Mersey 2020 – 2021 Tender
Interactive Guidance Document

nationalgridESO

nationalgridESO

Legal disclaimer and Copyright

Disclaimer

This guidance document has been prepared by National Grid Electricity System Operator (NGESO) and is provided voluntarily and without charge. Whilst NGESO has taken all reasonable care in preparing this document, no representation or warranty either expressed or implied is made as to the accuracy or completeness of the information that it contains and parties using information within the document should make their own enquiries as to its accuracy and suitability for the purpose for which they use it. Neither NGESO nor any other companies in the National Grid plc group, nor any directors or employees of any such company shall be liable for any error or misstatement or opinion on which the recipient of this document relies or seeks to rely other than fraudulent misstatement or fraudulent misrepresentation and does not accept any responsibility for any use which is made of the information or the document or (to the extent permitted by law) for any damages or losses incurred.

nationalgridESO

Version Control

Version	Date published	Page No.	Comments
1.0	14/10/2019		

How to use this guide

This document aims to provide current and potential Reactive Power 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:


Return to main menu

Please contact 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

2. Reactive overview

3. Requirements

4. Assessment principles

5. Contract Options

6. How to participate

Key Documents

Return to main menu

1. Context and Market Information

1.1. Context

Why are we doing this?

- We have identified a need for reactive power capability within the Mersey region to solve high-voltages on the Transmission network.
- A long-term approach to include new build options as solutions to the need is in progress but will not deliver a solution until April 2022.
- This tender is seeking solutions for the immediate need. With the anticipated reduction in reactive capacity in April 2020, there is a need to procure additional reactive power capacity in the Mersey region.
- Responses to a request for information identified some providers which are already connected but may not have met the requirements of the previous tender for this period.
- This will also help inform our commitment to review reactive power procurement within our Reactive Roadmap
- This need was identified in a case study through the ENA Open Networks project to expand the Network Options Assessment (NOA) approach to consider transmission voltage needs and assess options to meet those needs.

1.1. Context

Aims

The aim of this tender is to:

- Formally invite tender submissions from potential providers of reactive power in the Mersey area
- Meet a requirement which exists April 2020 – March 2021

We will also:

- Test a procurement exercise with DNO involvement where embedded providers participate
- Use lessons learned to inform the review and reform of reactive power
- Consider the need for a tender next year to cover the period April 2021 – March 2022

1.2. Wider Activities Impacting Reactive Power

There are a significant number of activities on-going which impact the Reactive Power ancillary service. This is part of the Electricity System Operator's review of Balancing Services, aiming to create balancing service markets that meet our changing system needs.

The Product Roadmap for Reactive Power provides detailed information on the developments within the ancillary service. Developments that directly impact this tender are:

- Product Roadmap for Reactive Power
- Applying a 'Network Options Assessment' to Voltage
- Power Potential
- Greater Transparency of Reactive Spend
- Long Term Tender for Mersey

1.3. How information will be used

Use of information submitted within the tender includes:

- Calculate provider effectiveness of delivering reactive power at the relevant location on the transmission system
- Pass necessary technical information onto the relevant DNO for technical assessment purposes
- Conduct economic assessment of provider solutions

The results of the tender will be published alongside reasons for rejection, if relevant, and details of tender submissions. Published details will include:

- Reactive capability
- Calculated effectiveness
- Relevant submitted price (availability / activation) and calculated Total cost per effective MVAr

For information on stages of the tender process, please refer to the Timeline.

1.4. Market information for 2020

What are we tendering for?

Procurement is considered for 2020/21:

- Reactive Capability Requirement exists 1st April 2020 23:00 – 1st April 2021 07:00
- Requirement 23:00 – 07:00 year round
- Forecast utilisation – expect a need to arise in 60% of service periods
- Reactive Lead (Absorption) requirement: -200MVAr
  - We will procure enough additional reactive power to cover outages and unavailability of the largest accepted provider
- The Reactive requirement is measured at the transmission system, and procured volume depends on the exact location of the reactive providers
- Requirement is for static Reactive Power provision however, dynamic providers will be considered
- We invite embedded and transmission connected parties to participate
- All providers will receive utilisation payments at the equivalent ORPS rate £/MVArh
- Additional payments for availability or activation vary by contract type

2. Reactive overview

2.1 Voltage and Reactive Power

2.2 Voltage Constraint Services

2.3 Tender Outline

2.1. Voltage and Reactive Power

Why is there a need?	
System Operator Obligation	■ The ESO has a statutory obligation to maintain the National Electricity Transmission System (NETS) voltages within limits. This obligation also applies to voltage step change limits. These limits are defined within the NETS Security and Quality of Supply Standards (SQSS).
System Voltage	■ System voltage is continuously changing and is variable across the system. ■ Voltage is a localised property of the system. ■ There are differing requirements across areas of the system due to this variability.
Reactive Power	■ The ESO maintains voltages by managing the Reactive Power flows across the system. ■ Voltage constraint contracts have been used historically to procure additional reactive capability paid at ORPS rate. ■ We anticipate that the reactive capability in the region will reduce in 2020.

2.2. Voltage Constraint Services

What do we do now?	
General	■ The Electricity System Operator uses reactive capability provided by generators and assets. ■ Services have typically been limited to BM providers. ■ Dispatch of Reactive Power completed through electronic instruction. ■ Instruction is either via Reactive Power or Voltage Set point instruction. Key documents for more information
Availability	■ Where required, additional reactive power is accessed through purchasing Active Power via Trading and BM Actions. ■ Constraint Management contracts, such as the Optional Voltage Contracts, also allow the ESO to access reactive power. ■ Availability reported through ‘Constraint’ part of MBSS.
Utilisation	■ After the reactive capability has been procured – Reactive Power dispatch is paid at ORPS rate as outlined in the CUSC. ■ Reactive Utilisation is reported through ‘Reactive’ part of the MBSS.

2.3. Tender Outline

What are we doing next?

Providers	■ We are adopting a new approach to enable distribution connected providers to participate in this Reactive Power service tender ■ The service is open to BM and non-BM providers, with or without an MSA, and do not need to be a CUSC or BSC party ■ The service is open to any provider who can meet the requirements (see section 3) ■ Providers can offer other balancing services in conjunction with Reactive Power services, as long as this does not impact the reactive range tendered. The benefits of the additional services provided will not be considered as part of this tender. ■ There are four contract options with either an availability or activation payment structure ■ Technical restrictions require embedded providers to have an active power element at the same time as providing reactive power i.e. cannot provide reactive power at 0MW.

2.3. Tender Outline – Contract Requirements

What contract types are available?

	A - BM Firm	B - BM Call-Off	C - Embedded Non-Flexible	D - Embedded Flexible
	Providers require an MSA for Reactive Power capability and are signatory to the CUSC		Providers must be connected at 132kV or below	
Transmission Connected	Transmission connected providers must be able to operate in Voltage Control mode		Cannot participate	
Distribution Connected	Cannot participate	Providers must be able to operate in Power Factor Control mode		

This table gives an indication as to which contract type you may be eligible for

2.3. Tender Outline – Contract Options

What payment structures are available?

	A - BM Firm	B - BM Call-Off	C - Embedded Non-Flexible	D - Embedded Flexible
Aimed at:	BM providers expecting to run every night	BM providers not expecting to run every night	Embedded providers who can meet entire Service Period	Embedded providers who can't meet entire Service Period
Availability	✓ Available to deliver reactive power every service period (£/SP)	✗ Call off contract structure – no availability (£0/SP)	✓ Payment for availability if available (£/MVAr/SP)	✗ Access in real time only – no availability payment (£0/SP)
Activation	✗ Always delivering – no payment (£0/SP)	✓ Payment index linked to DA market (£/MWh)	✗ Already available – no payment (£0/SP)	✓ If instructed in real-time – paid an activation fee (£/MVAr/SP)
Utilisation	✓ All providers paid ORPS / equivalent rate (£/MVArh)			

This table highlights the contract payment structures – more detail available in Section 5

3. Requirements

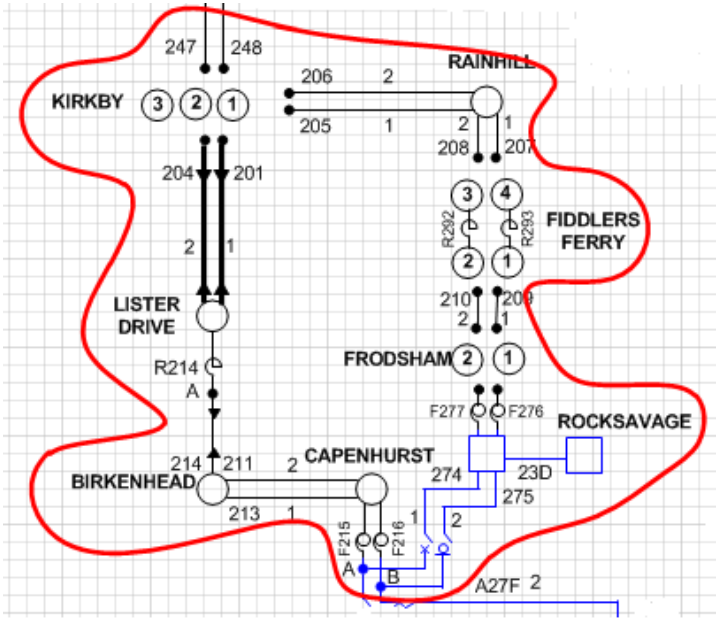
3.1 Location Requirements

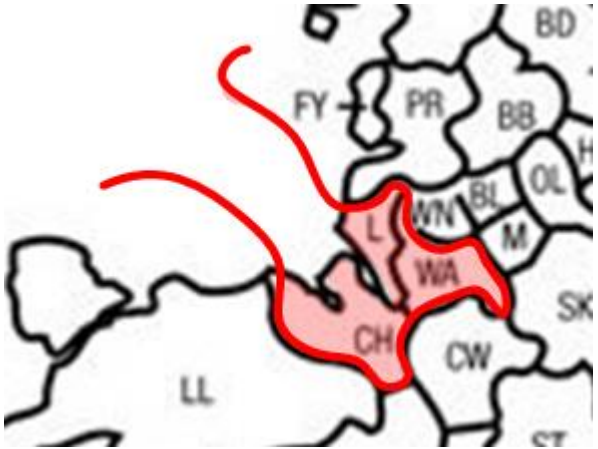
3.2 Technical Requirements

3.3 Other Requirements

3.1. Location requirements

Potential Reactive Providers must be within the red boundary:





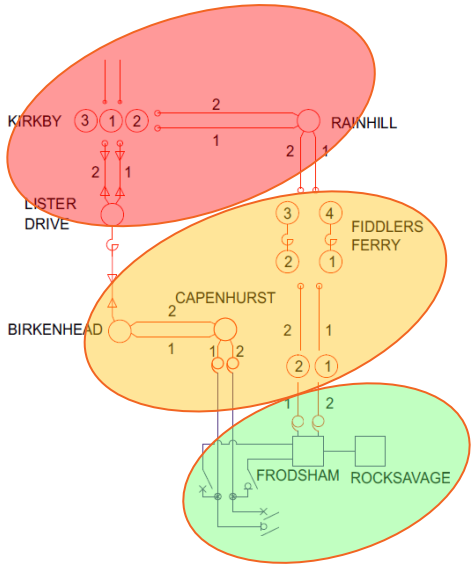
Continued...

The technical diagram is seen as the authority when determining a providers location

3.1. Location requirements

Indicative Site Effectiveness

Least Effective



Most Effective

Typical Effectiveness at various voltage levels*

Least Effective — Most Effective

33 kV
66 kV

132 kV
275 kV
400 kV

* Actual effectiveness depends on site by site assessment

Indication of reactive effectiveness e.g. greater at 400kV at Frodsham; less at 33kV at Kirkby

3.2. Technical Requirements

What are the minimum requirements to participate?	
Minimum size	• Minimum Reactive Power absorption is 5MVAr (for embedded providers this must be between 0.5 and 0.95 power factor leading (absorption)) and connected at 33kV or above. This can be from a single unit or aggregated from several smaller units at a single connection site
Location	• All providers must be within the location described in slide 20. Where providers are connected at distribution level, you may wish to confirm where you are connected on the transmission network. • Where postcode and technical drawings differ the technical diagram is seen as the authority.
Voltage Control	• Synchronous transmission connected providers must be in voltage control mode. • Distribution connected and non-synchronous providers must be in power factor control mode. • All technologies should be in correct control mode for duration of instruction, and if operating in a different mode, move to the correct mode without instruction

Continued...

These are the minimum requirements needed to participate

3.2. Technical Requirements

What are the minimum requirements to participate?	
Dispatch	• There must be a single point of dispatch. • The notice period required to deliver reactive power must not exceed 13 hours. • Reactive power must be available to dispatch as defined by relevant contract. • Providers must have capability of receiving, and responding to instructions 24/7 for the duration of the contract period. • Contract types A, B and C must be able to deliver reactive power for the entire service period (23:00-07:00). • Providers to inform NGESO of planned outages / periods of unavailability.
BM Dispatch	• Providers to be dispatched via existing NGESO computer systems.

Continued...

These are the minimum requirements needed to participate.

3.2. Technical Requirements

What are the minimum requirements to participate?	
Embedded	• Provider should host an IEC104 server so that NGESO can connect over a VPN such that NGESO have visibility of metering data and availability/status signals. • If contract type D providers wish to be electronically dispatched, they will also need to be able to accept IEC104 single point command, and respond appropriately. Providers will otherwise need to accept instructions manually.

These are optional, but preferable for ease of settlement and dispatch.

4. Assessment Criteria and Principles

4.1 General Assessment Information

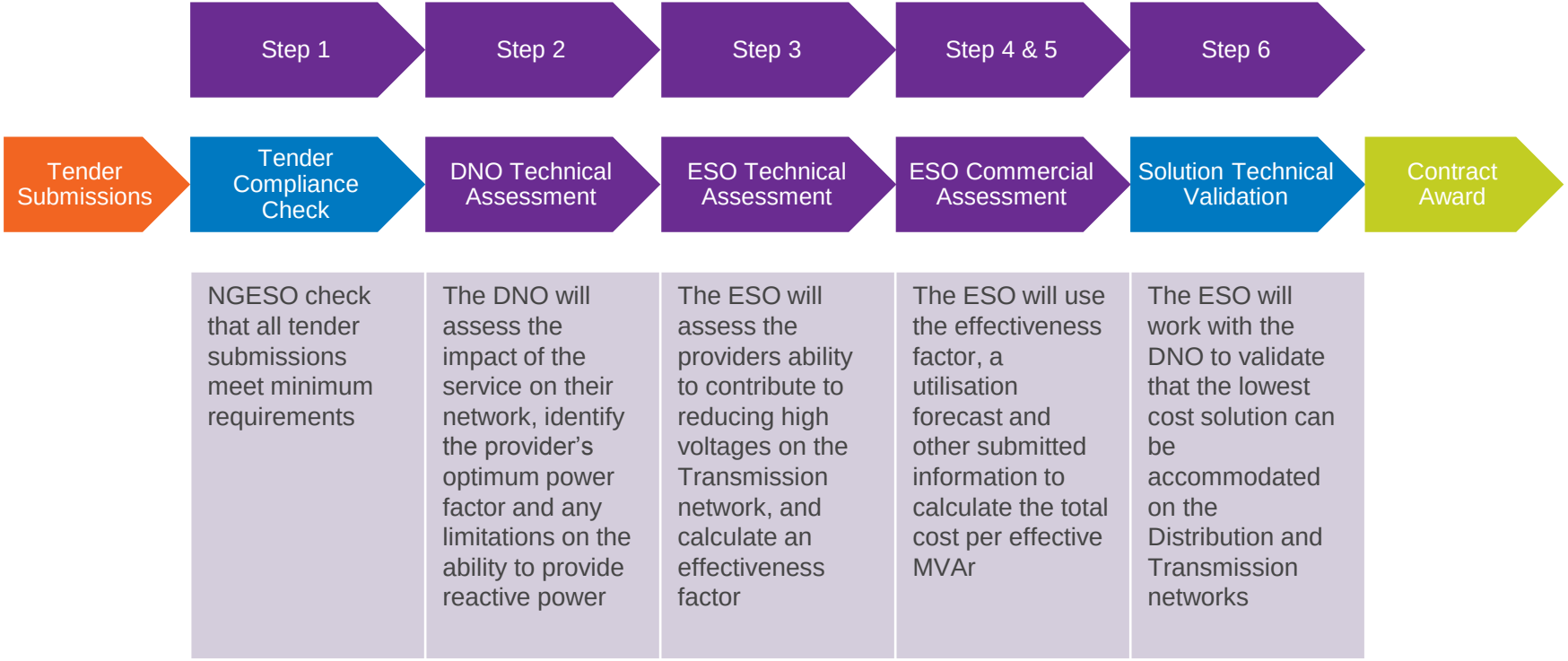
4.2 Reactive Tender Assessment Process

4.1. General Assessment Information

The criteria for selection include but are not limited to:

- The proposed service must meet the minimum requirements
- Location of asset and connection point
- Provider effectiveness
- Total Cost
- MVAr range
- SEL if applicable

4.2. Reactive Tender Assessment Process



4.2. Reactive Tender Assessment Process

Step 1: Ensure tender compliance

All submissions will be assessed against the requirements. As part of the submission, providers will have to complete the proforma and confirm that their options will meet all the minimum technical requirements. These include:

- Being connected and ready to provide the reactive power service no later than 1 April 2020
- Connected at 33kV or higher
- Connected within the Mersey region (refer to Section 3.1)
- Minimum 5MVAr absorption capability (for Distribution connected this must be between power factor 0.5 and 0.95 absorption)
- Ability to meet the relevant service period (23:00-07:00) requirements
- Where applicable, the notice period for NGESO to enact the reactive power service must be no more than 13 hours.

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

Continued...

4.2. Reactive Tender Assessment Process

Step 2: Assessment of impact on transmission/distribution network

For the purpose of this tender, the ESO work with the DNO to ensure the impact of any proposed options on their networks is considered in the assessment.

For distribution-connected options, network studies will be carried out by SP Energy Networks (SPEN) to identify the impact of the reactive power flows on the distribution network. Where providers have stated that their options are flexible on their power factors, SPEN will identify the most optimum power factor for the option. The MVAr capability at this power factor will be taken as the contracted MVAr volume for the cost assessment (Step 4).

Any restrictions on the transmission/distribution networks identified as part of the technical assessment may limit the reactive capability of a proposed option to provide the reactive power service tendered for. It is the limited capability which will be considered in the cost-benefit analysis. For example, some participants may be restricted to operate within a specific range of power factor; the ESO will then consider if such restriction will limit the ability of an option to provide the reactive power service.

Continued...

4.2. Reactive Tender Assessment Process

Step 3: Technical Assessment - Effectiveness

The next step in the assessment process is to establish through system studies the effectiveness of each option.

The effectiveness of any proposed options varies according to their points of connection. It will impact the total volume of Reactive Power procured. Options in different locations, connected at different voltage levels or of different sizes have different impacts on the transmission system voltage. Therefore an effectiveness factor needs to be established for each option.

The ESO work with SPEN to calculate the effectiveness factors when all bids are received.

Please refer to Effectiveness Factor assessment methodology for details on how effectiveness factors are calculated.

Using the effectiveness factor, the Effective MVAr provided by each option will be calculated:

- *Effective MVAr provided = MVAr provided at point of connection x effectiveness factor*

If an option is not effective, it will not be considered for further assessment.

Continued...

4.2. Reactive Tender Assessment Process

Step 4: Cost Assessment – Contract assessment and selection

As Contract D is a non-firm service, these tenders will only be considered if the requirement has not been met by tenders for Contracts A-C.

The assessment will calculate the total cost per effective MVAr of each contract using the parameters provided and our forecast utilisation to create a price stack. Contracts will then be awarded until our requirement has been fulfilled. We will procure enough additional reactive power to cover outages and unavailabilty of the largest accepted provider. Due to the granularity of the product this may result in some overholding.

Step 5: Cost Assessment – Comparison against other options

All tenders are compared against the BM counterfactuals although at times there may be no alternative BM actions to take due to generator outages and unavailability. NGESO is licensed to manage the system in an economic and efficient manner and the cost of the contracts will be compared to the historic cost of managing voltages in the Mersey region and other voltage areas. If the total costs of the contracts required to obtain 200MVArs absorption is excessively high compared to these costs, NG may reject tenders with Effective £/MVAr costs that show significant deviation from the average accepted tender price. Providers are expected to be price reflective in line with the market.

Costs for managing volts on the Transmission system are available in the MBSS reports, on the National Grid website.

Continued...

4.2. Reactive Tender Assessment Process

Step 6: Validation of the combined solution

If the lowest cost solution is a combination of options, the ESO will collaborate with SPEN to perform a validation. This is to validate that when all the selected options are working together to provide the reactive power services, no system limits will be exceeded inadvertently as a result. Shall the lowest cost solution prove to cause other system issues, the next-lowest cost solution will be selected instead. Step 6 will be repeated until a solution is found to clear the validation process.

5. Contract Options

5.1 Contract Option A

5.2 Contract Option B

5.3 Contract Option C

5.4 Contract Option D

5.1. Contract Option A – BM Firm

Payment Structure	■ Provider paid a fixed fee for periods of availability (£/settlement period). ■ Utilisation paid at ORPS (£/MVArh).
Contract Structure	■ Provider contracted reactive capability to be available for every Service Period for the duration of the contract with the exception of technical outages. ■ Availability payment is £/SP against an agreed Reactive volume. ■ Reactive power to be delivered at contracted SEL for duration of service period. ■ Service Period is 16 settlement periods per day (23:00-07:00). ■ For sites with multiple units; unit's contracted reactive capability can be delivered from any unit, as long as the contracted reactive capability is maintained. ■ Reactive capability must always be delivered from the agreed contract location.

5.2. Contract Option B – BM Call-off

Payment Structure	■ Option price without availability component. ■ Payment linked to Day Ahead Market, £/MWh and to PN position of unit before and after service period. ■ Utilisation paid at ORPS (£/MVArh) or equivalent.
Contract Structure	■ Contract enacted before 10:00am day ahead or a later notice as agreed. ■ When NGESO enacts the contract, NGESO will payout the difference between the day ahead dark/spark spread and pre-agreed strike price. ■ Contract payment £/MWh is for contracted SEL. ■ When enacted, providers must provide reactive power throughout service period (23:00-07:00). ■ For sites with multiple generators unit's reactive capability can be delivered from any unit, as long as the contracted reactive capability is maintained. ■ Reactive capability must always be delivered from the agreed contract location.

5.3. Contract Option C – Embedded Non-Flexible

Payment Structure	■ Provider paid a fixed fee for periods of availability (£/MVAr/SP). ■ When under instruction, utilisation is paid at a rate equivalent to ORPS (£/MVArh).
Contract Structure	■ Contract enacted before 10:00am day ahead or a later notice as agreed. ■ Provider contracted reactive capability to be available for every Service Period for the duration of the contract except for technical outages. ■ Availability is a £/MVAr/SP against an agreed reactive volume regardless of how often and how much Reactive Power is provided (within contract limits). ■ When enacted, providers must provide reactive power throughout service period (23:00-07:00). Provider will be paid for utilisation at a rate equivalent to ORPS. ■ For sites with multiple generators unit's reactive capability can be delivered from any unit, as long as the contracted reactive capability is maintained. ■ Reactive capability must always be delivered from the agreed contract location.

5.4. Contract Option D – Embedded Flexible

Payment Structure	■ When instructed by the ESO to be available, providers paid activation fee (£/MVAr/SP) for all settlement periods whilst under instruction. ■ When under instruction, utilisation is paid at a rate equivalent to ORPS (£/MVArh).
Contract Structure	■ Activation is agreed with provider against the real-time available volume (within contract limits). ■ ESO instructions will only be issued during the Service Period (23:00-07:00). ■ For sites with multiple generators unit's reactive capability can be delivered from any unit, as long as the contracted reactive range is maintained. ■ Reactive capability must always be delivered from the agreed contract location.

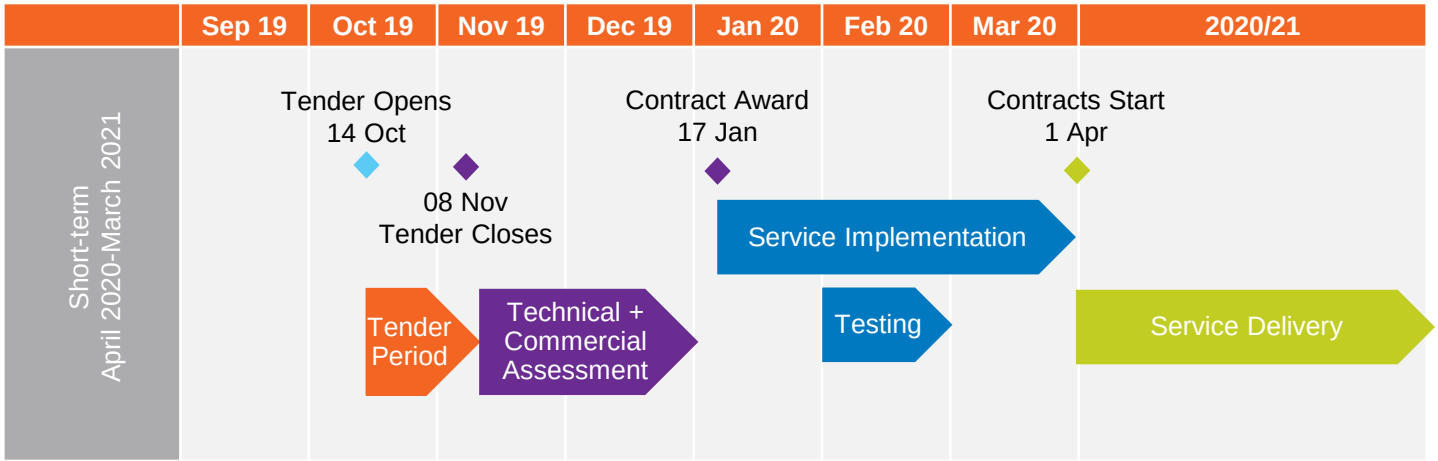
Return to main menu

6. How to Participate

6.1 Timeline

6.2 How to submit information

6.1. Timeline



nationalgridESO

6.2. How to submit information

Please use the below proforma when responding to the tender.

Tender Proforma

The deadline for submission of information is 8th November 2019.

Submissions may only include one tender per unit/asset for each contract type.

NGESO will consider the submissions and publish the tender outcome by 17th January 2020.

Please send your responses via email to commercial.operation@nationalgrideso.com by 5pm on 8th November 2019.

If you have any questions, please contact commercial.operation@nationalgrideso.com or call 01926 654611.

Return to main menu

Key documents

Current and Short Term information

- Constraint Management Contracts
- Balancing Service Reports
- ORPS Information

nationalgrideso.com

National Grid ESO, Faraday House, Warwick Technology Park,
Gallows Hill, Warwick, CV346DA

nationalgridESO