

# Stability Phase One Tender Interactive Guidance Document

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# Version Control

Version	Date published	Page No.	Comments
1.0	05/11/2019		
1.1	12/11/2019	19 32 37	Fault ride through requirements updated to match contract Rebate table updated to cover 7 month summer period Erroneous link to tender proforma removed

# How to use this guide

This document aims to provide potential stability providers with clear, simple and transparent guidance on the service. It pulls together FAQs on the service and provides links to related documents.

A menu button on each page allows access back to the main menu:



Please contact [commercial.operation@nationalgrideso.com](mailto:commercial.operation@nationalgrideso.com) if you have any questions or feedback.

**Note:** icons on this page are for illustration only - links do not work.

# Main Menu

1. Market information

3. Requirements

5. Contract Options

2. Stability overview

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# 1. Context and Market Information

1. Market  
information

1.1 Context

1.2 Wider Activities impacting  
Stability

1.3 How information will be used

1.4 Market information for Phase 1

# 1.1. Context

## Why are we doing this?

- Stability pathfinder phase one is designed to support our national stability needs
- Responses to our stability pathfinder RFI suggested that solution providers typically needed between 12-18 months to deliver solutions to meet this need
- We are therefore proposing an accelerated tender process and timeline for phase one to give maximum opportunity for providers to develop solutions ready for service from no later than April 2021

## Aims

The aim of this tender is to:

- Formally invite tender submissions from potential providers of a stability service, GB wide at either 132kV, 275kV or 400kV voltage levels
- Submissions are invited from TOs & DNOs as well as commercial solution providers
- Reduce the cost of operating the system



## 1.2. Wider Activities impacting Stability

There are a number activities that have potential interaction with our Stability Pathfinder Phase 1:

Grid Code VSM Expert  
Group

NOA Methodology

Black Start Tender

EU Code  
Implementation

EFCC NIC Project

Phoenix NIC Project

*NIC = Network Innovation Competition*

*VSM = Virtual Synchronous Machine*

*EFCC = Enhanced Frequency Control Capability*

*NOA = Network Options Assessment*



## 1.3. How information will be used

Use of information submitted within the tender includes:

- assessment of technical capabilities of a provider compared to our minimum technical specification
- economic assessment of provider solutions in accordance with our assessment principles

After the assessment, we will publish the number of providers, tender parameters including prices and whether they were accepted or rejected.

This will include details of submissions by any TOs & DNOs – see [slide 28](#) for further details of how tenders will be processed from these parties.

For information on stages of the tender process, please refer to the [Timeline](#).

## 1.4. Market information for Phase 1

### What are we tendering for?

- We are tendering for a zero MW firm availability stability service
- Tenders are requested for contracts ending 31<sup>st</sup> March 2023 or 31<sup>st</sup> March 2026
- Service delivery can commence between 1<sup>st</sup> April 2020 and 1<sup>st</sup> April 2021
- This stability service comprises three elements:
  - Inertia
  - Fast acting dynamic voltage
  - Short circuit level
- We will procure up to a maximum of 25GVA seconds, capped at 8GVA seconds per individual company\*
- Solutions can be GB wide and connected at voltage levels  $\geq 132$  kV
- We require availability (24/7) throughout the year (5 days planned outages pa)
  - We will pay availability at the tendered price, inflated by CPI from FY 21/22 onwards (£ per settlement period)
- The availability payment will only be paid when the plant is available to provide the service or during agreed planned outages. Payment will not be made during any period a plant is generating active power.
- Reactive power will be paid at the default reactive payment rate (£/MVarh)
- Active power consumption requirements will be reimbursed at imbalance price (£/MWh)

\* Company is defined as the highest level definition of group structure, including (non-exhaustive) all subsidiaries, affiliates, special purpose vehicles or majority shareholding interests



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## 2. Stability Overview

2. Stability  
overview

2.1 Stability Context

2.2 Accessing Stability

2.3 Tender Outline



## 2.1. Stability Context (1/2)

### Why is there a need?

#### System Operator Obligation

- The ESO has a statutory obligation to maintain the National Electricity Transmission System (NETS) voltage and frequency within limits. These limits are defined within the NETS Security and Quality of Supply Standards (SQSS).

#### System Stability

- By stability, we mean the stability of frequency and voltage, and the ability of a user to remain connected to and to act to support the system during normal operation, during a secured fault or after a secured fault Voltage is a localised property of the system.

#### System Stability – National Context

- At national level, frequency is maintained within limits by consideration of frequency response/reserve market products.
- At national level, Rate of Change of Frequency(RoCoF) is maintained within limits by consideration of largest generation/demand loss on the system and planning for national levels of inertia.



## 2.1. Stability Context (2/2)

Why is there a need?

Stability  
Context –  
Regional

- Based on the conditions at the time, regional inertia across GB could influence the scale of regional variations in RoCoF, or regional frequency variations.
- Voltage is a regional characteristic and it is maintained within limits by consideration of the balance of local/regional reactive power support both through transmission owner assets or market products. Voltage support must be provided across all times of regulation, the period of the fault/ disturbance, and the recovery period immediately following it.
- Short circuit level is a regional characteristic, influenced by local network elements (demand, generation) and is important in ensuring local voltage, frequency stability and control system integrity.



## 2.2. Accessing Stability

What do we do now?

### General

- The system maintains stability with capability provided inherently by generators and assets.
- Access to additional capability is limited.

### Availability

- Where required, additional stability is accessed through purchasing Active Power via Trading and Balancing Market actions.
- Costs are reported through the 'Constraints' section of the MBSS.



## 2.3. Tender Outline

### What are we asking for?

#### Providers

- We are seeking a new stability service comprising:
  - Inertia, Fast acting dynamic voltage support & Short circuit level
- We are willing to pay for this service from as early as April 2020, although will consider tenders from providers that are enable to commence service by no later than 1<sup>st</sup> April 2021
- Due the timing and nature of our requirements for phase one, we need high confidence in service delivery. We are restricting technologies to synchronous compensators and synchronous generators running in a synchronous compensator mode. These could be provided from existing plant, conversion or new build from either existing or new BM participants
- This is a zero MW service (payments are only made when plant isn't generating)
- The service is open to generators who wish to forgo winter availability payments for generation revenue streams, but who will provide firm (24/7) availability for this service over the summer
- The service requires a number of Conditions Precedent to be fully met before service commencement – these are outlined in [5.3](#) and in further detail in the contract
- Providers can offer other balancing services in conjunction with this Stability service, as long as this does not impact the tendered stability service. The benefits of the additional services provided however will not be considered as part of this tender.
- Providers can include TOs & DNOs as well as Commercial solution providers

**This page summarises the service we are asking for**



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# 3. Requirements

3. Requirements

3.1 Technical Performance  
Requirements



## 3.1. Technical Performance Requirements (1/4)

What are the minimum technical requirements to participate?

### Short circuit level and inertia

- Short circuit current contribution of  $\geq 1.5$  p.u. of plant's MVA rating
- Inertia contribution of  $\geq 1.5$  p.u of plant's MVA rating
- Power Oscillation Damping capability
- Operation across a range of minimum short circuit levels

### Fault ride through and transient stabilisation (1)

- Withstand voltage changes of  $\pm 10\%$  for 15 minutes
- Withstand voltage changes of  $\pm 5\%$  continuously
- Operation across all system voltages between 0.9 and 1.1 per unit (pu) and at all system frequencies between 47 Hz and 52 Hz
- Ride through voltage depression of down to 0-0.3 p.u for up to 140 ms
- Ride through voltage depression curves in Grid Code ECC.6.3.15
- Reactive current response across all timescales consistent with the performance of a voltage source behind an impedance of at least 10%

**This page (1/4) summarises the minimum technical requirements needed to participate. Further details can be found in Schedule E of the contract.**

## 3.1. Technical Performance Requirements (2/4)

What are the minimum technical requirements to participate?

### Fault ride through and transient stabilisation (2)

- Reactive current injection into a voltage depression within 5ms
- Maintain its phase of reactive and as relevant active power and current injection at least over a period of 0.5s after fault/disturbance
- Withstand, and ride through, any rate of change of frequency occurring  $\leq 1\text{Hz/s}$  on average or in absolute change across a sampled window of 500ms
- Withstand, and ride through, any rate of change of frequency instantaneously measured exceeding  $1\text{Hz/s}$  within the sampled window period
- Withstand an initial RMS over-voltage of up to  $1.4\text{p.u.}$  for 100ms after fault clearance followed by a reduction in over-voltage towards no more than  $1.05\text{pu}$  as per the requirements of TGN(E)288;
- Start responding within 5ms of fault clearance during an over-voltage condition
- Respond up to its rating with reactive current countering the initial voltage angle change

## 3.1. Technical Performance Requirements (3/4)

What are the minimum technical requirements to participate?

Fault ride  
through and  
transient  
stabilisation  
(3)

- Capable of continuous operation at such ratings shall be achieved over an outside air temperature range of -10°C to 30°C and a humidity range of 5 to 100%
- Capable of repeated supply Fast Fault Current to the System each time the voltage at the Grid Entry Point or User System Entry Point falls outside the limits specified in ECC.6.1.4

## 3.1. Technical Performance Requirements (4/4)

What are the minimum technical requirements to participate?

Steady state  
voltage  
support

- Steady state dynamic voltage support of +/-0.4 p.u of plant's MVA rating
- Ability to operate in target voltage and constant MVar mode
- Adjustable slope characteristics over the range 2% to 10%

Location

- GB wide onshore on voltage levels 400kV, 275kV and 132kV

Dispatch\*

- Must be a BM unit
- Must be CVA registered
- Must have an MSA
- Must have EDL and EDT
- There must be a single point of dispatch
- Reactive power must be available to dispatch as defined by relevant generating / non-generating agreement
- Providers must have capability of receiving, and responding to instructions 24/7 for the duration of the contract period
- Providers must inform NGESO of planned outages / periods of unavailability

*\* Dispatch requirements are required to be in place ahead of service commencement if not at time of tender submission*



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4. Assessment  
principles

## 4. Assessment Criteria and Principles

4.1 General Assessment Information

4.2 Stability Tender Assessment  
Process

4.3 Comparison with Network  
Solutions



## 4.1. General Assessment Information

The criteria for selection include but are not limited to:

- The proposed service must meet the minimum requirements
- The inertia contribution
- Reactive range
- The stability support both national and local
- Regional voltage
- Power consumption
- Total Cost

To support solutions being provided from a range of sources, we will procure a maximum of 8 GVA seconds from any company\*.

*\* Company is defined as the highest level definition of group structure, including (non-exhaustive) all subsidiaries, affiliates, special purpose vehicles or majority shareholding interests*

# 4.2. Stability Tender Assessment Process





## 4.2. Stability Tender Assessment Process

### Requirements for tender compliance

All submissions will be assessed against the technical requirements summarised in [section 3](#) of this ITT pack. The technical requirements are laid out in more detail in Schedule E of the contract.

Tender submission involves confirming that the tendered solutions meet all the minimum technical requirements. This is done through the completion and submission of a tender pro-forma.

Providers also need to provide a set of project milestones (post-tender milestones) to accompany the tenders.

Any submissions which do not meet the minimum technical requirements will not be progressed further in the assessment.

For clarity, by the time of service commencement the full [Conditions Precedent](#) need to have been met.





## 4.2. Stability Tender Assessment Process (1/3)

### Commercial tender assessment

#### Assessment principles

Our objective is to maintain the balance of the electricity system in an efficient, economic and coordinated manner. So, to assess tenders we calculate a forecast cost for each tender and assess all tenders against the alternative cost of maintaining the stability of the system. We only accept those where the forecast tendered costs are lower than the forecast alternative cost.

#### Contract duration

Participants can submit tenders to run up to either 31<sup>st</sup> March 2023 or 31<sup>st</sup> March 2026 . We will assess the 2023 and 2026 tenders separately to understand which duration holds the best value, before selecting the most economic tenders of that duration. We will therefore not award a mix of 2023 and 2026 tenders.

#### Forecast costs

The forecast cost is made up of the:

Availability payment = £/settlement period

Active energy (consumed) payment = £/MWh

#### Assessment methodology - see also the Stability Phase one Assessment Principles document alongside this

To determine the most economic tender, the tendered availability price is scaled by 5 parameters (detailed overleaf):

1. Inertia contribution: How much inertia the asset provides
2. Reactive range: What the reactive range of the asset is
3. Stability Support (National & Local): The level of stability support provided
4. Regional Voltage: Where the asset is located
5. Power consumption: How much active power is consumed



## 4.2. Stability Tender Assessment Process (2/3)

### 1. Inertia contribution

The amount of inertia a unit provides will determine how useful it is in providing stability to the system. We will scale the price received by the inertia contribution. **Tenders that have a higher inertia will be valued higher than tenders with lower inertia.**

### 2. Reactive range

The quantity of MVar leading and lagging determines how useful it is in managing voltage in a region.

**Providers that can provide larger lead and lag capability will be valued higher than those providing a smaller capability.**

### 3a. Stability Support – National

The voltage level that providers are connected to will impact the effectiveness in providing stability to the wider power system. For phase 1 all substations will have a connection effectiveness assumed, based on the connection voltage.

**Providers connected at 400kV are more effective for assisting with the national stability requirement so will be valued higher than those connected at lower voltages (i.e. 275kV or 132kV).**

### 3b. Stability Support – Local

The location of the provider in GB will affect the ability to provide stability support to the local power system. We will assign a benefit to each zone in terms of short circuit level, inertia and dynamic voltage support. The mapping of the substations to the zones will be provided in the invitation to tender pack. We will provide a view of the zones where the benefit is higher.

**Providers connected at substations where zonal benefit is higher will be valued more highly than those where the zonal benefit is low.**



## 4.2. Stability Tender Assessment Process (3/3)

### 4. Regional Voltage

The location in GB of the provider will affect the ability to provide reactive support to the system. We will map the substations to the voltage regions which will be shared in the invitation to tender pack. We will also provide a view of the regions where the reactive weighting is higher.

Providers connected at substations where the reactive weighting factor is higher will be valued more highly than those where the reactive weighting factor is low.

### 5. Power consumption

The quantity of power (demand) used to provide the inertia. We will pay the active energy payment for the quantity of power taken from the system up to the capped value submitted in the tender.

Providers that have a smaller demand for power for their inertia contribution will be valued higher than those tenders with a larger demand for power for their inertia contribution.

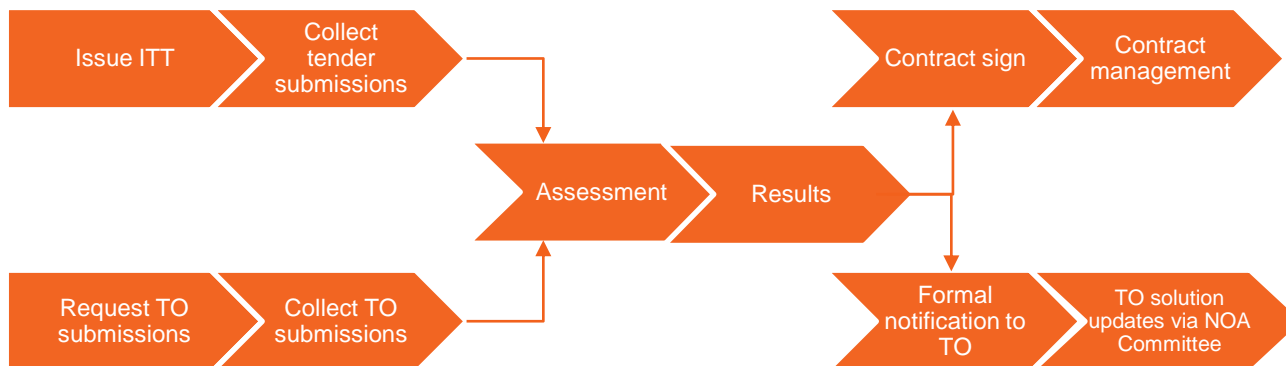
**The alternative costs for stability will be made up of one or more of the following:**

- Footroom and headroom creation to allow units to be synchronised
- Synchronising additional synchronous machines to provide inertia
- Frequency response costs
- Curtailing the largest losses
- Voltage costs
- Additional bids and offers to maintain generation and demand balance.
- Regulated network solutions

## 4.3 Comparison with Network Solutions

### Input of commercial and TO options runs in parallel

#### Commercial options



In the enduring process when a regulatory funding mechanism for DNO options is agreed, it is expected that DNO options will follow a similar route as TO options, but presently a suitable regulatory funding mechanism is not in place for DNO options. Until a suitable funding mechanism is established it is expected that DNO options will be paid via a Balancing Service Contract; hence any DNO options will follow the same route as commercial options in this pathfinder.

This page outlines how network solutions will be compared against commercial solutions

## 5. Contractual Framework

5.1 Key Contract Terms

5.2 Payments & Rebates

5.3 Conditions Precedent

5.4 Post-Tender Milestones

# 5.1 Key Contract Terms

## Contract Duration

- Tenders are invited from providers who can be ready between 1<sup>st</sup> April 2020 and 1<sup>st</sup> April 2021
- Contracts will run up until either 31<sup>st</sup> March 2023 or 31<sup>st</sup> March 2026
- Tenders can be submitted for either or both of the 2-3yr and 5-6yr durations

## Availability

- The service needs to be available 24/7 throughout the contract term, with an allowance of 5 calendar days of planned and agreed outages pa
- National Grid ESO reserves the right at all times to temporarily instruct that the service be de-activated, although availability payments will continue - as applicable - through such periods

## Payment types

- The tendered £/settlement period will apply for Financial Year 2020/21 with the availability fee indexed thereon at CPI annually
- As this is a 'zero MW' service, availability payments will not be made if the plant is generating Active Power
- Reactive Power will be paid for at the Reactive Default Payment Rate to Mandatory Services Agreement (MSA) holders
- Active Power consumed to provide the service will be reimbursed at imbalance rates (system buy price), up to the steady-state power requirements indicated in the tender proforma



## 5.2 Contract Payment structures (1/2)

### What are the payment structures?

	Availability	Reactive Power	Active Power (consumed)
<b>Rate</b>	<ul style="list-style-type: none"> <li>Apr'20-Mar'21: Tendered price (£ per sett period)</li> <li>Apr'21 onwards: Tendered price + CPI</li> </ul>	<ul style="list-style-type: none"> <li>Utilisation @ reactive default payment rate (£/MVARh)</li> <li>Leading &amp; Lagging</li> </ul>	<ul style="list-style-type: none"> <li>Imbalance @ system buy price (£/MWh)</li> <li>Capped at steady-state power requirements</li> </ul>
<b>Paid by NGESO</b>	<ul style="list-style-type: none"> <li>Not generating; and</li> <li>Available; or</li> <li>Un-available within planned outage</li> </ul>	<ul style="list-style-type: none"> <li>Available &amp; Active - providing synchronous service; or</li> </ul>	<ul style="list-style-type: none"> <li>Available &amp; Active - providing synchronous service (following instruction via EDL)</li> </ul>
<b>Not-paid by NGESO</b>	<ul style="list-style-type: none"> <li>Generating; or</li> <li>Un-available outside of planned outage level</li> </ul>	<ul style="list-style-type: none"> <li>Un-available within or outside of planned outage; or</li> <li>Instructed to de-activate service</li> </ul>	<ul style="list-style-type: none"> <li>Generating; or</li> <li>Un-available (within or outside planned outage); or</li> <li>Instructed to de-activate service</li> </ul>
<b>Rebate to NGESO*</b>	<ul style="list-style-type: none"> <li>Un-available outside of planned outage level (Summer only, with effect from 2022 onwards)</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>

\* Rebate due to NGESO for un-planned Summer unavailability from 2022 onwards – see next page for more details

## 5.2 Availability Rebates (2/2)

- To incentivise availability in the summer, where our needs are greatest, we will invoke a payment rebate scheme for non-availability outside of the planned outage allowance:
  - **Summer (Apr-Oct) – 2022 onwards:** One settlement period's availability payment **rebated** per unavailable settlement period (or part of)
  - **Summer (Apr-Oct) – 2021 only:** One settlement period's availability payment **forgone** per unavailable settlement period (or part of)
  - **Winter (Nov-Mar) – 2021 onwards:** One settlement period's availability payment **forgone** per unavailable settlement period (or part of)
- Payments will be made on a rolling monthly basis with any prior-period rebate netted off that month's payments
- At financial year-end an invoice will be raised if necessary to reclaim any outstanding rebate not netted-off to-date
- Rebates will be capped at the total of payments made over a financial year, leading to a maximum exposure of zero GBP
- The table to the right illustrates what proportion of the potential summer and winter availability payments would be paid from Apr'22 onwards for different levels of monthly un-availability.
- For clarity, there will be no rebate process applied to either the Reactive Power payments nor the Active Power consumption requirements payments at imbalance rates.

### Illustration of Availability rebate mechanism:

Simplified monthly illustration

As of April 2022 onwards

% of maximum availability fee		Winter					
Mths u/a	Summer	0	1	2	3	4	5
0	100%	100%	80%	60%	40%	20%	0%
1	71%	100%	80%	60%	40%	20%	0%
2	43%	100%	80%	60%	40%	20%	0%
3	14%	100%	80%	60%	40%	20%	0%
4	0%	80%	60%	40%	20%	0%	0%
5	0%	40%	20%	0%	0%	0%	0%
6	0%	0%	0%	0%	0%	0%	0%
7	0%	0%	0%	0%	0%	0%	0%



## 5.3 Conditions precedent

### Conditions precedent

The following contractual conditions need to be met for the service to commence:

- The accession of the provider to the Balancing and Settlements Code (BSC)
- The registration of the provider's facility as a Balancing Mechanism Unit (BMU)
- The provider becoming bound by the relevant bi-lateral connection agreement with the relevant transmission or distribution network (BCA or BEGA)
- The provider acceding to the Connection and Use of System Code (CUSC)
- The provider becoming bound by a Mandatory Services Agreement (MSA)
- The successful completion of the Initial Proving Test following compliance with appropriate Post Tender Milestones (see overleaf)

NGESO has the right to terminate the contract if it feels the conditions precedent will not be sufficiently met to enable service commencement within 3 months of 1<sup>st</sup> April 2021

**This page summarises the Conditions Precedent which need to be completed prior to service commencement**

## 5.4 Post-Tender Milestones

### Post Tender Milestones (PTM)

- To ensure the technology is operational from service start, service commencement will be conditional upon appropriate milestones being agreed and met in time
- As part of the tender submission, providers are required to provide a milestone plan outlining the steps necessary to complete their build / conversion project with associated timescales
- A checklist of milestones (summarised below) is outlined in more detail in Schedule C of the contract
- Progress against the milestones will be measured formally at the PTM date (6mths prior to scheduled service start). If NGESO feels the agreed milestones will not be met within two months of the PTM date then it reserves the right to terminate the contract at that point.

### PTM checklist

1. Financial means
2. Planning permission & necessary permits
3. Technical solution model / analysis
4. Proof of land ownership / control
5. Construction & procurement plans
6. Provision of technical requirements tables (from schedule E of the contract)
7. Building / engineering contracts
8. Certification
9. Pre-commissioning testing, connection & proving tests (& outages where existing generation asset)
10. Conditions precedent obtained in full



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# 6. How to Participate

6. How to participate

6.1 Timeline

6.2 How to submit information

## 6.1. Timeline

Stage	Milestone	Date
Pre-Tender Process	RFI Feedback deadline	13 <sup>th</sup> September '19
	Publication of RFI feedback and next steps	21 <sup>st</sup> October '19
	Publish service outline	21 <sup>st</sup> October '19
Tender Process	Invitation to tender	5 <sup>th</sup> November '19
	Draft contract terms review open	5 <sup>th</sup> November '19
	Draft contract terms review closed	11 <sup>th</sup> November '19
	Contract terms finalised	18 <sup>th</sup> November '19
	Tender deadline - submit proforma & PMT	29 <sup>th</sup> November '19
	Contract award	13 <sup>th</sup> December '19
	Contract signature*	19 <sup>th</sup> December '19
Service Period	Service starts	1 <sup>st</sup> April '20 - 1 <sup>st</sup> April '21
	Service ends	31 <sup>st</sup> March '23 or 31 <sup>st</sup> March '26

\* Against finalised contract terms published on 18<sup>th</sup> November

## 6.2. How to submit information

Please use the tender proforma, found in the below tender proforma pack, to respond to the tender.

Along with this proforma, please submit a copy of your project's post-tender milestones. An example schedule & checklist are provided in the tender.

As this represents the first time NGESO are tendering for this service, we are running a 2-step tender process:

- **Step 1:** 5-11<sup>th</sup> November (week 1 of tender) – draft contract terms are open to review. NGESO will consider any common suggestions / amendments ahead of finalising the contract terms.
- **Step 2:** 18<sup>th</sup> November (mid-point of tender) – NGESO confirms the final contract terms, providing 2 weeks for providers to (re)tender / withdraw on the basis of the revised terms.

The deadline for submission of tender is **29<sup>th</sup> November 2019**; providers can withdraw their tender at any point up to this date. Submissions may only include one tender per unit/asset for each contract duration.

NGESO will consider the submissions and publish the tender outcome by **13<sup>th</sup> December 2019** on the NGESO website. This publication will include details of all successful and unsuccessful tenders. By participating in this Procurement Process, you agree to such disclosure and/or publication by NGESO.

Successful participants will then be asked to sign the contract by **19<sup>th</sup> December 2019**.

*Please send your responses via email to [commercial.operation@nationalgrideso.com](mailto:commercial.operation@nationalgrideso.com) by 5pm on **29<sup>th</sup> November 2019**.*

*If you have any questions, please contact [commercial.operation@nationalgrideso.com](mailto:commercial.operation@nationalgrideso.com) or call 01926 654611.*

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