Call for input response

Transmission Constraint Licence Condition call for input response

Response from Regen and the Electricity Storage Network

February 2024

1 About Regen and the Electricity Storage Network

Regen is an independent centre of energy expertise with a mission to accelerate the transition to a zero carbon energy system. We have 20 years' experience delivering expert advice and market insight on the systemic challenges of decarbonising power, heat and transport. Regen has over 150 members who support our mission including clean energy developers, businesses, local authorities, community energy groups, academic institutions, and research organisations across the energy sector.

Since 2018, Regen has managed the Electricity Storage Network (ESN), the industry group and voice for grid-scale electricity storage in GB. The ESN has over 90 members who have a shared mission to promote the use of energy storage and flexibility to support the net zero transition. The ESN membership includes clean energy developers, owners, investors, optimisers, and academic institutions. This includes representation from publicly-listed specialist funds focusing on storage and a independent developers that have raised several billion pounds to invest in this new technology class.

In November 2023 we hosted Andrew Bowie MP, parliamentary under secretary of state at DESNZ at our annual winter conference alongside 150 industry attendees to discuss progress in the storage sector and future developments.

We have six active working group across the key topics in our industry. Including Markets and Revenues Working Group, Sustainability, Safety and Supply Chain Working Group, Innovation and Technology Working Group, Grid Connections Working Group, REMA working group, and the Electricity Storage Network/National Grid ESO strategic meeting.

2 Background and contacts

The Electricity Storage Network, managed by Regen, hosted a members' workshop on 17 January 2024 to discuss this call for input on the Transmission Constraint Licence Condition (TCLC). The points made in that workshop – as well as feedback from bilateral conversations with members and ongoing engagement with the Ofgem and Department for Energy Security and Net Zero (DESNZ) teams – have fed into this response.

We responded to the Ofgem Inflexible Offer Licence Condition Consultation on the Balancing Mechanism last year – see here.

This response also builds on our wider work on constraints, including our briefing to the Energy Security and Net Zero select committee on 17 January – see summary blog here and slides here, and our *seven solutions to the rising cost of transmission network constraints* insight paper – here.

2.1 Continuing engagement

We would like to offer our help and insight in the reform process following this call for input, as a centre of expertise in the energy system and a membership organisation.

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2.2 Context: the rising costs of constraints

Constraint management costs increased sharply in September 2021 as the energy crisis drove up the cost of gas. They have since dropped but remain higher than they were. Under current arrangements these costs are socialised across demand which equates to around £5.70/MWh consumed. That adds about £15/year to a typical domestic consumer's bill.[1]

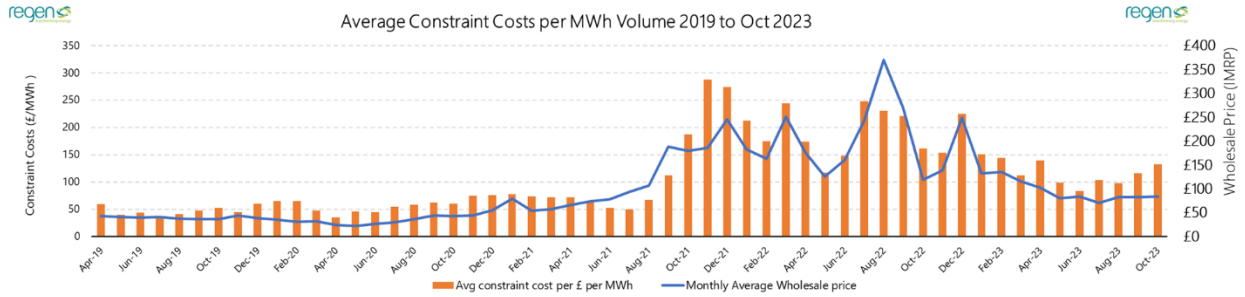

Figure 1: Average constraint costs per MWh volume 2019 to 2023 Source: ESO Balancing Services Monthly Reporting

Constraint costs consist of two types: turn down costs behind an export constraint and turn up costs in front of an export constraint. Much of the increase in constraint costs in recent years is due to the steep rise in gas prices and the cost of turning up gas generators to replace cheaper renewables which had been turned down on the constrained side of transmission boundaries – the volume of power being constrained has actually remained pretty steady.

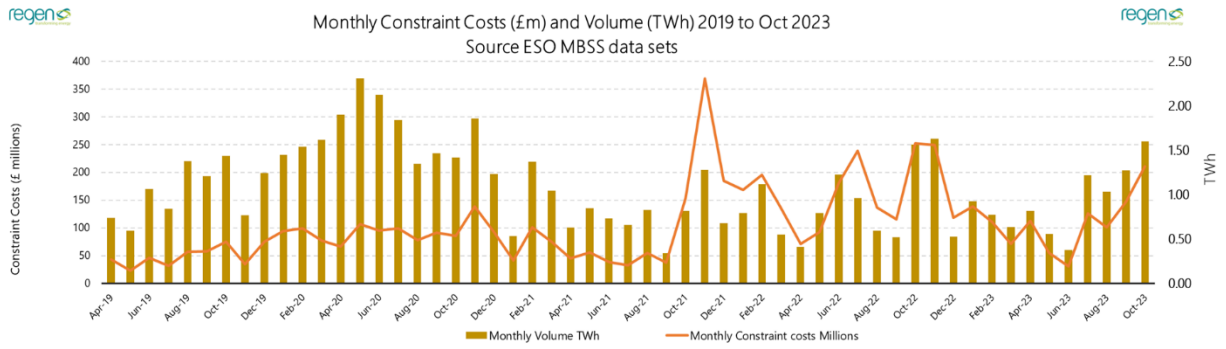

Figure 2: Average constraint costs per MWh volume 2019 to 2023 Source: ESO Balancing Services Monthly Reporting

While in the past balancing actions were delivered by a relatively small number of large power stations, in the future it is more likely that a large number of small providers including batteries, demand-side response provision, aggregators and renewable generators will be dispatched to deliver the same volume of flexibility.

[1] Gill, 2024; Exploring options for constraint management in the GB electricity system

Despite this, gas CCGT plants still dominate the turn up actions in the Balancing Mechanism (BM), which account for 70-80% of constraint costs. This highlights the fact that current market arrangements do not make efficient use of all assets on the system, with the number of actions needed to manage today's network going significantly beyond the capability of the ESO's control room processes and IT capability. This has led to concerns about the performance of the BM, with rising costs and high skip rates whereby lower-cost flexible assets are under-used.

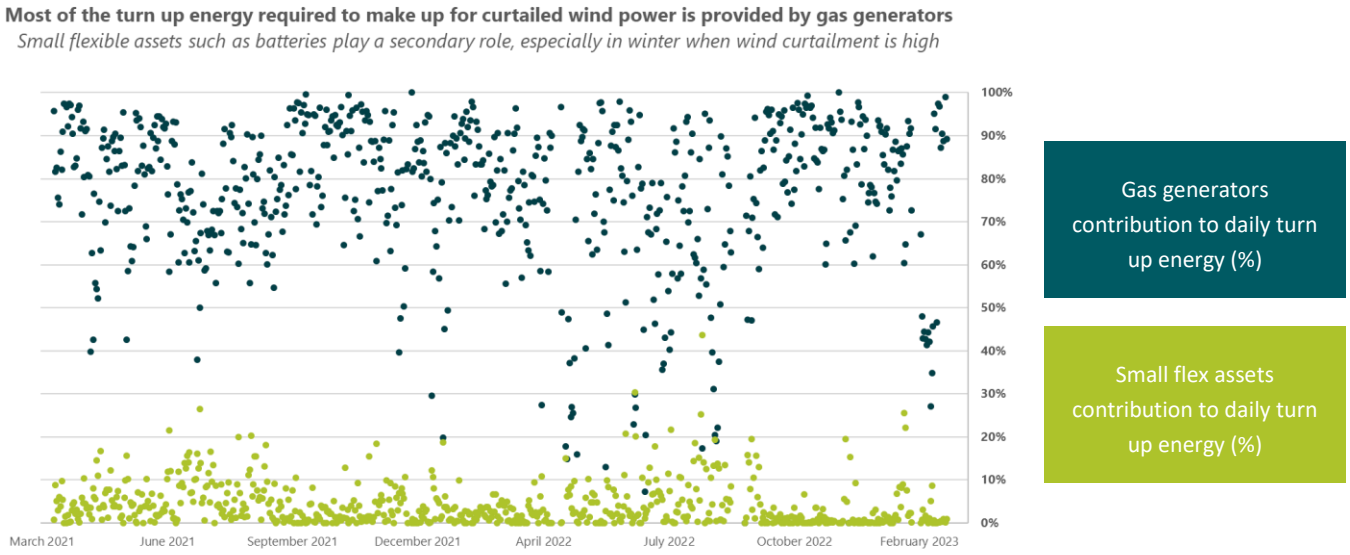

Figure 3: Contribution to daily turn up energy (%) by technology type Source: NG ESO Balancing Mechanism Dispatch Data, March 2023

3 Ofgem call for input response

This call for input on the TCLC has caused some uncertainty in the industry, due to wide impacts of some of the options laid out. We held a productive members' workshop on this topic with Ofgem to discuss some of the concerns from members and this has contributed to our response below.

Summary of recommendations

In summary, we would like to highlight the following key areas of concern and recommendations for Ofgem to assess and inform policy decisions on the TCLC:

- **Market power**
  Recommendation: Newer entrants to the balancing mechanism, such as electricity storage, have less market power and face more barriers to participation. Ofgem should consider how to apply TCLC to these market participants.

  Recommendation: Closely consider the impact of any TCLC extension to include offers, as it would disproportionate impact grid scale electricity storage projects, which rely on price spreads.

  Recommendation: Ofgem should provide further guidance and examples of how the TCLC applies to storage and how excessive benefit is defined for this set of technologies.

- **Balancing Mechanism dispatch limitations and high skip rates for batteries**
  Recommendation: Ofgem should continue to monitor progress and hold ESO to account on the pace of OBP rollout, to allow storage BMUs to be able to meaningfully contribute to balancing actions, and reduce the cost of managing constraints versus the status quo.

  Recommendation: We ask that Ofgem directs ESO to review their rules as to which system actions storage BMUs are able to respond to, to improve the ability of storage BMUs to contribute to constraint management.

- **Lack of market information to assess transmission constraints**
  Recommendation: Ofgem should require ESO to publish more datasets on transmission constraints, including thermal, voltage and stability ahead of the introduction of CSNP. This should include detailed forecasts ahead of time to inform industry parties, leading to higher transparency and a reduced risk of breaching the TCLC.

- **Go-away pricing (very high bid/offer prices)**
  Recommendation: Ofgem should engage with ESO and advise industry on the future use of go-away pricing in the BM to signal unavailability. And confirm how this will impact policing of the TCLC.

- **New constraint services and markets**
  Recommendation: Ofgem should work with ESO to develop a new set of constraint services and markets that harness the potential and capacity of low carbon flexibility, such as storage, to help alleviate constraints effectively over 2024.

Investment risk

The Electricity System Operator's (ESO) ancillary service and balancing markets are crucial to enabling the deployment of low carbon flexibility, such as electricity storage, which, in turn, is required to achieve the UK's aims of a resilient, affordable and low carbon energy system, as well as delivery of the 2035 zero carbon electricity system target. The government has recognised the importance of these markets, setting out in its draft Strategy and Policy Statement for Energy Policy that "We expect the FSO [Future System Operator] to be looking to drive competitive, coordinated, and effective markets which are open to all flexibility technologies of all sizes."

We would like to draw Ofgem's attention to the urgency and vital importance of ensuring low carbon sources of flexibility such as electricity storage[2] are effectively dispatched in the Balancing Mechanism (BM). The best way to ensure value for the consumer is to promote greater competition within the BM,. Actions to facilitate this include continuing to open up the BM to more participants and ensuring that all BM participants can compete within an open and transparent market.

As part of our ongoing industry representation as the ESN, we are continuing to push for the removal of barriers to the dispatch of electricity storage in the BM that has been a long-running challenge for the sector. This includes:

- Continuing to work with the ESO to reform the processes, IT and control room systems to increase dispatch rates of electricity storage in the BM. We particularly welcome the Grid Code 1066 modification which is being developed to help solve the 15-minute rule limitation on the instruction of limited duration assets.
- Highlighting the discrepancy between treatment of non-BMU (Balancing Mechanism Unit) vs BMU-registered assets and the risk that, if dispatch processes are not improved, more assets will decide not to register as BMUs.

Investment decisions on storage projects in the UK pipeline depend on efficient dispatch of electricity storage assets in the BM as a crucial element of the business model. At present there is around 3.6 GW and 4.6 GWh of grid scale battery storage operational on the system. However, the majority of grid scale battery storage in the pipeline is yet to be built, with an estimated 35 GW in the planning system and 122 GW of standalone projects with a connection offer[3]. Current dispatch issues in the BM are

[2] Electricity storage technologies include Li-Ion batteries, pumped hydro and other options such as liquid air energy storage and iron air batteries.

[3] ESN, 2024 https://regengis.maps.arcgis.com/apps/dashboards/9c29e3a1dc42497db27308ee87e099ba

putting billions of pounds of investment in low carbon flexibility at risk. Changes to the TCLC have the potential to make the situation worse and increase the investment risk at a crucial time for build out of storage in GB.

Market power

The TCLC was designed to manage the market power of a small number of large thermal plants. However, as we shift away from traditional, large scale thermal plants to a much high share of distributed renewable generators, alongside low carbon flexibility providers (such as storage) continues, it is important that policies such as the TCLC are designed with these newer providers in mind.

As part of the review process of TCLC guidance, Ofgem should take the opportunity to differentiate low carbon flexibility such as storage, as recently defined in the Energy Act 2023 which ESN helped draft, from incumbent high carbon technologies, to reflect its relative lack of market power, for three reasons:

1. The size of battery storage assets is much smaller than the incumbent thermal power plants and pumped hydro – typically 50-100 MW rather than 100's of MWs or GWs, meaning that each asset is unlikely to wield significant market power.
2. As we discuss in more detail below, it is clear that flexible operators in the BM are not being dispatched effectively. This means that, even in circumstances when such assets are in merit order, they are not being dispatched efficiently and represent a tiny proportion of BM instructions. Therefore, to argue that they have market power and should be subject to the TCLC as it stands is not accurate due to the current barriers and limitations.
3. Differing business models. Grid scale electricity storage makes money in merchant markets by maximising the spread of prices it can realise by importing and exporting at the right times. This is a fundamental departure from the business model of existing thermal assets on the system. Grid scale battery assets with shorter duration (one hour) will target the extremes of the price spread and, as we shift to two-to-three hour systems in GB, they are increasingly focused on merchant markets such as the wholesale electricity market and the BM, providing a crucial low carbon technology alternative to thermal assets. This drives them to import energy when power is cheap, and there is lots of renewable energy on the system, and export when power prices are high. This operating behaviour is therefore *helping* to balance the system, rather than exacerbating constraints and other issues. As long as the market signals they are responding to are representative of the constraints on the system, grid scale storage will help to balance the system as this the basis of the merchant price spread business model.

Recommendation: Newer entrants to the balancing mechanism, such as electricity storage, have less market power and face more barriers to participation. Ofgem should consider how to apply TCLC to these market participants.

The TCLC currently applies to BM bids. However, one of the options in the Call for Input was to expand the scope to include offers as well as bids. This change would have a disproportionate impact on storage, due to the BM revenue being earned from price spreads.

Recommendation: Closely consider the impact of any TCLC extension to include offers, as it would disproportionate impact grid scale electricity storage projects, which rely on price spreads.

As we outline above, we believe that there is a good case for treating grid scale storage differently under the TCLC due to the lack of market power exerted in the BM. We also believe that there remains significant uncertainty regarding the policing and treatment of this group of technologies under the TCLC. And while we accept the updated TCLC guidance has some further detail, we are asking for further clarity on how the TCLC will impact grid scale storage. Particularly as this asset class is deploying capacity so rapidly in the GB market (approx. 1.4 GW in 2023).

Recommendation: Ofgem to provide further guidance and examples of how the TCLC applies to grid scale storage projects and how excessive benefit is defined.

Balancing Mechanism dispatch limitations and high skip rates for batteries

The ESN has been campaigning for the removal of barriers to the dispatch of storage in the BM for some time. See, for example, our letter to ESO in July last year[4].

It is promising to see the ESO taking steps to address this, such as committing to increase participation in the BM and, as part of the Open Balancing Platform project[5], deploying the Bulk Dispatch Optimiser in December of last year, which is an agile tool to allow control room send hundreds of instructions to smaller BMUs and battery storage. Further stages are exected to be delivered over the next few years, to integrate additional services into the Open Balancing Platform and BM dispatch.

The changes made so far have not made a meaningful difference to the level of skipping of batteries in the BM.[6] While the number of instructions has increased significantly, the average volume of each Bid and Offer Acceptance has decreased by almost 50% in the first few weeks[7]. And skip rates remain very high. We have heard anecdotally from members that revenues from the BM have actually got worse since the introduction of OBP in December last year. One of the reasons for this seems to be limited use of the Bulk Dispatch tool in OBP by the control room so far and little change in the total volume of instructions sent to batteries. We are hoping with time, as control room engineers get used to the new tools, that this will start to change and deliver cost savings to consumers and lower carbon emissions.

[4] ESO, 2023 https://www.nationalgrideso.com/news/eso-responds-esn-call-balancing-mechanism-reforms

[5] National Grid ESO, December 2023; First stages of Open Balancing Platform go live

[6] 'Skipping' can be defined as an asset not being accepted in the Balancing Mechanism despite offering a more attractive price to grid than the top price accepted for a settlement period (being in merit order).

[7] Modo Energy, 2024 https://modoenergy.com/research/balancing-mechanism-bulk-dispatch-battery-energy-storage-open-platform-volume-skip-rates

As Figure 4 shows the continued use of CCGTs instead of grid scale batteries contributed an estimated 71,000 tCO_2 in Jan-Oct 2023 as Sky News documented in December[8].

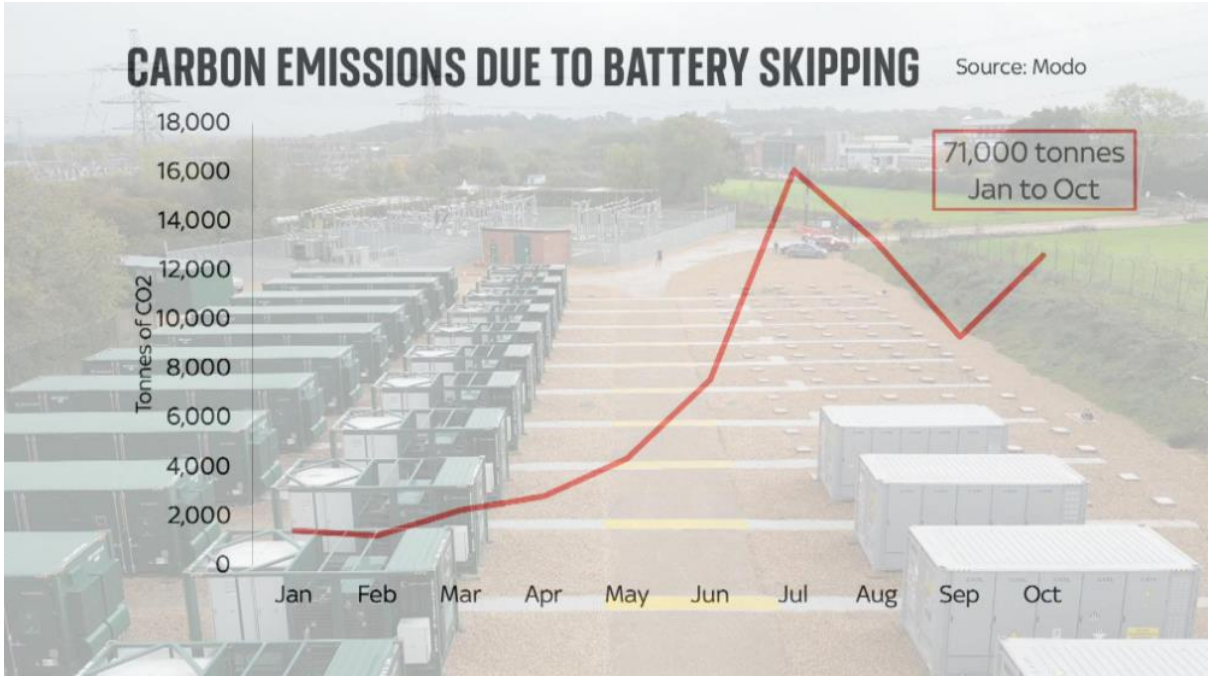

Figure 4: Carbon emissions associated with battery skipping (Jan-Oct 2023)

This considerable uncertainty as to whether battery assets even get dispatched in the BM makes the pricing of assets very challenging, even if they are priced in the merit order, they are very unlikely to be dispatched. On top of this, the risks associated with a broader TCLC that includes a wider array of actions could make pricing even more challenging.

Recommendation: We ask that Ofgem continue to monitor progress and hold ESO to account on the pace of OBP rollout, to allow storage BMUs to be able to meaningfully contribute to balancing actions, and reduce the cost of managing constraints versus the status quo.

ESO has admitted that storage assets are not being used for constraint management in the BM (system flagged actions). This means that for system flagged actions, no matter how batteries are pricing themselves in BM bids and offers, they currently are not being dispatched and are limited to energy actions only, which represent only a small proportion of the actions taken in the BM. This is a significant limitation and means that on top of a high skip rate for energy actions there is a 100% skip rate for system actions.

As we outlined in Section 2.2, one of the main drivers to the high cost of constraints is the use of CCGTs for turn up actions in the BM. Opening up these actions to wider competition from low carbon sources

[8] Sky news, 2023 https://news.sky.com/story/uk-pumping-more-than-70-000-tonnes-of-extra-carbon-emissions-into-atmosphere-sky-news-finds-13025768

of flexibility would help to reduce balancing costs passed back to consumers, and help to lower the carbon intensity of the BM.

Recommendation: We ask that Ofgem directs ESO to review their rules as to which system actions storage BMUs are able to respond to, to improve the ability of storage BMUs to contribute to constraint management.

Lack of market information to assess transmission constraints

The TCLC guidance confirms that thermal, voltage and stability constraints are all included in the TCLC. However, there is very limited market information available to asset owners on constraints. A storage operator won't necessarily know if they are submitting bids at a time of transmission constraint due to a lack of clear market information.

There is some information already available. The ESO system flagged actions in the BM are an indicator of transmission constraints being active. A pattern of accepted system flagged actions does indicate there is a constraint active of some kind. And in our members workshop, Ofgem confirmed that identifying patterns where bids are being system flagged under specific system conditions and weather could allow asset owners to identify if they are behind a transmission constraint. However, this is not a clear form of assessment and the lack of transparency increases risks for industry participants that they may fall foul of the TCLC.

It is arguable that there is at least some market information available on thermal constraints. However, voltage constraints are more opaque. ESO retains the key sources of information on this area and, while there are moves to open this area up under new the new stability markets[9], this area remains costly to consumers and is dominated by high carbon assets on the system. The development of these new services and markets has been very slow.

Network outages is another area of uncertainty. It may be clear if your own asset is impacted, or you are provided a report by the Transmission Operator (TO) that there is a transmission outage active. However, it is likely that other market participants are not aware of this ahead of time to respond and price themselves in the BM accordingly. We also understand that some industry parties have a much better understanding of the network condition, such as nuclear power station operators, leading to a mismatch in the availability of information between different actors.

In addition, almost all of the above is likely to only be available retrospectively. It is not providing a clear market signal of a transmission constraint ahead of time to inform pricing in the BM, to help industry participants to be in alignment with the TCLC.

ESO has committed to provide a Centralised Strategic Network Plan (CSNP) as part of their transition to the National Energy System Operator, that will provide "the assessment of system requirements and

[9] ESO, 2024 https://www.nationalgrideso.com/industry-information/balancing-services/stability-market

will look further out, 10 years ahead"[10]. There remains a lack of market information on constraints in the interim.

Recommendation: We ask that Ofgem directs ESO to publish more datasets on transmission constraints, including thermal, voltage and stability ahead of the CSNP. This should include detailed forecasts ahead of time to inform industry parties, leading to higher transparency and a reduced risk of breaching the TCLC.

Go-away pricing (very high bid/offer prices)

One of the key points identified in the workshop with members is that there seems to be a mismatch of expectations and guidance for BM participants from Ofgem and ESO. On the one hand ESO has advised industry to use 'go-away' pricing to inform ESO that they are not willing to be dispatched by putting in a very high price as a bid in the BM. However, there is a risk this could be perceived as price gouging by Ofgem and other industry parties.

The use of go-away pricing is a tool that has been used effectively by industry and ESO over many years. Grid code requires assets to provide their capacity available to the ESO, meaning that there is an obligation to provide a price. The use of go-away pricing therefore provides ESO with information on those assets which are not willing to dispatch for a variety legitimate reasons. For example, an asset may want to retain state of charge ahead of frequency response service delivery. Or they may be delivering some onsite maintenance works.

On the other hand, Ofgem expect BM participants to always price in the BM according to their costs of dispatch and not price to receive an "excessive benefit" under the TCLC. This mismatch is unhelpful and increases the risk of asset owners being accused of price gouging via go-away pricing and falling foul of the TCLC.

However, on 7 January 2024 ESO released new guidance[11] to industry that advised using Maximum Export Level (MEL) / Maximum Import Level (MIL) changes to indicate the reserved capacity for frequency response contracts and clarify availability, rather than very high bid/offer prices (e.g. +£9,999/MWh). We welcome this clarification from ESO as this has been an ongoing problem in the industry. It has also been causing IT systems at ESO and Elexon considerable issues over the last few months, particularly in the legacy systems being used (EDL/EDT).

However, even with the publication of this guidance, we do still think there needs to be further clarity provided to industry on this area, as well as wider dissemination of the new guidance and approach. This is something we will be contributing to via our ESN markets and revenues working group and wider network.

[10] ESO, 2024 https://www.nationalgrideso.com/document/299926/download

[11] ESO, 2024 https://www.nationalgrideso.com/document/300231/download

Recommendation: We ask Ofgem to engage with ESO and advise industry on the future use of go-away pricing in the BM to signal unavailability. And confirm how this will impact policing of the TCLC.

New constraint services and markets

This discussion has raised a wider question that the industry has been grappling with for some years. It is widely accepted that the low carbon flexibility provided by grid scale storage could be harnessed more effectively to alleviate constraints on the system. As already outlined, batteries are excluded from system actions in the BM, and we continue to rely on CCGTs. There needs to be more of a clear role for storage in delivering constraints services.

The wider policy question above then leads on to a discussion on the potential solutions. We are encouraged to see the creation of the Local Constraint Market and more recently the Thermal Constraints Collaboration Project by ESO[12]. And the wider work on stability and voltage services in development, following on from the Pathfinder projects. And in general, we are clear that open and transparent competitive markets for system services should be the default approach from ESO and other network operators, as this is normally in the best interest of industry and consumers.

However, alongside more market information outlined above, we would like to see development of new specific constraint management services and markets that are open and competitive. Echoing some of the findings from the report that was published by the Energy Landscape for Scottish Renewables recently[13], that was a hot topic of discussion at our recent REMA in-person event.

Recommendation: We ask that Ofgem works with ESO to develop a new set of constraint services and markets that harness the potential and capacity of grid-scale storage and other forms of low carbon flexibility to help alleviate constraints effectively over 2024.

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[12]ESO, 2024 https://www.nationalgrideso.com/industry-information/balancing-services/thermal-constraints-collaboration-project

[13] Scottish Renewables, 2024 https://www.scottishrenewables.com/publications/1488-exploring-options-for-constraint-management-in-the-gb-electricity-system-the-potential-for-constraint-management-markets