

Energy Systems Catapult

Call for Evidence – Review of the arrangements for electricity ancillary services

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About Energy Systems Catapult

Energy Systems Catapult (ESC) was set up to accelerate the transformation of the UK's energy system and ensure UK businesses and consumers capture the opportunities of clean growth. ESC is an independent, not-for-profit centre of excellence that bridges the gap between industry, government, academia and research. We take a whole-system view of the energy sector, helping us to identify and address innovation priorities and market barriers, in order to decarbonise the energy system at the lowest cost.

Responses to selected questions

Objective and scope of our review

1. Do you agree with the objective and scope of our review? Are there any other relevant issues we should consider?

While we agree with the objective of the review, we believe that more consideration needs to be given to Whole System Thinking and how the power system can be expected to develop as it decarbonises. The Energy Systems Catapult recently published a report on the challenges of operating a zero-carbon energy system:

https://es.catapult.org.uk/report/zero-carbon-energy-system-the-operability-challenge/

Two issues highlighted by the report are the need for non-time critical demand to flex to meet available generation and the need for large volumes of long-term storage to provide the additional energy required under a cold winter. Both developments could have significant impacts on the provision of ancillary services. For example, initial analysis suggests that the most economical way to store energy for long periods would be the electrolysis of water to create hydrogen that can be stored until needed to generate electricity. If we will need to create a fleet of generators with access to hydrogen fuel to provide security of supply in winter, these sites could be used as ancillary service hubs providing:

- Inertia, MVAr support and fault infeed by running as synchronous compensators
- Black start capability by virtue of their access to stored fuel
- Reserve services providing that sufficient hydrogen is retained for a severe winter
- Relief to transmission constraints if the sites are within importing groups

This is an example of how the relationships between technologies and the services that they can provide is complex. Only by understanding these relationships, and the future need for services both in terms of volumes and locations can an efficient approach to procurement be developed. Failure to follow such an approach could lead to a reactor being installed one year to absorb



reactive power, only to discover the following year that fault infeed is also needed, leading to the installation of a synchronous compensator.

Hence, we would suggest adding the following question to the scope of the review: How will the move towards a net-zero power system affect the need for ancillary services and the most efficient way of providing them?

2. Table 1 summarises the key dedicated ancillary service technologies and the ancillary services that they provide. Do you consider other technologies as capable of providing dedicated ancillary services? If so, please indicate what services they can provide.

	Synch Comp	Shunt Reactor	Battery & Invertor	H2 GT with	EV Chargers/ Flexible
				clutch	Demand
System	С	Ν	С	С	Ν
Stability					
Voltage	С	С	С	С	С
Management					
Fault Infeed	С	Ν	С	С	Ν
Inertia	С	Ν	С	С	Ν
			(pseudo)		
Reserve	С	Ν	С	С	?
Frequency	Ν	N	С	С	С
Response					
Black Start	Ν	Ν	С	С	Ν

Table 1: Ancillary service technologies matrix

It is important to recognise that some assets can provide many services and to ensure that this potential is fully exploited. For example, as mentioned above, long term storage to provide energy security on a 1 in 20 years demand day may be provided by a generator with access to stored hydrogen. Once the need for such an asset is accepted, it is relatively cheap to provide a clutch between the generator and the power source. The asset could then provide black start, reserve, inertia, fault infeed, voltage support and system stability. Clearly such an approach would need coordinated procurement but provides the potential for a more efficient approach.

Level playing field issues

3. What are the barriers to commercial dedicated provision of ancillary services?

Network Operators rely on ancillary services to meet their Licence Conditions relating to security of supply. Hence, they need confidence that the services will be available when required. The licencing of ancillary service providers would provide the opportunity to place corresponding licence requirements on them to give Network Operators this confidence.

a. Are their specific barriers for dedicated stability service providers? If so, what are they? No Comment

b. Are there specific barriers for dedicated voltage service providers? If so, what are



they? No Comment

c. Are there specific barriers for other types of assets dedicated to providing ancillary services? If so, what are they? No Comment

4. Should assets dedicated to providing ancillary services receive regulatory funding, be commercially provided, or should there be a combination of the two? It seems likely that a combination of the two will be required. The attraction of commercial funding are the incentives provided to innovate and reduce costs. However, there are services that while essential, are unlikely to be profitable of themselves; for example, the provision of storage intended to meet the needs of a "1 in 20" winter is unlikely to be provided if the only income was the sale of energy in a "1 in 20" winter. It is likely that a regular payment would be required to cover the provision of the service coming from either the ESO or regulatory funding.

5. On an enduring basis, should electricity consumed solely to provide an ancillary service be exposed to the costs, charges and levies that consumption of electricity in general (such as final demand) is exposed to? Please provide details to support your position, such as the magnitude of the impact to your business, and the impacts on competition and energy consumers more widely.

Electricity consumed solely to provide an ancillary service can be thought of as part of the 'running cost' of an operable electricity system. There is therefore an arguable case for it to be treated differently in relation to the charges and levies that are applied to electricity for final demand, and that this would not distort wider competition. Indeed it may potentially enhance competition and efficiency in the provision of ancillary services. The potential cost and difficulty of administering different treatment along with the materiality of potential benefits are likely to be important in determining whether this distinction is worthwhile to apply in practice.

6. Are any other changes to the licensing and charging regime needed which could better enable competition that drives down prices for the dedicated provision of ancillary services and why? As stated above, we believe that the most effective way to reduce prices is to understand how moving towards a zero-carbon system will affect ancillary services and the relationships between the technologies and the range of services that they can provide.

7. Are there any other existing disadvantages between different providers of ancillary services that need to be addressed and why? Some generators are agreeing to Automatic Network Management (ANM) schemes as a way of securing an earlier grid connection than would otherwise be possible. It is important that these schemes do not disadvantage either the provider (by being used more than is strictly necessary) or other users (for example by rendering them ineligible for a contract to limit generation, because the ANM would immediately negate the reduction in generation).

Licensing arrangements:

8. Should the dedicated provision of ancillary services be a licensed activity? Yes, licencing the providers of ancillary services would enable Ofgem to place licence conditions on them to underpin the provision of services that the Network Operators will be relying on to meet their obligations under their own licences. When a company could be the sole provider of a service that is "mission"



critical" to the operation of the grid it seems reasonable for Ofgem to have some oversight of how these services are provided.

a. What are the benefits and risks for consumers and other stakeholders of assets dedicated to providing ancillary services being provided solely through Transmission Owner (TO) ownership? There is an obvious risk that relying solely on a local monopoly will lead to a lack of innovation and downward pressure on prices. The benefit of such an arrangement is that the TOs are already licenced, have a track record of delivering the services needed by the system and the infrastructure in place, eg substations with physical and cyber security.
b. What are the benefits and risks for consumers and other stakeholders of assets dedicated

to providing ancillary services being provided only through commercial ownership? The benefit comes from the additional competition driving innovation and tending to lower costs. The risk is that cost cutting measures could lead to the services being less reliable than currently. It is for this reason that we support the licencing of ancillary service providers to give Ofgem oversight of the provision of these services.

c. Would different licensing treatment for assets dedicated to providing ancillary services present any challenges? For example, with TO-owned assets licensed under their electricity transmission licence and commercially owned assets under a different (or no) licence. There is a risk the different licencing arrangements could lead to different perceived levels of confidence in the services provided. If a Network Operator believes services from one supplier to be less reliable than another, this is likely to affect their contracting strategy.

d. What would be the impact of each of these options on competition? We believe that it is important to both have a level playing field and to avoid restricting competition without good cause. Hence, we support open competition with ancillary service providers being licenced.

9. Do you think that the dedicated provision of ancillary services should fit within an existing licence category as an enduring solution? If not, how should this activity be best categorised within the licensing framework? No Comment

Roles and responsibilities

10. Do you think there is enough clarity around existing roles and responsibilities in the provision of ancillary services? Where network compliance depends on both assets provided by the TO and ancillary services procured by the ESO from a third party responsibilities will need to be carefully allocated. For example, was a compliance failure caused by the TO providing defective assets, the ESO mis-specifying the service required or the third party failing to honour their contract?

11.Are changes to arrangements needed to clarify responsibilities? If so, what changes are needed? No Comment.