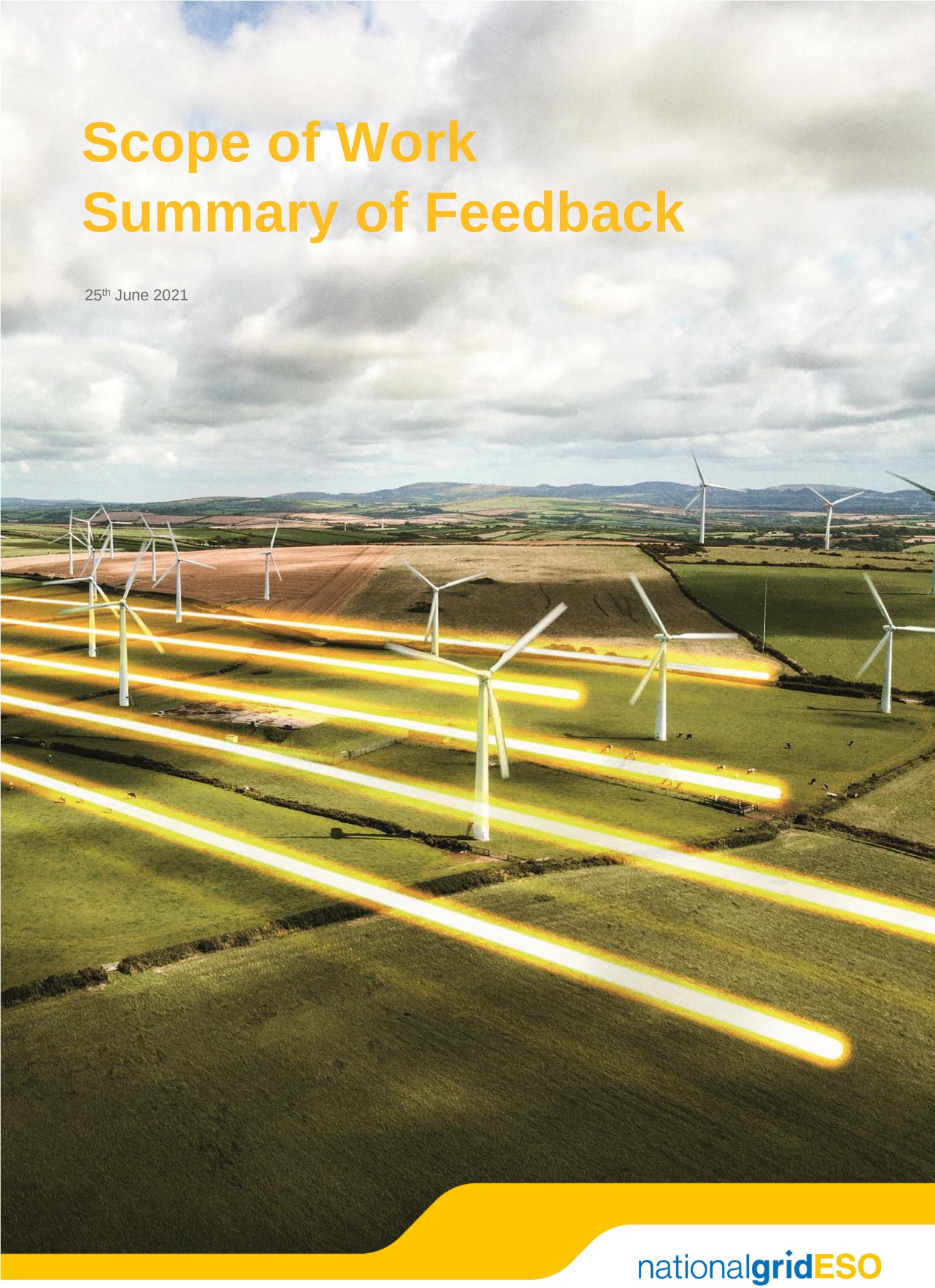
Scope of Work
Summary of Feedback

25th June 2021



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Feedback Summary | 25/06/21

Purpose of document

This document is a summary of the feedback provided by stakeholders on the Draft Scope of Work for the ESO Energy Storage for Constraints Management Technical Feasibility Assessment.

National Grid Electricity System Operator (ESO) is to run a technical feasibility assessment on how energy storage could help manage constraints on the electricity transmission network between 2022-2030. The Draft Scope of Work was published on 10 May 2021 and the wider industry was invited to provide feedback and comments by 10 June 2021. In parallel, the ESO invited consultancies to offer Expressions of Interest in bidding for the project.

The feedback has now been reviewed and an updated Scope of Work has been shared with the consultants who will tender for that work.

Categories of Feedback

The feedback covered a variety of topics that ranged from exploring the wider benefits of storage through to detailed observations on the effectiveness of the analysis itself. We received 80 points of feedback from 14 different stakeholder groups that covered a range of storage companies and industry consultants.

All of the comments proved valuable in testing our understanding of the scope and approach. Some of the feedback has resulted in changes to the final scope of work that we have asked the consultants to bid against. Some of the feedback items will be discussed with the consultants at the start of the project when we begin the detailed planning of the analysis. Some of the suggestions we could see the merits of, but ultimately decided to leave out of scope to keep the project focussed on the core question.

For the purposes of this feedback summary, we have grouped the feedback into themes that fall into three main categories

1. Changes to scope and Scope of Work document
2. Feedback that will refine the analysis approach once the consultant is appointed
3. No change of scope

1. What we changed and why

There were several suggestions in the feedback that resulted in changes to the Scope of Work document. In some cases, the feedback highlighted that we had not explained the intended scope clearly enough and we needed to improve the language used. In other cases, the feedback identified valuable additions to the scope which would improve our ability to deliver the desired outcome of the analysis and for our partners to confidently tender for the work.

The main areas of the scope that we have changed as a result of the feedback relate to:

The objective functions of the optimisations in the study

It is important for us to be clear what the modelling should optimise for in of the various stages of the study. The optimisations will be affected by the nature of the information being analysed within each work-package. We now propose that two optimisations should be carried out. One will be a technical optimisation (MWh) and is the output of work-package 1. The second is an economic optimisation (£) and will be the output of work-package 2.

The importance of the location of storage

We were asked to make sure that our modelling will reveal the benefits of storage at various locations on the transmission network, including close to the constraint, close to renewable generation and at points in between. The importance of including the location of the storage in the analysis has been clarified in the scope.

What is included in the benchmark costs?

There were comments that indicated that the cost assumptions to be used in work-package 3 should be clearer and highlighting some costs that should be included. The description of work-package 3 in the scope now states that these costs include the cost of a network connection, and that the costs must reflect the technology maturity to acknowledge that some technology costs could change over the period being studied.

The role of hydrogen as an electricity storage option

We were asked about the role of hydrogen in this study, as a way to remove energy from the electricity system and store it in another form, which can later be converted back into electricity or used in another way. We clarified that all storage technologies that absorb electricity from the network and later release it back into the network at the same location are within scope. This includes hydrogen technologies if they are designed to operate in this way. Alternative uses of hydrogen (e.g. power to gas, transport) are not in scope as they result in a net transfer of energy from the electricity system into other systems.

2. Feedback that will help us refine the analysis

In addition to the above we also received some valuable feedback that promoted beneficial discussions on how the detail of our analysis may play out. They will help us develop our approach to the early stages of the project once our consultant partner is appointed. The following is a summary of the topics covered.

Temporal resolution

Analysis of network constraints often uses a 4-hourly resolution. This is usually sufficient but can miss events that occur more briefly. Some of the system balancing processes we use occur on a half-hourly basis and there could be advantages to matching that in the analysis. Using a higher temporal resolution for the modelling could provide additional useful information but could also significantly increase the time it takes for models to run.

Availability of data and models

The ESO holds detailed models of the GB transmission system which include data representing the capability of the actual assets in the system. The data these models contain is confidential and not owned by the ESO. Securing permission to share the data and assurances about how the data will be protected would add a significant cost to the project. We also hold simplified models of the network with no confidential data which we can more easily share with consultants.

Sharing the more detailed models and the data they contain with the consultants could improve the accuracy and usefulness of the analysis, but it is not clear how significant the improvement would be and whether it would be sufficient to justify the additional cost.

Impact of nested boundaries

Some of the boundaries in the GB transmission network are “nested” within other boundaries. Actions that mitigate a constraint on a nested boundary can also affect the constraints at the other related boundaries. To fully understand the impact of storage on constraints the analysis would have to include the impact on all the affected nested boundaries. However, it is not necessary to analyse all the boundaries in the GB transmission network to understand how storage can help with constraints, analysing only the most constrained boundaries is probably sufficient to answer the question. A set of only the most constrained boundaries would not include all of the nesting effects.

Operating strategy design

There will need to be an operating strategy governing how storage operates to mitigate constraints. The design of this operating strategy could be quite complex. The strategy might predict a minor constraint in the future, followed by a more severe one and have to decide whether to address the first constraint or hold back capacity for the second one. Similarly, it might have to decide whether to wait for an optimal time to discharge, or discharge at an earlier, less optimal, time in order to create capacity to address future constraints. All of these operating strategy decisions will depend on how well the future state of the network can be predicted. How the operating strategy is designed in the model may affect the results of the analysis.

Optimisation approach

The project needs to determine what storage to use, where to place it and how to operate it in order to reduce constraints on the network. Modelling can determine answers to these questions via optimisations. These optimisations need to be designed carefully to ensure they give useful answers. For example, what property or properties should the model optimise for? Is it better to optimise for the property we care about most, or something simpler that has fewer confounding factors? Are multiple optimisations required and if so, how should the results of one optimisation feed into the next?

3. What we didn't change and why

Some of the feedback requested an increase to the scope or the complexity of the work to be done. Others highlighted the urgency of the situation and requested we simplify the work to deliver it more quickly. In deciding whether these should be accommodated we had to consider the impact the change would have on the ability of the study to answer the primary question – 'What role could storage have in reducing constraint costs between now and 2030?'. Many of the requested changes may have improved the quality of the analysis but not sufficiently to justify the additional time and effort.

The feedback we received in this area has been grouped in themes and is listed below:

- We were asked to include within the study the additional benefits that storage can provide beyond reducing network constraints, including inertia, black-start, response, reserve and other balancing services. These additional services are valuable for system operation, and other ESO activities will investigate what changes might be needed in how we buy these services, but they are not relevant to the primary question of the study and so remain out of scope. Others benefits that some storage can provide, such as voltage, short circuit level and stability, might have an impact on some types of on constraints. We plan to assess the scale of these potential impacts early in the project and where they are found to be significant, they will be included in the analysis.
- We were asked to include the impact of interactions with other markets and consider how current or future market arrangements could change outcomes. The subject of possible future market arrangements for electricity and flexibility is potentially larger in itself than the whole of this feasibility study. The ESO is running a programme of work to get us to net zero carbon electricity markets (find out more here). For this reason, it remains out of scope for this project to keep the analysis focused on the primary question of the study.
- Some stakeholders highlighted implications associated with the 2022-2030 time window for the analysis. At the 2022 end of the range these include the time it takes to build some types of storage and the earliest available connections dates. At the 2030 end of the range the main issue is that some types of storage have long lifetimes and will continue operating long after this date, which could distort the business case analysis in work-package 3. However, some types of storage could be built and connected quite quickly and there are ways to use simplifying assumptions to avoid distortions in the business case analysis without increasing the modelling. After 2030 we expect new network capacity to significantly reduce constraint costs and beyond 2030 the uncertainty increases significantly for scenarios of network build and energy demand and supply, which would undermine the value of the analysis. For these reasons we still believe that 2022-2030 is the correct time frame to use
- We were asked about other mechanisms that can be used to reduce constraint costs, such us increasing electricity demand or other types of flexibility. In order to keep the project focused to deliver results quickly the analysis will only consider storage as a solution. Using demand side response and other types of flexibility will be assessed as part of the wider Constraint Management 5-point plan and in other ESO work.
- We were asked to ensure that the study considers only specific, real technologies that are ready to be deployed. We agree with the need to keep the study tightly focussed to ensure that we can make use of the conclusions However, we feel it is important that the analysis remains broad enough to identify what changes to current technologies could improve their ability to minimise constraints. To balance these requirements, we have stated that only solutions reasonably close to known technologies should be included.
- It was suggested that we should include the impact of building large storage solutions on subsequent network build decisions. We expect the effect of this within the period being analysed to be negligible and

the effect beyond the end of the period to be difficult to model with confidence so will not include this in the scope.

Next Steps

We are grateful for all of the feedback received. It has resulted in a Final Scope of Work which can be confidently used as a basis on which the shortlisted candidates will submit their proposal under the subsequent tender process. If you would like to contact us in relation to this document or any other aspect of the project, please use our email address: .box.Storage.Tender@nationalgrideso.com

The Energy Storage for Constraints Management project is only one part of the work the ESO is doing to understand the future roles of storage in the electricity system. For example we are investigating the changes needed in electricity markets in the medium and long term through our Markets Roadmap and Net Zero Market Reform projects, we are investigating constraint management services that storage could provide through our NOA Constraint Management Pathfinder, and we have innovation projects looking at many other aspects of the future of flexibility in the electricity system. You can find information on these projects and more on our website, or you can get 'Plugged In' – subscribe to our new weekly newsletter to keep up to date on everything ESO.