nationalgridESO

Mersey Long Term Reactive Power Services RFI

FAQ

22 May 2019

Contents

FAQ

General

1. **Are the Mersey RFI webinar slides available?** (last updated: 8 May)

You can find the slides from our Mersey RFI webinar held on 1 May on the Network Development Roadmap page of our website. This page is regularly refreshed with the most up-to-date information on all our pathfinder projects.

2. **Does this RFI acts as a pre-assessment for the tender?** (last updated: 8 May)

No, this RFI does not act as a pre-assessment for the tender process. We'd like to understand through this RFI:

- The ability of the market to provide alternative options to Network Owner options to meet the identified Reactive Power needs to control high voltage
- The level of interest to provide a Reactive Power service to meet the identified long-term needs
- The likelihood of achieving a more economic and efficient overall solution by considering a wider range of options
- The delivery timescale of market-based options
- The potential framework restrictions

We'd also like to seek feedback on:

- Assessment criteria and principles
- Contract options

Requirement

3. **Is the RFI targeting mostly existing generation in the area?** (last updated: 8 May)

No, we're interested in hearing from both existing generation (for services beyond any mandatory obligations) and new participants. We're interested in services which are available from 2021, if something is not available until later, e.g. 2022 or 2023, we're still interested.

4. **Are you open to have battery storage solutions as options to the RFI?** (last updated: 8 May)

Yes, we're interested to hear from any participants who can meet the technical requirements.

5. **Is it possible to apply for a 10-year contract?** (last updated: 8 May)

The need we've identified is for 10 years. We're interested to hear back from potential providers what length of contracts they're interested in. We'll state the possible lengths of any contract as part of the tender.

6. **What are the drivers behind the reactive power absorption requirement in the Mersey area?** (last updated: 8 May)

The requirements for reactive power absorption in the Mersey area are as a result of a fault of the double circuit between Capenhurst, Frodsham and Connah's Quay during periods of low demands and low power flows across the Mersey area. The latter tends to coincide during periods of low power flows from Scotland to England. An increasing need for reactive power absorption has been identified across many areas of the GB system. Further information can be found in the Product Roadmap for Reactive Power.

7. **What is the difference between static and dynamic reactive power provision?** (last updated: 8 May)

The main difference with regards to the timescales in which providers are required to respond. Dynamic reactive power is usually required to maintain system stability and as such, the providers

need to respond swiftly to rapidly changing system conditions or faults usually within hundreds of milliseconds. Static reactive power providers are much slower and will either be in service or out of service. They cannot respond automatically to system conditions or faults.

8. **Can you please explain what you mean by "the market may deliver the reactive capability without intervention from the System Operator"?** (last updated: 8 May)

Where existing BM participants self-dispatch and can meet the reactive power requirement in the Mersey area, the ESO will not have to intervene in the market. During other times, where there is a shortfall in reactive power absorption capability, the ESO will have to intervene by instructing service providers to absorb reactive power. Through the tender stage, we'll identify the most economical way to meet the shortfall in capability to absorb reactive power.

9. **Can you please use the term "reactive power absorption" instead of lead reactive power?** (last updated: 8 May)

Thank you for the feedback. We will use the term reactive power absorption from now on for clarity.

Network owners (TO/DNO) related

10. **Are there any restrictions on the DNO network which could prevent reactive power from being accessed from providers wishing to connect to the distribution networks?** (last updated: 8 May)

We're aware that in some cases, there may be restrictions or limitations on the DNO or TO networks such that even though a site may be effective, it may not be possible to deliver. The impact of a potential solution will need to be discussed with the DNO or TO who will provide an impact assessment on their respective networks.

11. **Will the DNO penalise potential providers for operating at a Power Factor other than unity?** (last updated: 8 May)

We're looking into this question and will provide an update soon.

Effectiveness

12. **Can you provide an indicative heatmap for effectiveness, similar to the one you previously provided for the Enhanced Reactive Service in Scotland tender?** (last updated: 8 May)

We've included an indicative heatmap for effectiveness with further information in the slides from our Mersey RFI webinar held on 1 May. You can find the slides on the Network Development Roadmap page of our website.

13. **Are the effectiveness factors final or only indicative?** (last updated: 8 May)

The effectiveness factors which were provided have been derived from network simulations and should therefore be reasonably accurate. For the transmission sites (275kV and 400kV), we have a good level of confidence in the effectiveness factors. For sites which are 132kV or below, we need further discussions with the DNO as we don't have full visibility of the detailed network topology which may impact on the effectiveness factors. As effectiveness factors depends on future backgrounds and system conditions, we may update the effectiveness factors if we see significant changes before the tender process starts. This RFI does not act as the pre-assessment for the tender process.

14. **Can the effectiveness factors be provided for each node on the transmission and distribution network within the area of interest?** (last updated: 15 May)

We appreciate that effectiveness factors are important to enable you to target the right locations for your prospective options. There is a large number of nodes on the transmission and distribution network within the Mersey area and at this stage we are not able to provide the effectiveness

factors for all these nodes. We intend to look into this further and determine the best way to provide you with the information that you will need for the tender stage. We will consider your feedback to date when we prepare the tender information pack, if the conclusion of the RFI is a tender will follow.

Please let us know as part of your response to this RFI whether you are flexible on your location or whether you are targeting specific locations on the network.

15. **Can you provide an effectiveness map for each of the year within the tender period?** (last updated: 15 May)

Based on our current assumptions, effectiveness factors will not change significantly over the tender period and therefore we do not plan to publish an effectiveness map for each of the year within the tender period. We intend to review our assumptions when we prepare the tender information pack if the conclusion of the RFI is a tender will follow and you will be made aware of the effectiveness factors that will be used in the assessment.

16. **Can you explain how the effectiveness factors are calculated?** (last updated: 15 May)

We've included an example with explanation in Appendix A of this FAQ document to illustrate how we calculate effectiveness factors for this RFI.

17. **Can the effectiveness factors change post tender award? Will potential providers be penalised if the effectiveness factors changed post tender?** (last updated: 8 May)

We're looking into this question and will provide an update soon.

18. **What is the rationale behind procuring reactive power support from less effective locations?** (last updated: 8 May)

The ESO is looking for the most economical way to meet the reactive power absorption requirements. This may mean procuring reactive power from less effective locations if the price is significantly cheaper than procuring the reactive power from a more effective location.

19. **Why is the availability cost for all participants fixed to a single value? Having a fixed value may lead to higher balancing costs which will be picked up by the end consumer?** (last updated: 8 May)

The cost for the availability of options will be submitted by the participants and will therefore not be fixed. We'll select the options which are most cost-effective to meet the reactive power requirements which should bring down the costs to the end consumer.

Utilisation

20. **What is the expected utilisation of reactive power in the Mersey area over the tender period?** (last updated: 8 May)

We have provided a view of historic utilisation based on data from 2017 and 2018. The chart shows the percentage of time various levels of reactive power have been utilised over the last two years. Please note that utilisation will vary according to system conditions and may therefore be different from the historical information.

21. **Could you provide information on your views of how often and how the market may deliver the reactive power capabilities without intervention from the ESO in the BM.** (last updated: 8 May)

We're looking into this question and will provide an update soon.

Assessment

22. In the RFI information pack, it says "The BM cost considered forecast constraint which is consistent with the NOA Methodology…". Can you explain further how you ensure the assessment is consistent with the NOA Methodology? (last updated: 8 May)

In the assessment, we'll use the same constraint cost modelling tool as NOA i.e. Poyry's BID3 to estimate constraint cost. This provides consistency with the NOA for network boundary flow. However, the criteria applied to evaluate constraint actions for high voltage control is different to those used by the NOA to determine network boundary flow related constraint actions. The criteria used for high voltage control is linked to the minimum number of local generators required on the system to maintain voltage compliance.

23. In the assessment principles, the formula in Step 3 suggests that for tender options the cost of connecting any new asset (if applicable) to the electricity system will be counted towards the capital cost. If an option is expected to provide multiple services, how will this cost be allocated to each service? (last updated: 8 May)

We're considering a generic per MVAr (£/MVAr) connection cost to be applied to all tender options which do not currently have a connection. This provides a balance between considering the further potential of any options to provide multiple services and the full costs of each options. We'd welcome your feedback on this approach as part of the RFI response.

24. Is the Capital Cost element of the total Option Cost only applicable to options which require a new connection? (last updated: 8 May)

Yes, we're proposing that such cost element is only applicable to options which do not currently have a connection. We'd welcome your feedback on this approach as part of the RFI response.

25. What is the assumption to footroom cost if a provider has to generate at a min. MW level (e.g. SEL) to provide the Reactive Power Service? (last updated: 8 May)

We procure only Reactive Power for this service. Providers are expected to manage any Active Power actions required to achieve the Reactive Power output required.

26. I read about your recently published "Zero carbon operation of the electricity system by 2025". Will CO_2 reporting be considered in the assessment? (last updated: 8 May)

No, we currently do not consider CO_2 reporting in the assessment.

27. Will all tenders i.e. whichever region/service it is for be assessed against the BM cost counterfactuals and TO options? Is this the new way all future tenders will be assessed? (last updated: 8 May)

No, we design our assessment according to the requirements we see for each region and each service.

28. If a provider submits a bid for the reactive power service stated in this RFI over a 5-year duration, where they may submit an optimal bid in year 1 and year 5 but the bid wasn't optimal for year 2, year 3 and year 4, how would this be assessed? What if this was the only provider? (last updated: 15 May)

The principle of our assessment is to find the most economical and efficient solution to meet our requirement over the entire tender period.

If a bid over a 5-year duration, where it is optimal in year 1 and year 5 but not year 2, year 3 and year 4, helps to achieve the cheapest overall cost over the tender period, it may still be selected.

Conversely if a bid over a 5-year duration, where it is optimal in year 1, year 2, year 3 and year 5 but not year 4, does not help to achieve the cheapest overall cost over the tender period, it will not be selected.

29. **The ESO suggests they consider the TO asset option for its full regulated asset life, what timeframe does that mean e.g. 30 or 40 years?** (last updated: 8 May)

In our assessment, we're proposing to consider the capital cost of the TO asset for its full regulated asset life (i.e. 40 years) but limit the benefits of the TO asset to the tender period (i.e. 10 years for this RFI).

30. **Reactive Power Service providers are required to deal with real power costs. How are Network Owner (TO/DNO) options paying for losses? Is this a level-playing field?** (last updated: 8 May)

We're looking into this question and will provide an update soon.

31. **Can you share the current cost of a reactor?** (last updated: 8 May)

No, this is commercially sensitive information which the ESO does not own and therefore we cannot share such information.

32. **The ESO wants to procure 200MVAr of capability to absorb reactive power, so how do you assess the benefits and cost of capability to generate reactive power if an option is capable to do both i.e. absorb and generate?** (last updated: 8 May)

We'll only consider the benefits provided by the capability of an option to absorb reactive power in the assessment. Similarly, we'll only consider the cost we pay to procure the capability of an option to absorb reactive power as no payment will be made to the capability of an option to generate reactive power under the service targeted by this RFI.

33. **How will you assess the value of dynamic versus static capabilities?** (last updated: 8 May)

The requirement in the Mersey area is for static reactive compensation. We will also consider solutions which can provide dynamic reactive compensation as part of our assessment but they will not be given any additional value when compared to static reactive compensation. Options will be compared according to their cost and effectiveness.

34. **How have you identified the requirement and the timescales of the provision of reactive power?** (last updated: 8 May)

The requirement in the Mersey area is for static reactive compensation. We have identified the requirement by conducting voltage analysis in line with guidance of the NETS SQSS. As the requirement are not within stability timescales, we believe that the 2-minute response time is adequate to meet the requirement in the Mersey area.

Contracts / Terms and conditions

35. **In the webinar, you suggested the potential to include penalty terms for unavailability or non-delivery to provide the contracted service. Can you explain further your considerations behind the proposal to include such terms?** (last updated: 8 May)

The requirements in the Mersey area are for SQSS compliance. This means that under some conditions we may not be able to take alternative actions in the balancing mechanism to resolve network issues. Therefore we propose to include penalty terms for unavailability or non-delivery in any contract providing the service targeted by this RFI to ensure security and operability of the network. We'd welcome your feedback on this approach as part of the RFI response.

Connection agreement

36. **Can a provider respond to the RFI without having secured a grid connection in the area?** (last updated: 8 May)

Yes, we're interested to hear from potential providers in the area for the RFI and do not require them to have a secured connection at this point. We may require connection agreements for a tender, but that will be confirmed later.

37. What testing to demonstrate the ability to provide the service and relevant data is required? (last updated: 8 May)

We'll need to ensure that any potential service provider can provide the service that they are tendering for. We'll work with our compliance teams to understand what testing requirements may be applicable for different parties. We'll provide an update soon.

38. Will competing in the tender guarantee a provider a connection for 2021 if the bid is successful? (last updated: 8 May)

No. Any party interested in providing a service to NGESO and who does not currently hold a connection agreement with either the relevant DNO or TO will need to apply for a connection. This will follow the existing connection application processes and associated regulated timescales.

Codes

39. How is the Access and Forward-Looking Charges code review going to affect participation in the Mersey RFI and any subsequent tender? (last updated: 8 May)

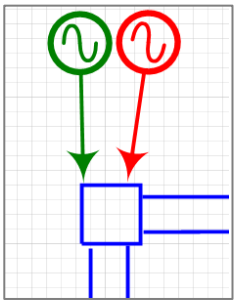
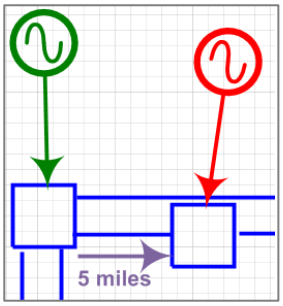
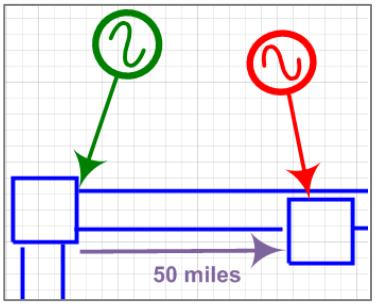
We're looking into this question and will provide an update soon.

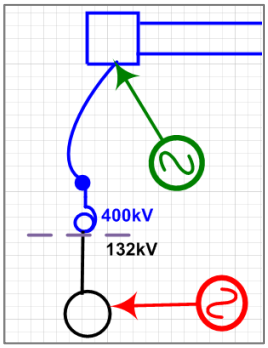
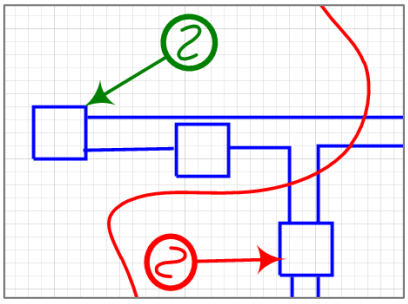
Appendix A – Effectiveness factors: how it is calculated (last updated: 15 May)

To allow a fair comparison to be made for all potential options, effectiveness factors are used when the ESO assesses options. The effectiveness of an option is directly linked to its point of connection and determines the amount of reactive power required to meet the requirement. This will change the total volume expected to be invested or procured. For example, if a unit A was assessed to be 50% effective and unit B 100% effective, to resolve the same issue the system would need to use twice as much reactive power from unit A than B. Unit A would need to be significantly cheaper to have the same benefits.

Effectiveness changes in certain system conditions, for example with certain outages. The ESO calculates effectiveness factors for each point of connection against the same (set of) background to ensure all providers are treated equally.

The below examples are all aimed to be illustrative, and provides approximations of potential differences in effectiveness. This will change when specific technical assessment for each region is completed. Provider A in green, Provider B in red.

Example 1 Provider A and B are connected at the same site. The site is run solid. The two different providers have different reactive ranges. The providers would likely have the same effectiveness factor.	
Example 2 Provider A and B are connected at different, adjacent, sites, which are geographically close together. The providers would likely have similar effectiveness factors. Note: Distance in the diagram is indicative only.	
Example 3 Provider A and B are connected at different, adjacent, sites, which are geographically far apart. The providers would likely have different effectiveness factors. Note: Distance in the diagram is indicative only.	

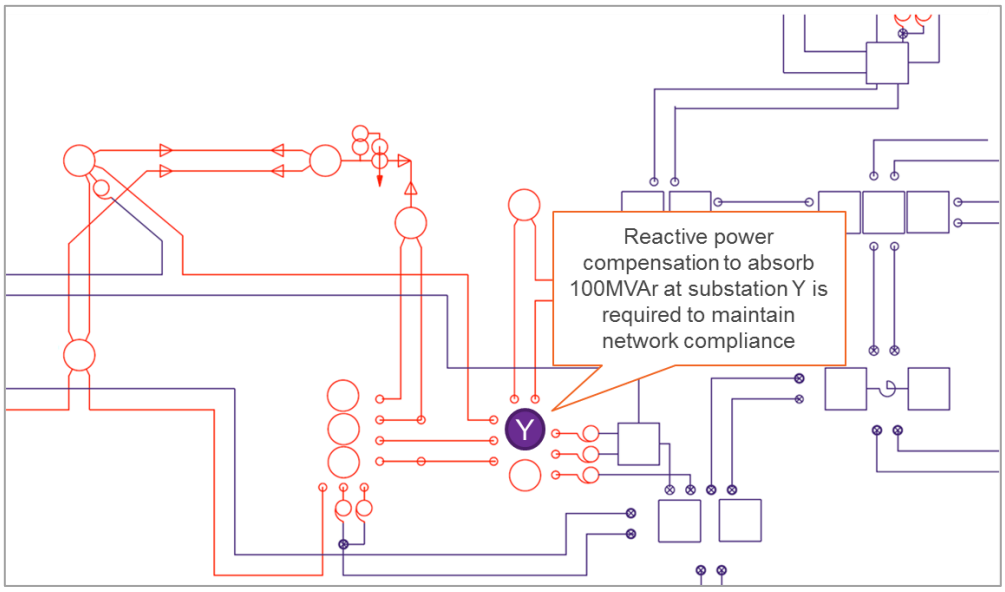
Example 4 Provider A and B are connected at different voltage levels. Provider B is connected at 132kV in the DNO network. The ESO expects that options close to the source of the issue will have higher effectiveness factors. If, for example, the source of the issue is at the transmission network, then Provider B that is connected at 132kV is likely to be less effective than Provider A. Providers connected at lower voltages than 132kV, in this example, would be expected to be even less effective. Alternatively, if, for example, the source of the issue is at the distribution network[1], then Provider B is likely to be as effective (or more effective in some cases) than Provider A.	
Example 5 The reactive power requirement is set specifically for a defined region. The region has been defined based on potential effectiveness. Provider A is inside the defined region and Provider B is outside the defined region. Providers outside the region are assessed as only being ineffective at resolving the issue.	

Calculation of effectiveness factors – an example

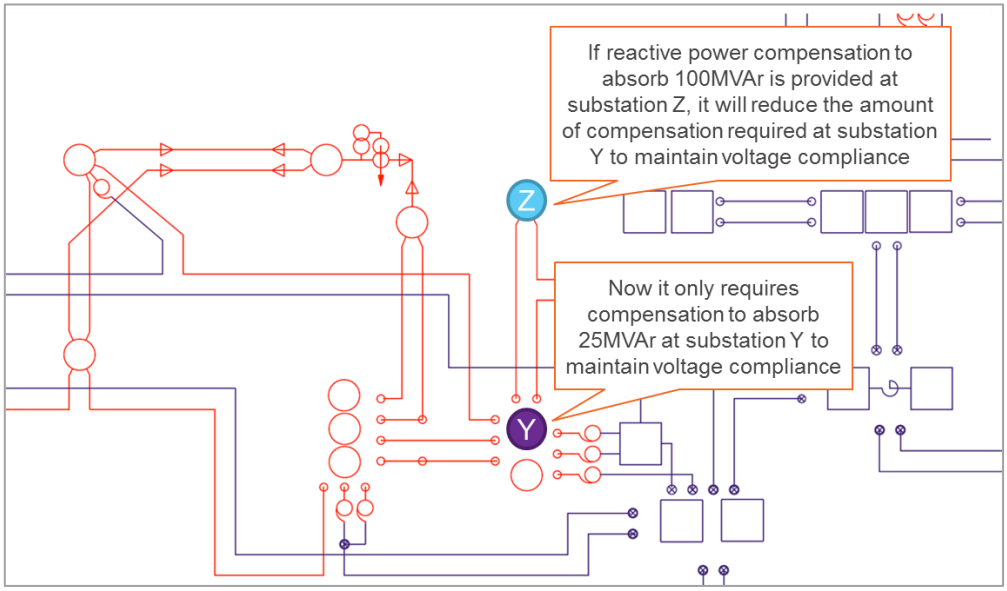
Many factors affect the effectiveness of an option, such as where and how it will connect to the network. Effectiveness factors are relative to a reference point on the network. The ESO chooses reference point(s) on the network based on where it is most effective to implement reactive power compensation to meet the requirement of the region of interest. Through system analysis the ESO calculates the effectiveness factors of relevant connection points with respect to the reference point(s).

In the example below, system analysis suggests that it is most effective to implement reactive power compensation at substation Y and that 100MVAr of reactive power absorption is required to meet the system requirement.

[1] The Power Potential Project, which aims to create a new reactive power market for distributed energy resources (DERs), will provide further insights into effectiveness of options connected to the distribution network. The ESO will learn from the Project and continuously improve their understanding of effectiveness.



Next, the ESO calculates the effectiveness for options connecting at substation Z with substation Y as the reference point. The ESO models reactive power compensation to absorb 100MVAr at substation Z and tests it under selected backgrounds and conditions. In this example, analysis results show that (on average) implementing reactive power compensation to absorb 100MVAr at substation Z reduces the compensation required at substation Y from 100MVAr to 25MVAr.



The ESO can then approximate the effectiveness for any options connecting at substation Z as (100-25)/100 = 0.75 with respect to the reference point.

$$Effectiveness\ factor = \frac{original\ compensation\ at\ ref.point\ Y - resulting\ compensation\ at\ ref.point\ Y}{size\ of\ option\ at\ Z}$$

Appendix B – Effectiveness factors: additional data
(last updated: 22 May)

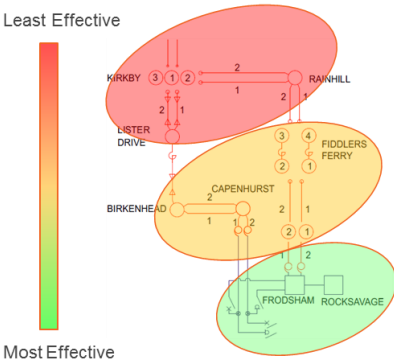
Information on effectiveness factors provided below is indicative only and may change prior to the start of tender process. The information gives no implication on availability of points of connection. We appreciate that effectiveness factors are important to enable you to target the right locations for your prospective options, and we're aware that we aren't providing effectiveness factors for all possible points of connection at this stage. As this RFI concludes, we'll review and determine the best way to provide you with the information you'll need for the tender stage if the conclusion of the RFI is a tender will follow.

Effectiveness

Connecting to busbars (indicative only)

Voltage	Effectiveness	Sites covered
400kV	>90% *	Frodsham, Rocksavage
275kV	60% - 90% *	Birkenhead, Capenhurst, Fiddlers Ferry, Frodsham, Kirkby, Lister Drive, Rainhill
132kV	>30% *	
66kV & 33kV	>20% *	

Least Effective



Most Effective

* Indicative figures based on analysis at selected sites and selected reactive compensation sizes

Connecting to Busbars (indicative only)

	Effectiveness
Birkenhead 275 kV	75% - 80% *
Capenhurst 275 kV	80% - 85% *
Fiddlers Ferry 275 kV	80% - 85% *
Frodsham/ Rocksavage 400kV	>90% *
Frodsham 275 kV	80% - 85% *
Kirkby 275 kV	60% - 75% *
Lister Drive 275kV	70% - 75% *
Rainhill 275 kV	65%-75% *

* Indicative figures based on analysis at selected sites and selected reactive compensation sizes

Connecting to tertiary of SGT (indicative only)

	Effectiveness
Birkenhead 275/132kV SGT	60% - 80% *
Capenhurst 275/132kV SGT	75% - 85% *
Fiddlers Ferry 275/132kV SGT	75% - 85% *
Frodsham 400/275kV SGT **275/132kV SGT**	65% - 85% *
Kirkby 275/132kV SGT	40% - 65% *
Lister Drive 275/132kV SGT	55% - 70% *
Rainhill 275/132kV SGT	60% - 70% *

* Indicative figures based on analysis at selected SGTs and selected reactive compensation sizes