level during EOI stage? (updated 05/10/20)**

This will form part of the connections review with TOs. We have published a scope of the connections review at the EOI stage.

- 186. Does ESO intend to fund the connections review? (updated 05/10/20)**

No cost for the connections review will be passed on to providers and will be covered by the ESO.

- 187. Will participants be given a high-level overview of which connection charges they will need to incur to submit a connection application before, during or after the connections review process? If not earlier than during the connections review process, are participants free to contact a prospective TO to get an estimate range in which these connection charges could fall or will this be communicated directly by NGESO? (added 22/10/20)**

Under a formal connection application process where a provider has applied and paid for a connection to a site, TO will carry out a detailed assessment of the costs of connecting a particular solution to the site. TOs may not be able to provide any cost estimates without doing that work. Under the normal connections process, a provider is free to contact TO for a pre-app call if they want any high-level information. In the TO connections review process under stability phase 2, providers are not charged any connection fees and ESO will coordinate the work with TOs to get the relevant high-level cost/connection works information. The ESO will provide this information to providers after completion of the TO connections review process. If successful in the tender, tender participants will then need to submit a connection application.

- 188. What happens if the connection availability or cost changes between the Connection Review and award of the contract? (added 22/10/20)**

There are limitations with the connections review process. The background could change in between the connection review and the contract award which could impact availability and costs. We have explained these limitations in our connections review scope document. While we recognise that there could be changes, we will require tender participants to submit full and final bids which cannot be changed post tender and therefore expect providers to factor in all costs and risks for their projects. This avoids the consumer taking financial risk for delivery of the contract by requiring NGESO to amend contract prices.

- 189. When can the TOs provide us with the infrastructure cost they will be charging for different connection solutions? (added 22/10/20)**

This will be at the end of the TO connections review process.

- 190. The coordinated connection review delivers very late to be useful in evaluating, discussing and using in a bid. Can this not be accelerated? (added 22/10/20)**

The normal timescales for a connection offer are around 7 months. Based on the number of solutions requiring the TO connections review, we will adjust the timelines.

- 191. Will participants get any preliminary outputs on the expected programme of works from the incumbent TOs before the final outputs? (added 16/07/21)**

We will not provide any preliminary outputs as this could be misleading. TOs will provide final outcome to ESO at the end of the connections review process.

- 192. It is not clear when the outcome of the connection review will be fed back to the market – is this likely to happen before or after the ESO review? (added 16/07/21)**

The outcome of the connection review will be fed back to participants following the ESO review.

- 193. Why does the connection review output (following the connection assessment and ESO review) overlap with the start of the tender submission window? (added 16/07/21)**

This is to allow participants more time to review the invitation to tender pack in advance of receiving the outcome of the connection review.

- 194. Sites where the Pathfinder has generated significant interest in Grid Connection that has resulted in multiple interactive offers, how are NGENSO going to reconcile this to the Pathfinder Grid Connections Review to ensure that all parties that have developed projects get a fair opportunity to compete? Will NGENSO assume some projects may fall away completely? (added 16/07/21)**

Our tender process was developed to allow wider participation and not requiring connection offers as a prerequisite to participate in the tender. Your question highlights the challenges seen due to this approach.

We are trying to be fair and consistent with our approach for all providers irrespective of their connection statuses. We are working in line with the existing connection queue assumptions approach in this pathfinder. We are not able to assume which projects with a connection offer might fall away as part of the formal connections process or as part of the connections review process.

- 195. I have a signed connection agreement which requires me to begin to fulfil various obligations (e.g. payment of securities); but I do not yet know if I will be successful under in the stability pathfinder tender. What are my options? (added 06/09/21)**

Your connection agreement specifies the connection cost and date for your project, these details should be used to inform your commercial tender submission. The details of infrastructure works specified in agreement will be used by NGENSO when your project is assessed in the tender assessment.

If you choose to meet the obligations of your connection agreement, then your connection process will continue, and the connection costs and dates will remain valid and will be used in the tender assessment process.

If you choose to terminate or waive your contract ahead of the tender submission in January 2022 (exact date will be in ITT pack), these works, costs and connection date will no longer be valid and cannot be used in the tender assessment.

Participants with a connection agreement did not form part of the scope of the Connections Review. The results of the Connection Review cannot be applied to participants that were not included in the original scope.

Participants considering terminating their connection agreement should contact NGENSO as soon as possible.

- 196. I have a signed connection agreement, but I am considering a mod-app. What are my options? (added 06/09/21)**

If you choose to submit a modification application this will be managed by NGENSO and the relevant TO in line with the established formal process (maximum 3-month period following clock start).



If you receive and sign your updated connection offer ahead of the tender submission deadline in January 2022 (exact date will be in ITT pack) then we will use the connection costs and date specified in that agreement when your project is assessed in the tender assessment.

However, we can still use the contents of an updated connection offer even if it is not signed as long as you receive the updated connection offer ahead of the tender submission deadline in January 2022 (exact date will be in ITT pack), and that offer has validity beyond the tender award date in March 2022 (exact date will be in ITT pack). If your unsigned offer meets these criteria, then we will use the connection costs and date specified in that offer when your project is assessed in the tender assessment.

To ensure you receive your new offer ahead of the tender submission deadline the clock start for the mod-app process must occur no later than end September 2021. Please note that clock start does not automatically occur at the point an application is submitted; the clock will start only once an application has been reviewed and deemed competent and the application fee is received.

Participants considering submitted a mod-app should contact NGENSO as soon as possible to ensure their ongoing participation in the pathfinder process is not put at risk.

**197. When will tender participants receive outcome of the connections review? what information will tender participants receive? (added 06/09/21)**

The results of the Connections Review process will be provided to participants by end of November 2021. Participants will receive the following information:

- Description of the works required to provide a connection for each proposed solution (works to connect at the proposed TO site plus works to address any fault level issues identified)
- Estimated cost of transmission works for each solution (split into connection and infrastructure costs)
- Estimated connection date for each solution

Please see the connections review scope [document](#) for more information.

**198. What is the difference between infrastructure costs and connections costs? What costs should be considered by the tender participants for the Stability Pathfinder Phase 2 project? (added 04/10/21)**

Connection assets are non-sharable assets installed for, and only capable of use by, an Individual user. All sharable assets are classed as Infrastructure assets and the costs associated with them are recovered through TNUoS charges.

Guidance on the different types of costs associated with a transmission connection can be found here: [ESO Connection Charging Guidance](#)

For Stability Pathfinder Phase 2 tender assessment process, there are three main elements of costs associated with a connection:

1. Participant site works – the cost of the participant’s stability assets, any works required to establish a site to house those assets, and the assets required to provide a connection between that site and the TO’s substation
2. Participant transmission connection assets – the new assets that must be delivered to connect a customer to the transmission network that are for the sole use of that customer

3. TO infrastructure assets – any works triggered by a customer connection that require new shared assets to be delivered and/or existing shared assets to be upgraded

Items 1 and 2 should be considered by the tender participant within their commercial tender submission. Item 3 will be considered by NGESO in the assessment of tender submissions. The [tender assessment methodology](#) explains how infrastructure costs will be considered.

All tender participants are responsible for estimating costs for item 1.

If a participant has an existing connection agreement, or valid connection offer, then the costs of items 2 and 3 will be taken from that agreement or offer.

If a participant does not have an existing agreement or offer, then their proposed solutions will be assessed through the connections review process and the cost of items 2 and 3 will be estimated by the relevant TO.

Please refer to the [connections review scope document](#) for more information.

**199. What assumption is the Stability Pathfinder Phase 2 Connections Review process making regarding location of solutions' sites? (added 04/10/21)**

The scope of the Connections Review work being undertaken by the Scottish TOs is limited to considering the infrastructure and transmission connection works required to provide a connection at the TO substation for the solution proposed by the participant.

For the purpose of the Stability Pathfinder Phase 2 Connections Review process, any works required to provide a connection from the participant's site to the TO substation are the responsibility of the participant and should be considered when developing their commercial tender submission.

## Tender technical feasibility study

**200. Does ESO intend to fund feasibility studies? (updated 05/10/20)**

Feasibility study will be undertaken and paid for by providers to demonstrate meeting key technical specification.

**201. What costs are participants likely to be required to cover as part of the feasibility study, including the connection assessment? (updated 05/10/20)**

Feasibility study costs are expected to be covered by the participants. The connections review process will be coordinated by the ESO and providers will not be paying for it.

**202. Are you expecting any models of performance to be provided at this stage or results from studies? the level of fault contribution for different residual voltages during a fault as per type b FRT faults may be helpful in the consideration of GFC effectiveness to more remote faults. (updated 05/10/20)**

We are not expecting any models to be provided during the tender. At the technical feasibility stage, we will be looking for study results to demonstrate compliance against some aspects of the technical specification. We have considered an approach similar to the one described to account for effectiveness due to remote faults.

**203. What will be the process to determine the technical capability for the solutions to deliver the services required in this tender? (updated 03/07/20)**

Desktop based feasibility study ahead of commercial tender submission.

**204. Is synchronism and rotor angle stability considered in this phase? Will EMT models of non-synchronous machines be released for the sake of transparency? (updated 03/07/20)**

As the feasibility study stage, potential solutions will need to demonstrate performance of their solutions for a series of tests (including tests for voltage angle changes). As ESO we don't own models so we cannot share any user defined models.

**205. What feedback is provided during the feasibility study. Is there scope to refine parameters during the study? (updated 03/07/20)**

We have published more information at the EOI stage on what can be changed after EOI. At the feasibility study stage, we expect that providers will have some feedback from the ESO before submitting their final feasibility study report.

**206. Can ESO provide any further information at this stage on what we will be required to provide and demonstrate during the feasibility study? Will the feasibility scope and requirement be published prior to the EOI commencing? Is NG the sole determinant of whether the feasibility study is passed or not? (updated 03/07/20)**

Yes, we have published a feasibility study guidance note which includes a list of simulations that we want to see. We will also publish a feasibility study template which providers are expected to populate and submit at the end of the feasibility study.

The main purpose of the feasibility study is to understand technical capability of any proposed solution with respect to the technical specification. We will use SCL and inertia values determined at the feasibility study will be used for commercial tender assessment.

The ESO will determine if a particular solution has passed the feasibility study and will be invited for commercial tender.

**207. Can you confirm EMT is not required for synchronous machine as a conventional generator would not require such a study and can be fully modelled in say Power Factory. (added 22/10/20)**

In this tender, we are considering all technologies equally. We are asking all technologies to provide EMT based results in the feasibility study to be able to compare them equally in the commercial tender submission.

**208. What is the expected interface point where bidders are expected to provide equipment/apparatus from i.e. interface point is busbar clamps, and bidders provide EHV bay equipment? Is this the same for all locations / designs of substations? (added 28/10/20)**

This will be dependant and in line each solution's bilateral connection agreement.

**209. Can you provide the site specific SCL range and X/R ratio for each possible substation as soon as possible for all possible substation locations in order that we can start doing the Feasibility work now? (added 28/10/20)**

This data will be provided on a site-specific basis upon completion of a successful EOI. If you want to do some early development work, minimum and maximum SCL values are published under our Electricity Ten Year Statement (ETYS) [document](#) Appendix D annually. However, the minimum value in ETYS are only for current year so the site-specific values may be lower.

**210. You mentioned that we can see current SCL values for each substation on your website - please can you clarify exactly where? (added 28/10/20)**

They are published annually under our ETYS [document](#) Appendix D.

**211. In the Feasibility Study Guidance document pages 6,10,11 all refer to a 140ms timeframe but page7 refers to a 100ms timeframe. Are these all correct? (added 28/10/20)**

140ms in the feasibility study guidance refers to fault clearance times. These are the times that should be studied in the feasibility stage. 100ms is the time we will consider for SCL value for commercial tender assessment. The SCL behaviour of a device is more complex than can be represented by a single number, however to do a commercial assessment we need to be able to compare solutions in a like for like manner. This is the purpose of the 100ms value.

**212. Can we be given the reactive power utilisation that the TOs are factoring into their costings? (added 28/10/20)**

Commercial solutions will be paid ORPS rates for any reactive power provided to the system. As we want to compare TO and commercial solutions on level playing field, we need to factor in the difference in cost of the TOs not receiving the same ORPS payments. We will make an assumption of utilisation based on past and future trends. The utilisation we will use will be site specific for each solution and reflect the expected reactive power needs over the contract term at these locations. We will not publish this data.

**213. TGN(E)228 is quite onerous and can increase costs, could you indicate if there is any flexibility in meeting TGN(E)288? (added 28/10/20)**

It is not possible for us to forecast how often over-voltages will be seen on the GB transmission network. We expect that in a low system strength network, we will see more over voltages due to normal system events. A stability provider must be able to absorb RMS over-voltage up to 1.4 p.u for 100ms.

**214. Are any of the technical requirements beyond what a Synch Comp would naturally, without special enhancement, be expected to provide? (other than say inertia via a fly wheel) (added 28/10/20)**

We would expect most requirements would be inherent for a synchronous machine but would be dependent on individual manufacturers. There are additional requirements such as Power Oscillation Damping capability which may need additional capability.

**215. My understanding of point 1.2.7 is that in the grid forming workgroup there are still discussion regarding the bandwidth of 5HZ. What is the alternative if the requirement has not been yet totally agreed in the grid forming workgroup? (added 28/10/20)**

The text reflected the latest version of the GC0137 work group at the time it was published. We acknowledge that this topic is still undecided at the current time. We will be keeping an eye on the conclusions of the GC0137 work group for what they decide. We want to strike a balance here between not changing the technical specification to allow providers to design their solutions and making sure it reflects the best outcomes of GC0137. We will therefore make a decision based on the output of GC0137 whether to change our technical specification based on the impact this has on providers and where we are in the stability pathfinder tender.

**216. Even though reactive power is supplied, grid forming converters may need an energy reservoir to provide the reactive current. How many consecutive short circuits does the plant have to be able to supply before recharging its energy reservoir? (added 28/10/20)**

Repeatability is defined in the technical specification. We want to know the limitation but there is not a specific number. This is based on the similar grid code requirements.

**217. Are you expecting both a Power Factory model (RMS) and a PSCAD (EMP) model? (added 28/10/20)**

As defined in the technical specification, providers must submit an RMS model as part of the service contract and an EMT model if requested.

- 218. For a Grid Application for a Conventional Synchronous Machine there is no requirement for EMT studies by the developer. Please can you explain why such a study is required for Synch Comp technology for this feasibility study? (added 28/10/20)**

In this tender, we are treating all technologies equally, so we are asking for the same requirement from all.

- 219. Is the continuous voltage support expected to be delivered cumulatively to SCL and inertia or only up to the total rating of the plant? E.g. if the plant is already providing the full MVA rating for continuous voltage support and there is a short circuit, does the SCL have to be provided on top of the continuous voltage provision or only up to the awarded MVA rating of the plant? (added 28/10/20)**

The stability service is need at all times. If the steady state operation of your device is limiting its ability to provide stability support you will need to enter with a lower value of inertia and SCL to reflect this reduced ability. Or you will need to change steady state operation of your device to enter the service.

- 220. A 1.1.2: "Setting of H must ensure that GFC does not hit rated current with RoCoF of +- 1Hz/s" -> is this only considered when active / reactive power setpoint is zero? What if the converter is stationary already operating at full power? Is the availability of inertia considered to be zero in this case? (added 28/10/20)**

See question above.

- 221. A 1.1.1: is this only additional current? Meaning if the current setpoint before the fault was nonzero, is here only the difference to the stationary current setpoint considered? (added 28/10/20)**

See question above.

- 222. Is stacking of services possible, e.g. with FFR or peak shaving applications for battery storage? (added 28/10/20)**

We have shared in the Heads of Terms as part of the EOI an initial list of services that may be stacked with Stability Phase 2.

- 223. Are you expecting all bidders to do feasibility studies for all options, many of which presumably will not be financially attractive to NGESO? (added 28/10/20)**

Yes, completing a feasibility is a prerequisite of an option being considered in the commercial tender. Providers can withdraw any options at any time.

- 224. What is the bottom frequency value to be considered for the provision of inertia? E.g. 47 Hz? (added 28/10/20)**

This is specified in section 1.2.12 of the technical specification and refers the frequency limits in the Grid code.

- 225. A 1.2.3. and 1.2.8., 1.2.10. seem to be contradictive. Could you please clarify. Can one choose between the options when voltage drops below 0.9pu? (added 28/10/20)**

1.2.3 is defining requirement for grid forming behaviour of keeping internal voltage reference fixed for voltage dropping below 0.9 p.u.

1.2.8 is defining requirement for reactive power injection support during disturbances/faults.

1.2.10 is defining requirement for reactive injection response time and proportion.

In our view, these three clauses are complimentary to describe the behaviour of reactive current injection during a disturbance/fault.

- 226. Do NGESO do the feasibility tests or the developer? (added 28/10/20)**



Developers will need to complete the feasibility study before progressing to the commercial tender stage.

**227. Will the retained voltage information be issued before EOI is finalised? As these impact assessed volume of SCL, they are important for site selection/solution optimisation and values cannot be changed post EOI? (added 28/10/20)**

Yes, based off feedback we will be providing this ahead of EOI closure and hope to get it out in the coming weeks.

**228. To be clear, for a device like a synchronous condenser, we don't have to provide active current oscillation damping (as we have no prime mover), we can provide oscillation damping through reactive current only? (added 28/10/20)**

Yes, for devices without a prime mover could provide only require reactive current damping. This could be considered as inherent from AVR for reactive oscillation damping or from another control system. Refer to the technical specification clauses on Power Oscillation Damping.

**229. Please can you go through "Example 1 Calculating Effective MVA values for SCL requirements" in "Draft Assessment Methodology V1" demonstrating how you calculated the values in each of the tables and the relationship between them? (added 28/10/20)**

This will be covered in the assessment methodology webinar and there will be opportunity to ask questions.

**230. I understood the effectiveness table previously supplied but by now also applying the retained voltage is that not double accounting? (added 28/10/20)**

No, the retained voltages calculation will demonstrate the short circuit current contribution into the point of stability from the solution for a fault at each of the 8 requirement locations. The effectiveness number will calculate the effectiveness of the current injection at the 8 requirement locations.

In order to run an assessment methodology, this method is a simplification of the actual performance of any device. In doing this we need to strike a balance between the accuracy of any calculation and keeping it simple and transparent. We believe this approach reflects the relative performance of solution whilst being simple and transparent in its implementation.

**231. When will NGESO provide the network to be simulated in the feasibility studies? In which format? (added 28/10/20)**

We will not be providing any models. We will be providing SCL and X/R ratios for providers to model the network. Retained voltages can be modelled by varying fault impedances.

**232. Can bidders recover the costs for all of these feasibility studies from NGESO? (added 28/10/20)**

No, this cost will not be covered by ESO.

**233. Did I hear correctly - the vector change studies are required for the feasibility study but are not a pass/fail criterion? (added 28/10/20)**

We are asking for 3 angle changes and expect Grid Forming Converters and synchronous machines to withstand these changes. We also want to understand how the machine behaves but there is no minimum performance for the behaviour.

**234. If my machine does not meet the requirements will it be hindered in the assessment? (added 28/10/20)**

A solution must pass EOI and Feasibility study to proceed to tender.

**235. For the DRC schedule, do we need to provide all the data classed as necessary for submission, or can we just provide SPD info? (added 28/10/20)**

Any data field stating "Yes" in the 'essential at the application stage' field within the DRC form is required.

- 236. Is co-location of assets acceptable? i.e. windfarm and synchronous condenser. (added 28/10/20)**

Yes, this is acceptable.

- 237. How should the SCL value be calculated? By simulation, short circuit calculation (e.g. G74 or IEC60909), and should factors such as transformer tap position be considered in any way? (added 28/10/20)**

SCL at 100ms for the EOI submission can be calculated based on G74 or IEC standards but will need to be proven through feasibility study simulations for consideration in the commercial tender assessment.

SCL values for the DRC schedule are likely to be from manufacturer/supplier datasheets.

- 238. It is my understanding that it is possible to calculate the fault current contribution at the POC/POS based on the retained voltage level for a fault at each of the remote locations. However, are you asking the tenderers to model the full network at the feasibility study stage using the network impedances provided in the ETYS to determine fault current contribution at the remote fault location? Or is there a more simple way to determine? (added 06/11/20)**

No, you will not need to model the full network. We expect you to model a single machine infinite bus with an impedance between your device and the point of stability that reflects the actual connection. Then apply a three phase to earth fault with a fault impedance such that the retained voltage at the point of stability equals the values given by the ESO. The fault current will then be equal to the instantaneous RMS current at 100ms after the fault.

- 239. It is my understanding that it is possible to calculate the fault current contribution at the POC/POS based on the retained voltage level for a fault at each of the remote locations. However, are you asking the tenderers to model the full network at the feasibility study stage using the network impedances provided in the ETYS to determine fault current contribution at the remote fault location or is there a simpler way to determine? (added 06/11/20)**

See previous question.

- 240. In the Tech Spec V2, please clarify what 1.2.10 means ("..be capable of reactive current injection at the Grid Entry Point or User System Entry Point as soon as possible and starting within at least within 5ms of the voltage disturbance using the whole machine rating and proportional to the size of the voltage dip") preferably with an example, esp. in the context of GFCs. (added 06/11/20)**

Refer to our technical webinar recording. A response from GFC plant will be limited by its converter limits.

- 241. For feasibility study of Stability pathfinder assessment, are you expecting both EMT (electromagnetic transient) and RMS dynamic studies to be carried out? (added 17/11/20)**

For feasibility study, we are asking for EMT studies for everyone. These can be done in power factory/pscad or another EMT analysis tool.

- 242. In your Technical Specification Part D Model provision, you require the provider to submit an EMT PSCAD model before/after commissioning of the Facility. Would you accept the EMT model in Powerfactory? (added 17/11/20)**

Please refer to the updated text regarding model provision in V3 of the technical specification. For provision of model after the contract award and pre-commissioning, an RMS model will be required but EMT model will be on case-by-case basis only. Hence, we mention that EMT model must be submitted if requested. If

requested, the exact requirements of the EMT model will be agreed at that stage similar to the exact requirements of the RMS model.

**243. If the plant is already operating at rated power, e.g. due to a severe frequency event that requires inertia - is it still required to provide Power Oscillation Damping on top of that? (added 17/11/20)**

No, we don't expect plant to provide power oscillation damping while supporting inertia/frequency events. POD is required under steady state operation.

**244. Can you confirm that it is sufficient that a converter based plant contributes its MVA rating to SCL and inertia in parallel? (added 17/11/20)**

We would expect a plant to support combined frequency and voltage events and to meet all the requirement of the specification. If in doing so you would exceed the current rating of your converter you would be allowed to cap the output at the current rating of the converter and maintain the phase angle of the injection. The values for inertia and SCL you declare in sections 1.1.1 and 1.1.2 should only reflect the capping for active or reactive current separately not for a combined event.

**245. For synchronous machines, does ESO require an EMT model for feasibility studies? (added 18/12/20)**

We are asking for EMT analysis in any tool as part of this feasibility study. For synchronous machines, we will accept RMS model based EMT simulations.

**246. Should feasibility studies be done considering nominal impedances of equipment or low/high manufacturer tolerance limits? (added 08/02/21)**

It is up to the providers how they model their machine/transformer impedances in the feasibility study considering its impact on SCL and inertia values. The SCL and inertial values from the feasibility study will be used in the commercial tender assessment/submission.

These values will also be entered in the commercial contract. Please refer to the draft contract terms on changes allowed post contract award and post contract signing.

**247. In Test4 of the document "Stability Pathfinder Phase 2 – Feasibility Study Guidance Note V2" is stated: *combine the tests from Test1 with the frequency events from Test2 and "Freq fall from 50Hz to 49.5Hz at 0.5 Hz/s"* but there isn't any frequency event from 50Hz to 49.5Hz at 0.5Hz/s in Test 2. Is test 4 simulation "from 50Hz to 49.5Hz at 0.5Hz/s" or "from 50Hz to 49.2Hz at 0.5Hz/s" as described in Test2? (added 08/02/21)**

This a typing error in Test 4 of the document "Stability Pathfinder Phase 2 – Feasibility Study Guidance Note V2". We have updated this in V3 of the document. Please use "from 50Hz to 49.2Hz at 0.5Hz/s".

**248. Test 2 mentions simulations at different levels of MW output if the inertia output is different. For battery assets, is it sufficient to consider these dispatches? (added 08/02/21)**

4. Zero MW (baseline)
5. Max Discharge
6. Max Charge

Yes, it is sufficient to consider these 3 dispatch conditions for battery assets.

**249. What results parameters are required for each of the simulations? (added 08/02/21)**

We have given some indication in the feasibility study guidance note and we will accept more variables/results if providers think that it shows relevant demonstration.

**250. Would you accept a single measure of the voltage or each of the three phases? (added 08/02/21)**

We expect to see positive, negative, zero sequence or 3 phase values (instantaneous) based on EMT simulations. Please note the feasibility study guidance V2 & V3 ask for 3 phase balanced faults only.

**251. Please give some examples of what is meant by ‘technology type/technology combination’ within the feasibility guidance document? (added 08/02/21)**

By ‘technology type/technology combination’, we are referring to technology types such as synchronous or converter or a combination of both. Some examples are following:

- Projects comprising of synchronous condensers (with or without flywheels) will be considered one ‘technology type/technology combination’.
- Projects comprising of synchronous condensers with battery energy storage will be considered one ‘technology type/technology combination’.
- Projects comprising of battery energy storage will be considered one ‘technology type/technology combination’.

**252. What do you mean by ‘asset rating’ in the feasibility study guidance note? Is this SCL value in MVA? Or is it referring to some other unit? (added 08/02/21)**

Asset rating can be used interchangeably with SCL value if options with the same nominal asset ratings have different SCL and inertia. For example, if there are synchronous condensers (with and without flywheels), treat SCL MVA as ‘asset rating’ but choose option with both ‘high SCL and high inertia’ for max ‘asset rating’ and project option which has low value for both ‘SCL and inertia’ to treat as minimum ‘asset rating’.

**253. What tests are needed for each technology type/technology combination? (added 08/02/21)**

The feasibility study guidance asks for all tests for minimum & maximum asset rating per technology type. Refer to the previous questions on ‘asset rating’ and ‘technology types’.

**254. What tests are required for each project? (added 08/02/21)**

Test 1-Step 3 and Test 2-all steps are required for all projects for which each SCL & inertia combination that will be submitted as a separate commercial option in the commercial tender. Results for these will need to be shown for all individual projects in sections Test 1 and Test 2 of the feasibility study template.

**255. Is it acceptable to combine multiple feasibility studies for various ratings and sites into one report? (added 12/02/21)**

One feasibility report per provider is preferred and acceptable.

Please have a clear and logical structure of how different sites and technologies are considered. If we cannot see which studies relate to which options, we may ask for the report to be re-written.

**256. How does NGENSO expect the simulation output files to be? (added 12/02/21)**

For any graphs for the feasibility study report, please use a picture format and submit results’ data files separately in excel as attachments (with graphs) clearly labelled and referenced in the appendix.

If excel files sizes are too big, please separate into multiple files. We want to be able to read excel data and graphs from your submission.

**257. Can we avoid duplication for Test 1- Step 3 for some options? (added 12/02/21)**

We expect different results for different sites for Test 1. For options that produce identical result we do not require you to repeat any test. However, we expect your final report to clearly state the logic for not repeating the test and where to find the results.

**258. Can we avoid duplication for Test 2 for some options? (added 12/02/21)**

We expect different inertia values to produce different results for Test 2. If results are same for all sites, please clearly state the logic for not repeating the test and where to find the results. We will accept results for one site being reflective of others.

**259. How should frequency changes in Test 2 (and Test 4) be simulated? (added 12/02/21)**

The simulation in Test 2 (and Test 4) should be done to achieve the frequency and Rate of Change of Frequency state in the test description. The Inertia of the system should not impact the result as long as the frequency and Rate of Change of Frequency are achieved.

You could choose to model the events in Test 2 (and Test 4) by simulating a system inertia and taking appropriately sized generation and demand events or introduce frequency step changes. However, we are not being prescriptive in how you choose to simulate this.

**260. How should fault impedance be modelled for retained voltage in Test 1-Step 3? Should we consider X/R ratio when modelling it? (added 17/02/21)**

The simulation in Test 1 Step 3 should be done to achieve retained voltages stated in the test description. We are not being prescriptive in how a retained voltage is achieved. The retained voltage could be achieved through voltage step change or fault impedance. It is best practice to consider inductive element if modelling the fault impedance.

Please note that retained voltage needs to be simulated without the solution. Please state the method and assumptions used to achieve retained voltages (including fault impedances) in the modelling assumptions part of the feasibility study report.

**261. In the feasibility study template on page 4, only 6 of the 8 nodes are listed in Table 2. Why are the Mark Hill/Coylton and Moffat/Elvantfoot missing? (added 17/02/21)**

This is an error. Please add missing sites in your study and in Table 2 of your report.

**262. Is there a requirement of a specific tool for feasibility studies? (added 17/02/21)**

There is no requirement of a specific tool, but we are requiring EMT output for all tests.

**263. Test 3 of the feasibility study guidance says that each voltage angle change must be “sustained for 0.5s after the event”, does that mean that after 0.5s the voltage angle must get back to its original value? (added 17/02/21)**

We want to see your solution’s performance under the described angle changes in Test 3 for 0.5s. It is acceptable if after 0.5s the voltage angle doesn’t return to its original value.

**264. Will ESO be issuing more versions of the feasibility study guidance? (added 17/02/21)**

No there is no intention of issuing further versions. V3 was issued to provide further clarification and minor corrections. We will update FAQs regularly to cover relevant feasibility study questions.

**265. Can SCL contribution at 100ms be changed in the feasibility study from what was submitted in the EOI form? (added 17/02/21)**

If the data submitted in the DRC form at the EOI stage is not changing and the SCL at 100ms is based on the submitted DRC parameters, a change in SCL value at 100ms is acceptable in the Feasibility Study.

**266. Can DRC data be updated following the EOI submission? (added 17/02/21)**



We are providing a brief window to providers to update any errors in the DRC data by 5pm Thursday 27/02/21.

For clarity, only these specific changes will be considered and a reason for change must be provided.

7. Errors in the DRC data such as transformer and machine parameters, circuit parameters, MVar range, MVA rating, inertia.

For clarity, these changes are not allowed and will not be considered.

8. There can be no change to sites (location or voltage level)
9. There can be no additional solutions

**267. Can sites and locations be updated/changed following the EOI submission? (added 17/02/21)**

Any additions or updates to locations and sites are not allowed post EOI. Any sites/solutions submitted at the EOI stage can be dropped post EOI. Please inform us of any sites/solutions that you do not wish to progress with as soon as possible.

**268. Should EMT simulation results be shown in the report? (added 17/02/21)**

Yes, EMT simulation results must be provided in the report. Please note that Test 1 Step 3 asks for 100ms fault current value in RMS which can be shown/demonstrated by RMS simulation plot or via calculations.

**269. Is it sufficient to do Test 2 for minimum conditions only? (added 23/02/21)**

Yes, it is sufficient.

**270. What does the 'largest instantaneous angle change' in Test 1 refer to? (added 16/03/21)**

The largest instantaneous angle change in Test 1 refers to voltage angle at the point of study.

**271. How should we interpret 'worse angle change seen' in Test 1 Step 1? (added 16/03/21)**

The worst case should be based on angle changes seen during the fault.

**272. How should current at 100ms be defined from Test 1 Step 3? Is it reactive current only? (updated 15/04/21)**

The current value at 100ms from Test 1 step 3 should be calculated to reflect the incremental total current (active + reactive) provided by the device between pre-fault and at 100ms post fault. The total current at pre-fault and at 100ms post fault could be calculated separately using  $\sqrt{I_{\text{active}}^2 + I_{\text{reactive}}^2}$  and incremental value in kA should be provided. The direction of pre-fault and during fault current should be considered.

**273. What is the required format for result plots in the feasibility study report? (added 16/03/21)**

For the main report, please show the fault period and up to 0.5-1s after fault clearance and refer to appendix for additional & underlying data/results. This will enable us to read the plots better and see the behaviour during the fault clearly. It will also clearly explain against the feasibility assessment criteria.

For avoidance of doubt, all tests should be simulated up to a period of reaching the steady state. All simulation results/data will need to be submitted in the appendices – see Q219.

**274. In Test 1 of the feasibility guidance and in the technical specification 1.1.1, should only ac component be considered? (added 15/04/21)**

Both ac and dc components should be considered while defining the current value at 100ms.

**275. Will the commercial solutions get feedback on the feasibility assessments as soon as the ESO evaluation process has ended? (added 16/07/21)**

Yes. Once the feasibility study evaluation has been completed, we will inform participants of the outcome and provide high level feedback.

**276. What feedback will ESO provide at the end of the feasibility assessment? (added 16/07/21)**

We expect to provide high level feedback which will include pass/fail indication for each solution. If a solution has failed, we will include the reason(s) for fail. If a solution has passed, we will confirm SCL & inertia values for commercial tender assessment and commercial contract.

## Contracts terms

**277. With the statement of start dates from the conclusion of procurement up to 2024, and I think to an end date in 2030. Does that mean that it is not a fixed period of 'x' years you are looking for but a service from the completion date of the project all the way out to 2030? (updated 03/07/20)**

We are reviewing this based on the feedback. We are not looking to change our latest start date of 2024 and end date of 2030.

**278. Does this mean up to a 9 year contract is available? (updated 03/07/20)**

The end date is end of March 2030. We are reviewing how we define the start date based on the feedback.

**279. Will there be a similar 'double-clawback' as for Phase 1 for availability payment? (updated 05/10/2020)**

We have shared in the Heads of Terms and associated spreadsheet our proposal to the rebate that we intend to apply for unavailability. We will seek feedback on this during the consultation of the draft contract terms.

**280. Will there be a similar 'double-clawback' as for Phase 1 of service fees for generators who would choose to generate when in merit? And how would this apply to generators that would typically only generate during periods of high inertia (i.e. when wind output is low and when this service is not required)? (updated 05/10/20)**

See previous question. We have amended the inertia requirement to allow individual providers to submit their own values, though the requirement for SCL remains at 90% for all.

**281. How will you monitor performance? Will there need to be some kind of fault recording device? (updated 03/07/20)**

We are considering how to monitor performance. We will publish more information later.

**282. How will ESO avoid risk of winners having lowest prices but not delivering. Will ESO consider bid bonds? (updated 05/10/2020)**

In the Heads of Terms, we have set out our proposal to introduce liquidated damages to successful providers to ensure projects are delivered in line with the tendered start date. The exact amount that would be required will be shared in the coming months and circumstances when it would apply.

**283. What securities are required for participation? (updated 05/10/2020)**

Please see responses above and further details will be shared in the draft terms.

**284. What will be stackability of this service? In particular for BM and energy markets for battery storage. (updated 03/07/20)**

In the Heads of Terms we have shared a list of services that could be stacked alongside the Stability service. We would review this based on feedback from providers and the introduction of any new services.

**285. Will the SO keep to the 10 year contract length rather than moving to short term contracts as has happened with ancillary services? (updated 03/07/20)**

The contract length for future contracts will be based on system requirements. At this stage, we cannot commit to the number of years future contracts will be awarded for.

**286. Will the SO consider extending the length of the contract from 2030 for those who connect in 2024? (updated 03/07/20)**

The end date is end of March 2030.

**287. What is the reason for contract ending in 2030 and not being set time frames from contract commencement? Will NG still require this service post 2030? (updated 03/07/20)**

The end date of 2030 has been set based on our current analysis of system requirements. From our response to Q1 and Q2, our ambition is to run future procurement events for Stability though the years we would look to contract for will be defined by our studies of system requirements.

**288. What due diligence do NG expect to carry out post contract award? (updated 03/07/20)**

Similar to phase 1, we will require all providers who are successful in the economic assessment to complete a comprehensive list of Post Tender Milestones to ensure services will be delivered as stated in the tender.

**289. What penalties are proposed for under delivery and non-deliver? (updated 03/07/20)**

From our response above to “**double-clawback**”, we are designing a payment mechanism to incentivise providers to deliver the high level of availability required for this service. This has been indicated in the spreadsheet alongside the Heads of Terms. We will consult on this mechanism as part of the draft terms due out in October.

**290. What is the reasoning for allowing contract commencement up to 2024? (updated 03/07/20)**

To encourage wider participation in this service and to open it up to a range of technologies, we recognise that some solutions may require a lead time prior to delivery.

**291. Please can you confirm that we are correct in reading that projects do not require planning permission to be in place so long as it is a clear post tender milestone. (added 22/10/20)**

This is correct that it is not required for the tender, though details will need to be provided in the indicative Post Tender Milestones at the commercial assessment stage, before they are finalised in the contract.

**292. Under ‘Assurance’ page 8 in draft Heads of Terms, it says that a Letter of Intent from funding party is required – please clarify at what point in the timeline is this needed. Does Pre-tender submission mean submit it with the tender? Or is it required before that e.g. part of the EOI submission? (added 22/10/20)**

At the tender submission stage, providers will have to include indicative timescales and details for the Post Tender Milestones which will be included in the final draft of the contract terms. Following the tender, these dates and details will be finalised before the contract is signed.

**293. What happens if the contract is awarded to a project which doesn't end up get planning? (added 22/10/20)**

As part of the tender submission, providers will be required to include indicative timescales and details for the Post Tender Milestones - which includes planning. If there are any delays which impact service delivery, the consequences of this are set out in the draft contract terms.

**294. Will tenderers be held to submitted cost if awarded? i.e. no post award adjustments allowed? (added 22/10/20)**

Yes, successful providers will be held to the price submitted in their tender. We are considering mechanisms to change this price, if the capability of the machine reduces- details of this will be included in the draft contract terms. We are interested in any other circumstances on which the price may be adjusted.

**295. What level of liquidated damages will need to be secured upon contract award? (added 22/10/20)**

We will share details of this in the draft terms as part of the consultation. We welcome your comments back on our proposal.

**296. Is there any incentive for declaring an availability for SCL above 90% in operation? (added 28/10/20)**

In operation, being available for SCL in more settlement periods will result in more payments, as we will pay for the number of Settlement Periods where the service is available by the service fee. Similarly, being available for Inertia in more settlement periods will result in more payment. There is a payment calculator in the EOI pack that you can look at.

**297. If we declare an availability higher than 90% does this change when the rebate is calculated from? (added 28/10/20)**

The rebate will apply when service availability for SCL over a month is below 90%, regardless of what may be submitted in the tender. For Inertia, the rebate will apply when service availability is below what was tendered.

**298. What would happen when a TO solution fails to meet the 90% availability criteria? Will there be similar penalties to those included in the contracts with Commercial solutions? (added 06/11/20)**

We are unable to penalise TO solutions as we don't have a contract with TOs. TOs will follow their license obligations to ensure availability of stability assets same as other TO assets.

**299. Will there be any more guidance on what will be considered acceptable for the Post Tender Milestones at the tender submission stage? (added 17/11/20)**

We may update the list of Milestones that providers will need to complete prior to commencing service delivery in any revisions of the contract terms.

Prior to the tender we will set out the details and evidence we require as part of the tender submission stage.

**300. Is it the correct reading that the required LAD security is 2x180 days' revenue and is required 30 days after signing an agreement? (added 17/11/20)**

The calculation is correct though whether security is required may be dependant certain criteria which we aim to share ahead of the tender. However please note that the multiplier (2) number of days of availability (180) and date by which security is required may change depending on the feedback we receive and any other requirements we may have.

**301. For delayed delivery by TO, .e.g. due to their own work management, for new connection would that lead to LDs on the service provider? (added 17/11/20)**

The liquidated damages will be due where there are any delays to the service start date, regardless of cause e.g. TO, equipment manufacturer. The exception to this is if there are any delays due to circumstances set out as Force Majeure.

**302. If the project is unable to deliver the service after contract award, would the project be liable for the full securities amount? (added 17/11/20)**

Yes, the liquidated damages would be liable where a provider does not deliver the service by the tendered service start date. In the case where the contract is ended prior to delivery, then the full amount will be due.

**303. When will security be returned, please? (added 17/11/20)**

Once the service commences delivery.

**304. Are you considering having different levels of security based on risk of delivery? E.g. Project bidding with land rights and planning requires reduced security (added 17/11/20)**

We are not considering having different levels of Security or Liquidated Damages based on how far developed providers may be with their project.

**305. Are LDs / termination at Cl. 3.6 intended as a sole and exclusive remedy? i.e. no additional damages claim following termination. (added 17/11/20)**

Yes, there would be no additional damages over and above any Liquidated Damages.

**306. Where ESO terminates under 3.3.2, what does it see as its potential scope of loss? (added 17/11/20)**

Where the contract is terminated ahead of service delivery, the provider would be liable for Liquidated Damages.

**307. For a level playing field, would successful TO submissions be exposed to LDs? (added 17/11/20)**

This contract terms only applies to commercial providers while the TOs will be subject to the requirements within their license conditions to ensure they deliver the service should they be successful in the tender.

**308. Question resubmitted: Will TO submissions be exposed to LDs for level playing field? (added 17/11/20)**

Please see our response to Q213.

**309. Will TO be exposed to LDs for level playing field? (added 17/11/20)**

Please see our response to Q213.

**310. How will TOs be exposed to unavailability loss of income? (added 17/11/20)**

Please see our response to Q213.

**311. How will TOs be exposed to LDs for late delivery? (added 17/11/20)**

Please see our response to Q213.

**312. The contract terms and risk are in stark contrast to what a licensed TO is exposed to. Do you not see this as unfair competition? LDs, availability, energy cost (added 17/11/20)**

This is one of the key questions at the heart of what we are aiming to achieve through our Pathfinders. While there are underlying differences between TOs and Commercial Providers, we are exploring ways to level the playing field between them to equally assess their solutions and any delivery requirements they must comply with.



**313. Is April 2024 connection date included in the April 2022-April 2024 tender requirement to start the services? (added 17/11/20)**

The service start date we are looking for is between 1 April 2022 and 31 March 2024. Where providers are offered connection dates after 1 April 2024, they can still participate in the EOI stage as we may extend the windows for service commencement.

**314. For a wind farm, can availability/inertia values be a function of wind speed? (added 17/11/20)**

The inertia value submitted in the tender must be a fixed value that we will use in the assessment and will be the Contracted Inertia Capability in the contract.

During service delivery, the amount of inertia may vary depending on wind speed and this must be declared.

**315. Can you clarify the division of availability payment between SCL and inertia (added 17/11/20)**

In calculating the availability payment, we will divide the Contract Rate by 2 and use each half for SCL and Inertia separately.

**316. How is availability to be shown / determined for both SCL and inertia? (added 17/11/20)**

Availability will be determined by the number of Settlement Periods where SCL/Inertia is declared as available to the Control room.

**317. Would availability and inertia unavailable together lead to double loss of availability? (added 17/11/20)**

Yes, as the calculation of the rebate applies the whole Contract Rate for SCL and separately to Inertia.

**318. Can a site choose to be unavailable for inertia for commercial rather than technical purposes? e.g. if the inertia availability parameter in the tender was 50% (updated 04/10/21)**

As stated in 4.3.2 of the draft terms, the service can only be unavailable for technical reasons or due to the provision of a Permitted Service.

For a synchronous machine, for the periods where it is delivering a permitted service, it will not be paid the availability payment under the stability contract, but these periods will be exempt from the calculation of the availability rebate. This is because as a nature of this technology type, it will be able to maintain its contracted levels of SCL and inertia when delivering a permitted service.

For a Grid Forming Convertor based solution, for the periods where the site is delivering a permitted service, only periods where it maintains its contracted SCL and inertia capability, will be exempt from the calculation of the availability rebate. Other periods where the contract capability is not maintained would be used in the calculation of any availability rebate.

NOTE: A review of the contract terms is being carried out and may require an amendment to clarify this point. If any changes are needed, this would be published as part of the ITT pack.

**319. Is non-availability for non-technical reasons a breach of contract or does it just reduce availability payment / increase rebate? (added 17/11/20)**

Please see response to the question above.

**320. How would you monitor whether the unit is claimed unavailable for commercial reasons or technical reasons? (added 17/11/20)**

A big emphasis in Phase 2 is Performance Monitoring and we will look to provide in future draft terms. We will have access to relevant data such as PN, MEL values to determine the cause of unavailability of a unit.

**321. How can the service provider be held responsible for lack of performance during a TO constraint? (added 17/11/20)**

As highlighted, in the event that providers cannot deliver the service due to a TO constraint, then we would not pay availability, but we would not include those periods to calculate any rebate. Therefore, there will be no additional financial consequence in the case of TO constraints.

**322. What is the expected number of settlement periods per year when providers will be called upon to provide inertia? And how long will the period be each time? (added 17/11/20)**

In our RFI slide 15, we have explained that our current forecasts show that across the range of years and FES scenarios, we may need to enact a service to enhance stability on the system between 55% and 85% of the time. This is the time the service is needed and not the likelihood of a system event happening. We published [a report](#) last year listing some historic frequency events the system has seen.

For the inertia support, we have not specified a time duration that support is needed however in the technical specification a minimum frequency, maximum frequency and maximum RoCoF are specified for which you would be required to provide the service. Between these number you should be able to appropriately design the inertia you want to provide.

**323. Since energy costs are not paid separately, i.e. must be included in the tender price, how can we estimate running hours? (added 17/11/20)**

Please see response to question above.

**324. Are SCL and inertia 'despatched' differently, i.e. SCL always available (up to 90%) in prep for fault, but providers instructed for inertia (+ reactive power)? (updated 06/09/21)**

Where SCL and Inertia are declared available and there is system need, we would arm the unit to be synchronised to the system (likely via EDL) and following this, should a fault occur, the unit would be expected to automatically deliver the SCL and Inertia capability it has declared. Time to synchronise the unit will be specified in your service contract.

Delivery will be automatic instead of manually instructed, as the response time response time required following a fault will be in milliseconds. For Reactive power, units may be armed where they are available, and we identify a system requirement to maintain pre-fault voltage and the unit would be expected to deliver automatically if there is a fault. Alternatively, post-fault we may manually instruct the unit to deliver reactive power if it was not already armed to do so. There is more information in the Stability Pathfinder Phase 2 Final contract terms which are published on the project webpage under Commercial Documents <https://www.nationalgrideso.com/future-of-energy/projects/pathfinders/stability/Phase-2>.

**325. How far in advance will NGEN issue instructions to provide stability services? (added 17/11/20)**

In the tender, providers will submit response times to instruct SCL and Inertia. These will not be considered in the assessment but shared with our control room to inform on when they use the service.

**326. Should reference to "Local DNO" in the FM definition now be read as "Local TO"? (added 17/11/20)**

We will review this and correct if necessary, in any future draft terms.

**327. We are intending to set up a Special Purpose Vehicle (SPV) to deliver the contract should we be successful. Does the EOI submission need to be made by the SPV or can it be set up at a later stage? (added 08/12/20)**

The EOI submission does not need to be made by the same entity that will tender or deliver the contract. Throughout the whole process we will track solutions to ensure that we are able to monitor when there are changes to the name of the entity that is proposing them.

**328. What is the expected date for issue of proving test details? (updated 16/07/21)**

We are working on developing a compliance testing guidance which we will provide ahead of the commercial tender.

**329. Please can you outline the process from a successful tender bid to build and the penalties to termination by the developer in this period. Before or after milestones? (added 01/04/21)**

Following contract award, providers will be expected to build their solution in line with the Project Plan submitted as part of the tender submission. The Project Plan will be reviewed monthly under clause 3.2 to ensure that providers are on track to meet the tendered start date.

12 and 6 months prior to the tendered start date, NGENSO will review whether the Post Tender Milestones have been met, and if not, whether they could be completed after a further 2 months.

Where a contract is terminated prior to commencing service delivery, then the provider will be liable for the Termination Sum as set out in clauses 3.3.2 and 3.4 which is equivalent to 75% of the LAD Cap.

If the service has not commenced by the Scheduled Commercial Operations Date, then the provider will be liable for Liquidated Damages. Where the delays is for 6 months, such that the amount of Liquidated Damages owed is equal to the LAD Cap, then NGENSO will have the right to terminate the contract as per clause 3.8.

**330. If a provider terminates for not meeting a PTM, planning for example, there is no termination penalty? (added 01/04/21)**

Where the contract is terminated due to the view of the ESO the Post Tender Milestones will not be met, then the provider will be liable for the Termination Sum as set out in clause 3.3.2

**331. What level of detail is expected from the project plan submitted as a part of the tender? (added 01/04/21)**

We are currently developing the project plan that will need to be submitted, though as mentioned in the webinar, this will require more details than required for the Post Tender Milestones. As an initial indication, this may include Gantt charts, risk logs etc to ensure that providers have a robust plan to deliver on time.

**332. Is there a penalty if the provider does not accept and sign a contract offer after the tender process? (added 01/04/21)**

We are considering setting a deadline for contracts to be signed post tender acceptance to allow both parties to complete the necessary governance and due diligence. In the scenario where a contract is not signed, we are proposing to re-evaluate the assessment from the previously unsuccessful tendered options to seek the best alternative solution, though we may not contract with any new units if it is more economic to manage our stability requirements in the BM.

**333. Can I confirm not making a PTM has changed from the initial contract terms. in the first draft there was no penalty for failing a PTM like planning? (added 01/04/21)**

In the first draft, the penalty for not meeting the PTM was that NGENSO had the right to terminate the contract if it felt that they could not be after a further 2 months. In the second draft, we are introducing the concept of Termination Sum that providers would be liable for in the event the contract is terminated prior to delivery.

**334. Would the change to the service term increase liabilities "LAD" and/or indexation on bid price? (added 16/07/21)**

The change in the service term does not change the amount of LADs that would be due. This remains as equivalent to 180 days of availability payments and will apply from the start date submitted in the tender. Similarly, there is no change to the application of the indexation as it will continue to apply from the April following service go-live.

**335. Will any liabilities be fronted by the TOs and/or NGESO should a provider not pass a relevant PTM or start service delivery in time due to delays caused by the incumbent TO which are outside of the provider's control? (added 16/07/21)**

No liabilities will be fronted by the TOs or NGESO should a provider not meet a post tender milestone. The contract terms do allow for Delay Events which include changes required by NGESO which may impact service dates, to be excluded from the triggering of liquidated damages.

**336. Following the proposal to extend the contract term will you allow for a one off 2 month maintenance period? (added 16/07/21)**

We will not be updating the contract terms to amend the maintenance plan that is currently set out.

**337. The assessment methodology section on 'Re-evaluating the solution' mentions 'while tenders are still valid'. Where do you make reference to this validity period? (added 16/07/21)**

We will inform the market of the period of time that we expect tenders to remain valid for as part of the ITT. We welcome your views on how long participants believe would be a reasonable amount of time.

**338. Will you be updating the contract terms to reflect the new timeline? (added 16/07/21)**

In the final contract terms, the definition of 'Service Term' has the end date in square brackets and has a footnote that the actual date will be confirmed prior to the tender.

When we come to sign the contracts post tender, the actual end-date of March 2034 will be entered.

**339. The period for signature after award in the revised schedule is too short to allow for formal approval procedures for substantial projects in major companies. Can you confirm that an achievable period will be agreed with successful parties? (added 16/07/21)**

We welcome views from providers on what they believe is a reasonable amount of time to complete signature post tender. We would expect providers to make preparations prior to the tender for any governance/sanction process they may need to complete should they be successful.

We need to be mindful that the period for signature is not too lengthy to cause any delays to services commencing delivery and will need to be the same for all providers.

**340. In the Draft Service Agreement document, under Schedule D, the requirement for "Physical testing to demonstrate of the value and behaviour of Short Circuit Level meeting those set out in schedule E" is listed. Can ESO clarify how Short Circuit Level contribution is intended to be physically tested against guaranteed values during the proving tests? (added 16/07/21)**

We are working on developing a compliance testing guidance which we will provide ahead of the commercial tender.

We expect the short circuit current contribution to be demonstrated via a set of simulations. Physical testing is expected to be limited to the current level of physical testing required in the GB grid code.

**341. How SCL values from the feasibility study will be used in the service contract? (added 06/09/21)**

The feasibility study has established SCL for a 3 phase to earth fault at the point of stability for min Q and max Q cases. Minimum SCL from these two values will be entered in the service contract against which contract payments will be considered.

All solutions must demonstrate all SCL values from Test 1 Step 1 and Step 3 of the feasibility study in the compliance and proving tests along with all aspects of the technical specification. Service commencement will be dependent on this demonstration.

- 342. Do you have an estimate of utilisation of the short circuit service? In your RFI webinar it was suggested the service could be enacted 55%-85% of the time. Is this still the expectation? (added 06/09/21)**

This is still our view. But please note that service is required to meet 90% availability for SCL.

- 343. In the tender assessment document, an example is given where mutually exclusive bids could be entered in such a way that a discounted price could be given if a combined larger MVA sized solution was taken rather than two smaller solutions. This seemed to be suitable for a single site however can you advise if there will be any way of tender participants combining solutions across multiple sites to take account of cost reductions? An example would be where we have two sites both which have a bid price per MVA if they were taken individually however both bid prices could be reduced due to economies of scale if they were both successful in the tender. (added 06/09/21)**

Yes, this is a valid option for across multiple sites. This will be reflected in the tender submission template.

- 344. When will the Credit Policy Statement mentioned in the SCTs be made available? (added 06/09/21)**

The Credit Policy Statement is one of the documents which will be included in the Invitation to Tender pack so it will be published end Oct/start Nov.

- 345. There seems to be an error in the definition of Force Majeure in the contract terms.**

*"Force Majeure" in relation to either Party any event, circumstance or condition which is beyond the reasonable control of such Party ... provided always that neither: (i) lack of funds, or (ii) restrictions imposed on the operation of the Facility by the Local TO, shall not be interpreted as a cause beyond the reasonable control of that Party;*

The text in yellow highlighting is a double negative which alters the meaning of the proviso. We believe this is an error and the word 'not' shown in red above should be deleted.

Following a review, we agree that the word 'not' should be deleted from the definition. This will be reflected in the updated terms published as part of the ITT pack.

- 346. Is it possible for the name of the contracting entity to change after the tender submission deadline? (added 04/10/21)**

For the purposes of the Stability Pathfinder Phase 2, there is no issue in changing the name of the contracting entity either pre-signing or post-signing of any contract(s) resulting from the Stability Pathfinder Phase 2. If this is required after the contract(s) have been signed, then a trilateral novation agreement can be arranged and signed to formalise the change(s) required.

## Codes related

- 347. Does NGENSO believe there could be implications to level playing field for new converter technologies to participate in phase 2 given that GC0137 Grid Forming Working Group has been**



**de-prioritise? I'd have expected both procurement process and working group, to progress in parallel to ensure converters with grid forming can participate competitively. (updated 03/07/20)**

The Stability Pathfinder has been working closely with the GC137 group to ensure that our product aligns with their work. Specifically, the technical specification has been aligned with the GC137 specification. There are specific reasons for the delay of the GC137 work group but we do not feel that we need to delay the Stability Pathfinder. If there are any specific barrier for converter technologies in the pathfinder RFI, we would like to know about them in the RFI feedback.

**348. Will you be waiting for the grid code modification GC0137 on the VSM service definition to be concluded before considering VSMs for this tender? (updated 03/07/20)**

See the previous question.

**349. Are sites going to need to become fully ECC and ECP compliant if they modify the grid connection? (ref 1.2.2 of tech spec) (updated 03/07/20)**

Providers will be subject to grid code clauses which are in their Bilateral Connection Agreements (ECCs or CCs as relevant). In addition to this, the providers will be subject to demonstrating compliance against the stability commercial service agreement which could mean additional compliance to their Bilateral Connection Agreements as some aspects of the stability pathfinder technical specification refer to ECCs.

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