

DEMANDING MORE

How the National Energy System
Operator can empower energy demand



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Empowering
Energy Demand

Executive Summary

Empowering Energy Demand strongly supports the establishment of a future-facing National Energy System Operator (NESO) and agree with the regulator that its “success is of paramount importance to reaching net zero”. Transforming a system victim to the whims of a handful of large generators to one embracing tens of millions of small assets dotted around the country that have day jobs first – charging a car, heating a home, powering a business – and can help the system second, is no small feat. **It offers Great Britain the chance to become a true clean energy superpower. We must make the most of this once in a generation opportunity.**

NESO will be a public body of massive strategic and operational heft, unlike anything the industry has seen in over two decades. Although the heavily regulated monopoly of ESO often felt like a public body wrapped in a private cloak, **the implicit presumptions upon which it built its practices do not align with the scrutiny afforded actual public entities.** Explaining shortfalls, embracing challenges, and executing change is imperative for our system operator to reach Clean Power by 2030. **This report considers 5 core questions.**

- 1 What is at stake?
- 2 What are NESO’s legal obligations?
- 3 How does the ESO stack up?
- 4 What conclusions can be drawn?
- 5 How do we move forward?

Context

On 6 April 2022, Government announced their intention to create a new public body responsible for the resilience, cost and decarbonisation journey of the GB energy system. This Future System Operator (FSO) would evolve from the existing National Grid Electricity System Operator (NGESO/ESO), a privately owned company licensed and regulated by Ofgem. Provisions in the Energy Act 2023 enumerated the roles and duties of what is legislatively referred to as the Independent System Operator and Planner (ISOP). In early 2024, ESO announced that when they undertake the roles of the FSO/ISOP they will be renamed as National Energy System Operator (NESO).

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Transforming a private entity into a public body with immense power and influence over the future of critical national infrastructure cannot, and should not, be underestimated. It requires a reformation, not an evolution.
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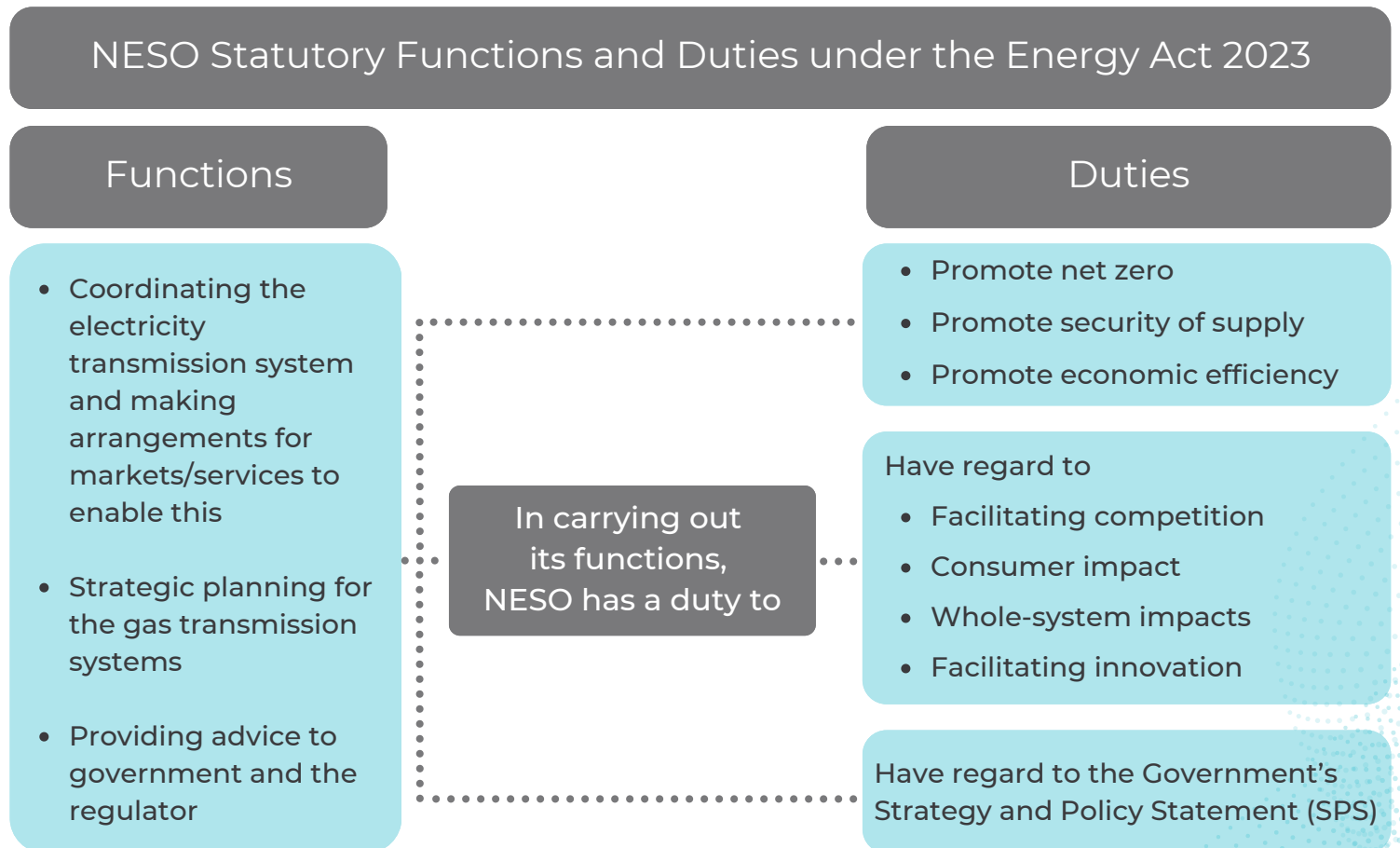
1 What is at stake?

Traditionally, we functioned in a world where generation was just expected to meet demand by burning more (or less) gas and coal. Such an arrangement will not get us to Clean Power by 2030. In the future, supply and demand will have a much more symbiotic relationship where they must complement one another. For periods of low renewable generation, demand will need to be incentivised to reduce their consumption or storage will need to increase its output and the opposite for periods of high renewable generation, using flexible assets such as electric vehicles (EVs), heat networks and heat pumps, and commercial and industrial plant. Electricity demand that is flexible under the right incentives could save the system £14.1bn per year and households hundreds of pounds on energy bills per year by 2040. The alternative is building a gold-plated electricity grid that never faces any congestion which would be like building enough roads so that vehicles never had to share the streets with each other.

Beyond small pockets of progress, ESO is still designing markets in a way that favours only a limited number of technologies. Debates over policy, politics, and prices have lost sight of who this system of turbines, wires, and pylons exists for. Without energy demand in the room, it is impossible to devise solutions and design markets that meet its needs. Becoming a public body mandates heightened public scrutiny and accountability, especially when consumers are being excluded from the markets they pay to fund. Enabling homes, businesses, and industry to be rewarded within the energy system cannot be taken as a naturally evolving process – it demands swift action from our public institution

2 What are NESO's legal obligations?

The Energy Act sets out the core functions of NESO and the duties that flow therefrom:



3 How does ESO stack up?

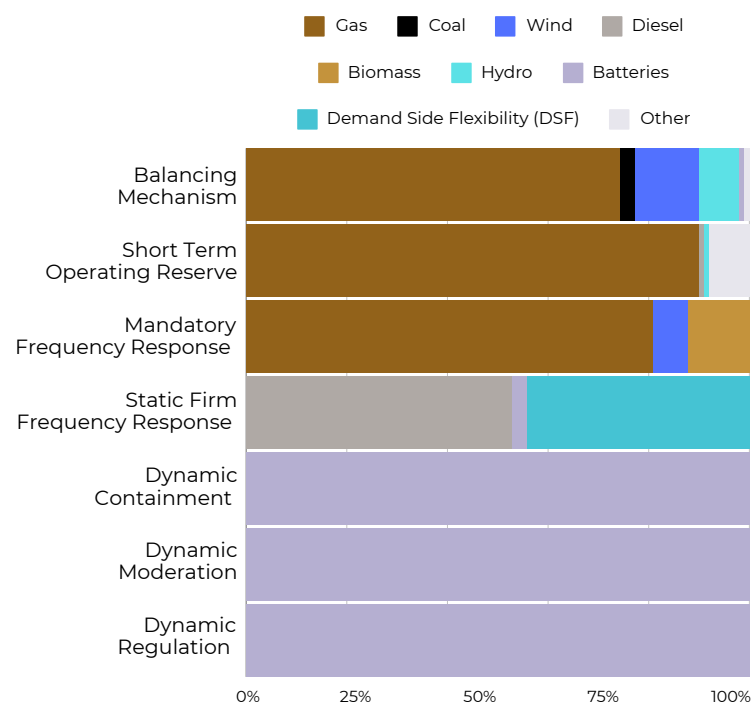
Transforming a private entity into a public body with immense power and influence over the future of critical national infrastructure cannot, and should not, be underestimated. It requires a reformation, not an evolution. To determine how an institution may act in the future, the most accurate measure is how they have acted to date. In light of their statutory duty to have regard to competition, consumers, whole-system impacts, and facilitating innovation, we highlight the practices and patterns of behaviour that demand further scrutiny and radical cultural transformation within NESO. Recognising the immense role that NESO has to play in net zero and Clean Power by 2030, it is difficult to reconcile the recent conclusion by Ofgem and DESNZ that “it is not for government or the regulator to set the internal culture of an organisation, nor is a licence a direct vehicle for giving specific direction on internal culture”. A new public body, funded by the British public, established in the midst of an energy revolution cannot simply be left to slowly evolve on its own preferred timeline – Government and the regulator must provide stronger checks and balances.

Inability to facilitate competition undermines efficiency

Reaching net zero is not simply a matter of building enough renewable generation, it is a matter of being able to operate such a system on a daily basis. To achieve this, NESO must “drive competitive, coordinated, and effective markets which are open to flexibility technologies of all types and sizes”. From the design of their most recent services, it is plain ESO is not living up to its proclamation that “[a]ll our programmes... are targeted at increasing competition to reduce overall system costs”. Not only does their approach to market design preclude technological competition, it stymies innovation, fails to take account of future consumer and whole-system needs, reflects a lack of understanding of demand side flexibility (DSF), and is threatening net zero. The longer DSF is excluded from markets, the longer it will take to fulfil these objectives, including getting more low carbon assets onto the system. Vast amounts of extra demand is coming online at an accelerated pace, electricity demand could double by 2050, whether or not ESO is ready for it.

The only remaining question is whether control room would like to have access to any of this capacity or be responsible for paying carbon heavy plant to meet its needs.

Figure 2: ESO markets by participating technology type in 2023



Data was taken from ESO Markets Roadmap 2024 and ESO Power Responsive Annual Report 2024

“Debates over policy, politics, and prices have lost sight of who the system of turbines, wires, and pylons exist for. Without energy demand in the room, it is impossible to devise solutions and design markets that meet its needs. The narrative needs rewriting.”

Consumer needs come second to energy control room comfort

With the price tag for balancing the electricity system projected to cost the public up to £4.5bn per year by 2030, the inability to consider, plan for, and include consumer behaviour and needs in market design will cost the country dearly. Homes and businesses who use electricity need to benefit from the energy revolution just as much as large generators - public support for net zero depends on it. The predominant ESO balancing market, the Balancing Mechanism (BM), demonstrates that we are exceedingly far from that future. It is not reasonable nor even rationale to expect millions of individual homes to invest in the same quality of meters as a handful of multi-million pound generators whose sole purpose is increasing or decreasing electricity output. Yet that is what current rules would require. Nor can we wait for control room to learn to trust smaller assets and therefore actually choose to use them in the balancing mechanism. Sacrificing current and future consumer needs for the comfort of the control room today is no longer an option. ESO markets must work with and for demand.

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Becoming a public body mandates heightened public scrutiny and accountability, especially when consumers are being excluded from the markets they pay to fund.

Enabling homes, businesses, and industry to be rewarded within the energy system cannot be taken as a naturally evolving process – it demands swift and strong action from our public institutions.

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Poor digitalisation and whole-system expertise risks future needs

The capability to achieve whole-system impacts must be considered against how ESO conducts its overarching responsibilities including digitalisation, market facilitation, forecasts for market reform, and system planning. Doubts over ESO's ability to deliver critical digitalisation projects is foundational to the formation of NESO and publicly ignoring the findings of an independent audit that raised concerns over £513m of investment hardly instils faith. Likewise, losing the role of market facilitator largely on the grounds of transparency, accountability, and trust should necessitate greater investigation. Therefore, far more emphasis is needed on these functions moving forward. Similarly, while whole system planning and cross-vector considerations are new to the organisation, both the connections queue and the 2024 Future Energy Scenarios (FES) should indicate to all that far more work is needed to establish these capabilities, especially with regard to regional energy strategic planning. Valuing whole-system impacts, across heat, electricity, and gas, is not an amorphous concept unrelated to the functions of the ESO to date, it is critical to achieving truly clean energy as opposed to simply reaching clean electricity.

Strong approach to innovation must be exported across NESO

Ofgem’s CEO stated in 2022 that NESO would ensure we “build a smart, efficient and flexible system” with Government noting that NESO should be “seeking to increase competition and innovation” within our energy system. Indeed, in the past number of years, ESO has undertaken numerous innovation projects to enable demand side flexibility and launched the Demand Flexibility Service (DFS) which projected flexibility into the mainstream and inspired sector-wide innovation. When ESO is tasked with taking a future-facing approach that considers not just what is needed right now but what will be needed over the coming years, strong results can be achieved. However, when attempting to translate these successes into business-as-usual arrangements, the same issues of agility and anachronistic systems emerge. Likewise, at times, it is not clear how much of a mandate from Ofgem ESO has to bring innovative solutions into the mainstream, even if it raises costs in the short-term. New statutory duties give equal weight to both current and future concerns and so too must Ofgem and NESO in their approach to facilitating innovation and prioritising the value of energy demand over the value of fossil fuel generation.

4 What conclusions can be drawn?

Comparing ESO’s performance with their statutory functions and the duties discussed above, a rather stark image emerges:

Statutory Functions Statutory Duties	System Operation	Strategic Planning	Advice to Government and Regulator
Facilitating Competition	New ancillary services are dominated by batteries and gas generation, undermining market depth.	Over-focus on assets that “look” and “behave” like traditional gas generation threatens competition and future system needs.	Given the foregoing, NESO cannot provide rounded advice on facilitating competition.
Consumer Impacts	BM improvements through metering and skip rates deprioritise small volume assets and do not incentivise trust in the sector.	Given ESO’s struggles to create a BM that incorporates energy demand, their broader ability for planning and consumer impacts must be questioned.	Without a more sophisticated understanding of the needs of energy demand, reliable advice on consumer impacts will be limited.
Whole-system Impacts	Significant concerns over both ESO’s approach to and ability to deliver large IT projects raises significant concerns.	Early steps in SSEP, CSNP, and RESPs show promise but over focus on hydrogen in the most recent FES reflects traditional thinking.	Without a more sophisticated understanding of the needs of energy demand, reliable advice on consumer impacts will be limited.
Facilitating Innovation	Crowdflex and DFS led to breakthrough understanding of flexibility.	Work undertaken on the CCP and REMA demonstrate an ability to take a future-facing approach to planning.	From the foregoing, NESO can think innovatively and therefore advise on the same.

From the foregoing, it is abundantly clear that significant work must be undertaken by all stakeholders to ensure that NESO helps rather than hinders Clean Power by 2030. It is evident that certain core issues are prevalent and consistent, speaking to a pattern of cultural and institutional inefficiencies rather than mere coincidences.

Three overarching conclusions can be made:

Not enough has been done to distinguish what ESO has been and what NESO needs to be.

Ofgem and Government have both underestimated the scale of industry concerns with ESO performance and therefore failed to incorporate stronger safeguards in the SPS and licences. Thus, nothing has been done to address who bears the burden of proof for decisions made by NESO. When there is one gatekeeper to the marketplace, the burden of proof is not upon those seeking access to prove “why” but upon the gatekeeper to prove “why not?”.

Transparency is not synonymous with accountability.

ESO have made some efforts towards greater transparency. However, transparency is a means to an end, not an end in itself. Without consequent accountability, transparency is a mere reminder of the failures industry has been flagging for years.

Clean Power by 2030 is not achievable without a NESO that is unrecognisable to ESO.

Previous notions that ESO could simply naturally evolve for the first few years of NESO poses a serious threat to Clean Power by 2030. Substantial changes to this approach are urgently needed to avoid a business-as-usual attitude.

5 How do we move forward?
From the foregoing, we recommend the following:

Responsible Party	Recommendation
PARLIAMENT	An inquiry into the priorities and needs of the NESO transition is launched by the Parliamentary Select Committee for Energy Security and Net Zero.
GOVERNMENT	When formally designating NESO, Government makes explicit the areas in need of urgent change in order to reach Clean Power by 2030

GOVERNMENT

The Strategy and Policy Statement is amended to:

- Recognise the significant cultural reformation needed within NESO for it to be an asset in reaching Clean Power by 2030;
- Emphasise that given its unique position in the energy system, NESO carries a strong burden of proof for its decisions;
- Highlight the priority role that demand side participation must play in system transformation and NESO's role in promoting it; and
- Clarify the role that NESO advice will play in Government decision-making.

OFGEM

Multiple amendments are made to the ESO licence to reflect the additionality it is supposed to provide to the legislation and the clearer expectations that are needed when reputational incentives are the core regulatory lever:

- Burden of proof:
 - Set out that decisions that appear discriminatory are presumptively invalid. Therefore, NESO has a burden of proof to rebut this presumption in all cases, rather than requiring stakeholders to prove why decisions are wrong.
 - To do so, it would be standard practice for NESO to demonstrate proportionality testing, to prove:
 - There is a legitimate purpose underpinning the measure;
 - The measure would achieve that legitimate purpose; and
 - The measure is reasonable and necessary to achieve the purpose; there is no less onerous or restrictive way to go about achieving the purpose.
 - Basic principles of necessity and reasonableness would be set out in advance in the Regulatory Instructions and Guidance (RIGs) where it is made clear that control room incapacilities, as opposed to system or energy needs, are not a justifiable reason for discriminatory treatment of assets in the design, procurement or decision-making on balancing services.
- Ethical Walls:
 - Since NESO represents a significant consolidation of power within one organisation, the licences must make provision for the separation of powers within NESO.

OFGEM

- Licences clarify that where a team within NESO is directly benefitting from a function eg market design/strategic planning/providing advice, that team is not designing that function.
- Building Ethical Walls between teams within NESO that may incur actual or perceived conflicts of interest with one another is imperative to establish public trust within an organisation that so clearly could fall into mission creep.
- Under Condition C9 - 'Procurement and use of Balancing Services':
 - Add 'Design' of balancing services rather than just 'Procurement and use'.
 - Explicitly prohibit any design, procurement, or use of balancing services that disproportionately discriminates against certain technology types based on technical differences such as volume or being a single or aggregated portfolio. This should ensure that lack of familiarity or trust in certain technology types does not impact design, procurement, or use within markets.
- Public forums:
 - While ESO have made efforts of varying success to increase transparency, Ofgem has an obvious role to play in connecting transparency to accountability.
 - The status quo - bilateral meetings and ad hoc workshops where both ESO and Ofgem are present - is no longer sufficient given the scale of the challenge to reach Clean Power by 2030.
 - Therefore, licences should mandate that on a quarterly basis Ofgem runs public forums where senior Ofgem and NESO officials present on public concerns and the work being undertaken to address them including proportionality analysis (above), with the chance for questions and answers.

NESO

NESO embraces and supports the above recommendations, including publicly acknowledging the need for massive cultural transformation and the concrete steps being taken to implement it.

The Power Responsive programme is reformed to:

- Have a stronger organisational mandate (including a name change) whereby recommendations are considered presumptively valid and to be employed expeditiously, not subject to the purview of control room;

NESO

- Create more direct links to licence obligations, such as those considered above, thereby ensuring equal incentives and weight to their work;
- Incorporate within its remit reform of all NESO balancing markets in coordination with the Market Facilitator;
- Establish Councils similar to the Markets Advisory Council (MAC) whereby Power Responsive and other Senior NESO representatives meet with different types of energy users to better understand their needs and capabilities. Initially, such groups could represent:
 - Industrial energy users with high and variable load factors;
 - Commercial energy users with high persistent load factors;
 - Domestic energy user representatives with highly variable aggregated load factors; and
 - Dedicated flexibility providers who already have strong representation within the Power Responsive Steering Group and may have crossover with any of the above groups.
- Ensure the programme is adequately resourced to fulfil the above.

Regional Energy Strategic Planners (RESPs) are established so that:

- Energy demand utilisation is at the heart of their remit and outlook.
- Industrial decarbonisation through a variety of pathways is well-understood and modelled.
- Heat network zoning and other large heat infrastructure projects are properly reflected within plans, including the flexibility they can provide.

Whole-system modelling ensures that energy demand is better represented in FES, including as the presumptive flexibility solution before first-of-a-kind technologies such as hydrogen.

“Explaining shortfalls, embracing challenges, and executing change is imperative for our system operator to reach Clean Power by 2030. It is not achievable without a NESO that is drastically different to ESO.”

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1 What is at stake?

“—
Debates over policy, politics, and prices have lost sight of who the system of turbines, wires, and pylons exist for.
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NESO is a public body, wholly owned by the Government, that will play a critical role in multiple aspects of the energy system: electricity markets, national and regional system planning, and providing strategic advice to Government and the regulator. On behalf of our mission, Empowering Energy Demand, this report seeks to spotlight the solemn responsibilities this entails for a new public body, especially for energy demand. We have a long and productive working relationship with ESO and our members look forward to this partnership continuing into a future where homes, businesses, and industry are the backbone of a net zero energy system. Equally, if NESO continues on the path of ESO, the role of demand in the energy transition will not be prioritised. Explaining shortfalls, embracing challenges, and executing change is imperative for our system operator to reach Clean Power by 2030. Government, the regulator, industry, and the public must work with NESO to unlock this near future.

The core statutory functions of NESO can be summarised as follows: operating the electricity transmission system; strategically planning the system across gas and electricity; and providing advice, analysis or information to Government and the regulator.

Operating a net zero system using millions of small assets

Traditionally, we functioned in a world where generation was just expected to meet demand by burning more (or less) gas and coal. Such an arrangement will not get us to Clean Power by 2030. In the future, supply and demand will have a much more symbiotic relationship where they must complement one another. For periods of low renewable generation, demand will need to be incentivised to reduce their consumption or storage to increase their output and the opposite for periods of high renewable generation, using flexible assets such as electric vehicles (EVs), heat networks and heat pumps, and commercial and industrial plant. Electricity demand that is flexible under the right incentives could save the system £14.1bn per year and households hundreds of pounds on energy bills per year by 2040.

Therefore, NESO needs to discard its assumptions around what kinds of technology are available to operate the system and embrace the tens of millions of assets dotted around the country that have day jobs first – charging a car, heating a home, powering a business – and can help the system second. Despite recently acknowledging that “new technologies will need to deliver the services historically provided by natural gas”, ESO fails to facilitate markets that encourage competition between technologies. With the price tag for balancing the electricity system projected to cost the public up to £4.5bn per year by 2030 and grid volatility only set to increase due to the growth in

intermittent renewables, NESO will not be able to fulfil its functions without the use of energy demand side flexibility (DSF).

Debates over policy, politics, and prices have lost sight of who this system of turbines, wires, and pylons exists for. Without energy demand in the room, it is impossible to devise solutions and design markets that meet its needs. Becoming a public body mandates heightened public scrutiny and accountability, especially when consumers are being excluded from the markets they pay to fund. Enabling homes, businesses, and industry to be rewarded within the energy system cannot be taken as a naturally evolving process - it demands swift action from our public institutions.

“Becoming a public body mandates heightened public scrutiny and accountability, especially when consumers are being excluded from the markets they pay to fund.”

For years we have worked with the ESO across countless consultations on the design of flexibility markets. In line with Ofgem, our aim has been to ensure that “all types of technology and solution are able to fully compete to provide the electricity system’s short, medium and longer-term needs” and that savings can be made from the participation of demand side flexibility. Beyond small pockets of progress, as discussed below, markets are still being designed in a way that favours only a limited number of flexible technologies.

What then could replace gas on the system? At the same time as we retire centralised, large carbon intensive plants we are welcoming millions of small, flexible domestic assets onto the system such as EVs, potentially over 7m by 2030, and heat pumps, potentially over 1m annual installs by 2030. Likewise, British businesses have a crucial role to play in system operation with industrial and commercial electricity demand rising to 177TWh by 2030.

Planning for a radically different net zero system

Energy infrastructure has historically been built either just in time to meet new generation or demand capacity on the networks, or at a slight lag. This made sense - we do not want to over-invest in wires, pylons, and substations that we don’t actually need. In other words, a gold-plated electricity grid that never faces any congestion would be like building enough roads so that vehicles never had to share the streets with each other. We don’t have the space, money, or time. However, since we’re in the midst of an energy revolution, necessary network buildout has not been able to keep pace with the capacity seeking to join the system. The queue to connect to either the Transmission or Distribution grid now stands at 725GW. Today, there is 116GW of installed electricity supply capacity and the Future Energy Scenarios model this could rise to 386GW by 2050, nowhere close to what the current queue would have us believe. It thus became eminently clear that a lack of strategic energy planning presented a clear risk to reaching net zero.

Having a strategic planner such as NESO is an absolutely necessary step to de-silo thinking across transmission and distribution electricity networks, the gas network and any eventual hydrogen network. Equally, it is critical that planning does not become generation-centric whereby the needs of the system is simply equated with the needs of generation. With industrial and commercial sites across the country wishing to decarbonise or electrify being given prospective connection dates well over a decade into the future, we must remember that what makes planning “strategic” is about creating an energy system that is just big enough to meet our needs.

Evaluating ESO's ability to undertake a role that spans the entire energy system necessitates understanding how they conduct their overarching functions as an organisation. When the regulator commissioned an independent "review of ESO IT Investment Plan" for a 5-year period to 2025 before the 2022 mid-scheme regulatory review, much of industry was pleased. However, to see only a summary of the final report published as an appendix to a regulatory review document was somewhat startling, especially given its findings. On the precipice of Government taking ownership of this private company, an independent review concluded that over £500 million of investment raised serious concerns and that "Future System Operator needs are at risk". Despite repeated calls for public hearings neither Ofgem nor ESO addressed the report in a coordinated public stakeholder session. Even when ESO representatives were questioned about the report at a Parliamentary Select Committee the only answer given was that they dispute some of the findings.

In our efforts to plan for a radically different system in 2030 and beyond, we cannot ignore recent issues nor can we overlook persistent shortcomings in valuing energy demand – since NESO only will exist to serve its needs.

Providing advice and analysis to Government and the regulator

As an independent, expert body, Government and the regulator will likely rely heavily on the advice of NESO. In fact, the Energy Act empowers NESO to tell Government when they do not think aims set out in their Strategy and Policy Statement (SPS) are realistically achievable.

ESO acknowledge that gaining expertise across heat and industrial energy will comprise a core part of their transition. However, from the foregoing, it is unclear how refined an understanding there is of the needs and intricacies of energy demand. There is a distinct risk that in the understandable desire to create as many flexible assets on the system that "look" and "behave" like natural gas, including hydrogen and carbon capture and storage (CCS), we spend significantly more on the net zero transition by subsidising first-of-a-kind technologies while overlooking one of the greatest assets we have – flexible demand. Any advice to Government and the regulator that is framed by such anachronistic thinking must be questioned.

Key Points

Transforming a private entity into a public body with immense power and influence over the future of critical national infrastructure cannot, and should not, be underestimated. It requires a reformation, not an evolution. Debates over policy, politics, and prices have lost sight of who this system of turbines, wires, and pylons exists for. Electricity generation and transmission only exist because the demand side wills it so. Why then, is energy demand treated as second class players in a system that only exists to serve it? We must upend this paradigm. Government, Ofgem, and NESO must work with energy demand, and more importantly, work for energy demand.

Through this report, we highlight how new statutory duties can align with this imperative and how creating a new future for the relationship of energy demand and NESO will benefit us all. The purpose of this report is to examine whether the NESO transition can "[help] drive a more open, flexible and efficient system... expected to result in a net saving on energy bills". In short, we will highlight the practices and patterns of behaviour that demand further scrutiny and radical cultural transformation within NESO and make recommendations for change.

Empowering Energy Demand writes this report in the spirit of continued, accelerated, and heightened collaboration with Government, Parliament, Ofgem and NESO.

2 What are NESO's legal obligations?

“Although the heavily regulated monopoly of ESO often felt like a public body wrapped in a private cloak, the implicit presumptions upon which it built its practices do not align with the scrutiny afforded actual public entities.”

Until now, the ESO, as a regulated monopoly, has been a private company licensed by the energy regulator. Ofgem has controlled the profit and loss incentives of ESO, but moving forward, as the ESO becomes a public body, NESO will be an entity wholly funded by the public purse and therefore should not be driven by profit and loss. Therefore, its core obligations arise from the provisions of the [Energy Act 2023](#) and their [new license obligations](#). Thus, it is critical that the statutory and licence obligations imposed upon NESO are properly examined.

Energy Act 2023

Part 5 of the Energy Act can be divided into: designation, functions, duties, considerations and licenses. Within the legislation, NESO is referred to as the Independent System Operator and Planner (ISOP).

Designation

While an ISOP must always be designated, it is within the remit of the Secretary of State to appoint and revoke a person's status as ISOP.

Functions

The Energy Act designates functions of the ISOP as follows: coordinating and directing the electricity transmission system, making and administering arrangements for markets and services to enable this, and strategic planning and forecasting in connection with the development of the transmission system, the provision of services, and other arrangements relating to the conveyance of electricity. The ISOP must also provide advice, analysis, and information on these matters.

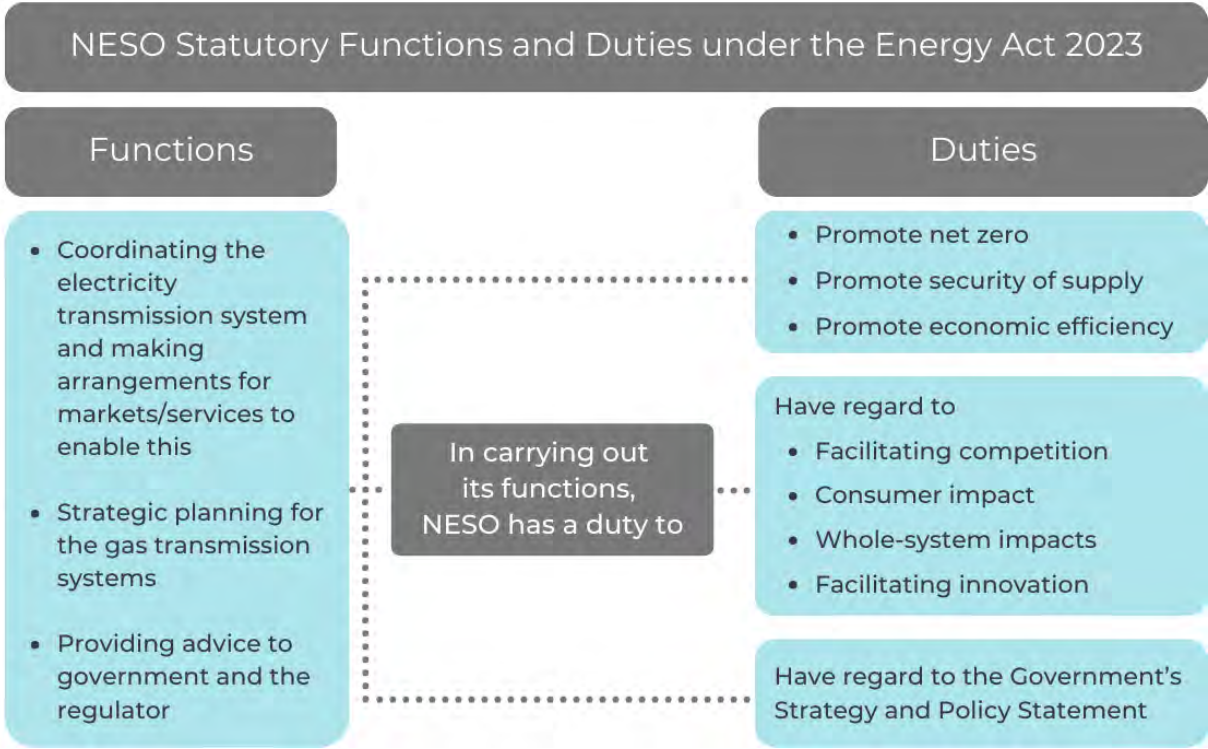
Duties

In carrying out its functions, ISOP has a duty to promote net zero, security of supply and efficiency and economy. Regarding the net zero objective, ISOP should enable the Secretary of State to ensure that the net UK carbon account for 2050 is at least 100% lower than the 1990 baseline and to ensure the net UK carbon account for a budgetary period does not exceed the carbon budget. The security of supply objective includes future and current consumers and covers electricity transmission and distribution as well as gas conveyed through pipes. Fulfilling the efficiency and economy objective includes promoting an efficient, co-ordinated, and economical system and promoting the efficiency and economy of persons carrying out work in electricity generation, transmission, distribution, supply, interconnection, multi-purpose interconnection, system operation, smart meter communication, code management.

Furthermore, ISOP has a duty to have regard to facilitating competition, consumer impact, whole-system impact, and facilitating innovation. Having regard to the consumer impact of their activity involves NESO considering both the impact (or likely impact) of both: their actions of current and future consumers, and the impact of current and future consumers on their activities. Having regard to the whole-system impact of their activities involves NESO considering both the impact (or likely impact) of both their actions on the whole energy system, and the impact of current and future consumers behaviours on their whole-system activities.

ISOP must also have regard to the Government’s Strategy and Policy Statement (SPS). ISOP must inform Government if it believes any of the goals are not realistically achievable. In doing this, they must state reasons why and outline the steps (if any) it is taking to deliver the outcome as far as is realistically possible.

Figure 1



Licences

Ofgem will continue to be responsible for licensing and regulating the ISOP, in line with the statutory functions and duties above.

Ofgem Draft Licences

Given the sparse statutory framework, there will be additional obligations required of NESO evolving from their current licences. Due to our focus on the implications for electricity demand, we primarily focus on NESO’s obligations under the Electricity System Operator (ESO) licence rather than the Gas System Planning licence. Ofgem and DESNZ conducted a statutory consultation on the remit of NESO licences in May 2024 and set out their proposals for a future regulatory framework in December 2023. Ofgem set out the

correct objectives to be achieved through the regulatory framework, including accountability, flexibility, proportionality, and transparency. However, as will be seen below, there is less detail on how these principles will be realised on a day-to-day basis. Indeed, Ofgem believes that the “new overarching legal obligations” make a “good case” for “lighter touch regulation”.

Recognising the immense role that NESO has to play in net zero and Clean Power by 2030, it is difficult to reconcile the recent conclusion by Ofgem and DESNZ that “it is not for government or the regulator to set the internal culture of an organisation, nor is a licence a direct vehicle for giving specific direction on internal culture”. A new public body, funded by the British public, established in the midst of an energy revolution cannot simply be left to slowly evolve on its own preferred timeline – Government and the regulator must provide stronger checks and balances.

Financial Obligations

Perhaps the most significant change that has occurred within the new licences for NESO is that they will be a publicly owned, not-for-profit organisation with “a high level of operational independence from government”. This change entails Ofgem playing an advisory role rather than controlling profits and losses. As a result, the licence attempts to implement a financial framework to ensure that NESO’s not-for-profit status is reflected in their revenue and that they are fulfilling the statutory function of cost-efficiency. Not only must NESO ensure that revenues are balanced between the two separate licence obligations (electricity and gas), but they must also make sure that any expenditure is only “for the purposes of carrying out the [NESO] Business”. These controls include NESO’s requirement to report and justify internal expenditure, ensure no expenditure is “uneconomical, wasteful or inefficient” as far as they are aware at the time of spending, and justify any spending when requested by Ofgem. As a not-for-profit body, when setting Balancing Services Charges (the levies charged to customers in association with NESO expenditure) NESO must ensure that they are consistent with forecasts.

Reputational Incentives

Crucially, the above means that NESO’s performance transforms from largely financially driven to “primarily regulated through robust reputational incentives for the organisation, with appropriate links to staff remuneration”. Ofgem has introduced requirements for performance reporting in line with delivery of their Business Plan and NESO Business Plan Guidance and to be assessed using the Reporting and Incentives Arrangements Governance Document. NESO must also facilitate a way for industry stakeholders to scrutinise their performance against the published report to assess if they are meeting requirements. The reputational incentive will be dependent on this and the scrutiny of Ofgem. NESO will also have to continue to comply with the Regulatory Instructions and Guidance (RIGs). This is set out by Ofgem and includes how:

- Systems and processes should be established and on what timeframes;
- Numbers must be calculated and to what degree of accuracy;
- Information must be recorded and presented to Ofgem;
- Definitions are to be established; and
- Information is to be audited and examined when deemed necessary by Ofgem and how assessment against this would be measured to ensure compliance.

Coordination

As above, one of the primary functions of NESO will be ensuring system security. Communication between Transmission and Distribution networks is required to achieve this and to guarantee that NESO are meeting their obligations to consider whole-system impacts.

“—
DESNZ and Ofgem recently referred to the changes needed to “promote a new approach to system operation” as “housekeeping”. This represents a startling lack of appreciation of the years of objections raised by the sector.
—”

It also includes a need to consider the assets that are connected to both networks and how competition and signals for participation are facilitated. NESO must work alongside the newly appointed Market Facilitator, Elexon, including a requirement to cooperate with the “development of markets and... the Total Electricity System”.

System Planning

NESO will have an obligation to create a Strategic Spatial Energy Plan (SSEP) and establish and apply a methodology as to how the plan will be achieved. The SSEP must “assess the optimal locations, quantities and types of energy infrastructure required across Great Britain to meet forecast energy supply and demand”. A Centralised Strategic Network Plan (CSNP) must also be implemented. Operability issues and the need for infrastructure development are within the CSNP remit, considering needs of the network over the next 25 years and beyond in order to make decisions on innovation and investment decisions. Furthermore, NESO will be responsible for devising and implementing Regional Energy Strategic Plans (RESPs) to coordinate the above at the distribution level.

Operations and Market Development

NESO is also required to promote “transparent, non-discriminatory and market-based procedures” for industry and consumers regarding the service design and development of balancing markets. Of particular interest, the licence demands “close cooperation with all market participants” to ensure “non-discriminatory participation” which is a consistent theme within this report. However, as discussed below, this

section of the licence does not go nearly far enough into how such requirements will actually be monitored.

Providing Advice

NESO will also provide advice to both Government and Ofgem and thus comply with the Advice Process Document. Ofgem are now required to summarise any advice given by NESO to help them with decision-making.

Key Points

The Energy Act 2023 and Draft ESO Licence set out the broad expectations and mandates for NESO. However, even the licence, which should add meat to the bones of the legislation, is relatively vague. Despite Ofgem's belief that the "new overarching legal obligations" make a "good case" for "lighter touch regulation", without unambiguous expectations and methods for holding NESO to account, it may not be able to fulfil the laudable statutory aims.

3 How does ESO stack up?

“To determine how an institution may act in the future, the most accurate measure is how they have acted to date. ESO have had over two years to prove that they are rising to the immense responsibility of becoming a public body, with the public interest at its core.”

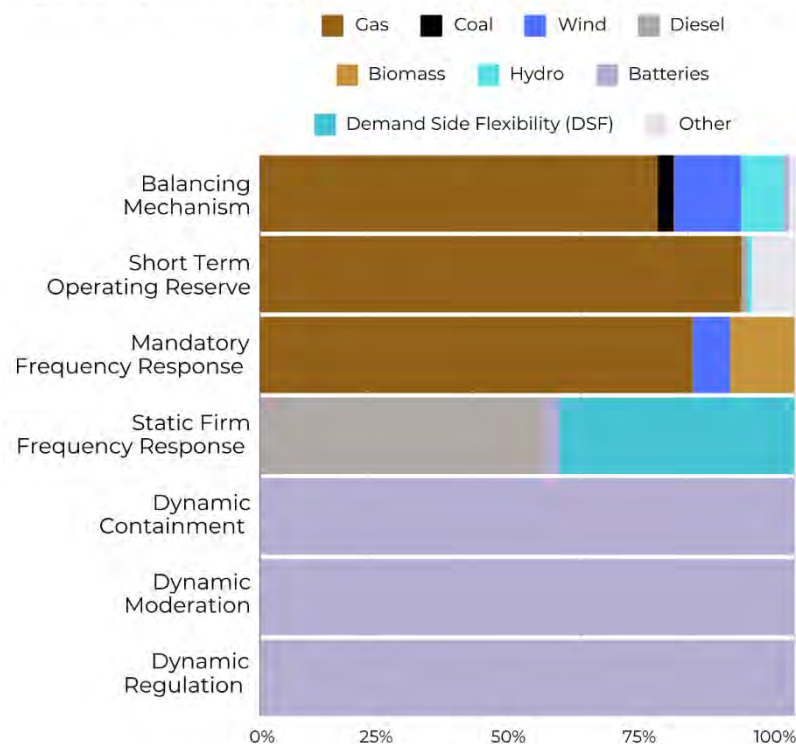
NESO have numerous legal requirements impacting how they properly value and incorporate energy demand into their new and existing duties. However, to determine how an institution may act in the future, the most accurate measure is how they have acted to date. Luckily, we have had over two years of institutional behaviour to analyse since the announcement that ESO would become NESO. In other words, ESO have had over two years to prove that they are rising to the immense responsibility of becoming a public body, with the public interest at its core.

Below, we interpret how the evolving ESO/NESO stacks up against the duty to have regard to competition, consumer impacts, whole-system impacts, and facilitating innovation when carrying out all its other core duties and functions across promoting net zero, ensuring security of supply, strategic planning, and providing advice to Government and the regulator. Similarly situated system operators are also considered as case studies for practices to embrace, and to avoid.

Facilitating competition

Reaching net zero is not simply a matter of building enough renewable generation capacity, it is a matter of being able to operate such a system on a daily basis. To achieve this, as per the current SPS, NESO must “drive competitive, coordinated, and effective markets which are open to flexibility technologies of all types and sizes”. ESO have repeatedly

Figure 2: ESO markets by participating technology type in 2023



Data was taken from ESO Markets Roadmap 2024 and ESO Power Responsive Annual Report 2024

committed to being able to operate the system carbon-free for periods of time from 2025 onwards. It is therefore important to consider the carbon intensity and technological diversity of ESO's current approach to balancing markets (see Figure 2).

Despite five new balancing markets being launched between 2019 and present (we consider the demand flexibility service (DFS) elsewhere), none have delivered more technological competitiveness than legacy, gas-dominated markets. Instead, they have been designed in a manner that systematically prefers battery storage, seemingly as a replacement for gas. Rather than approaching market design from the perspective of the non-dedicated assets upon which the future system will need to rely, the ESO has repeatedly sought ways to make different technologies look and behave more like the traditional fossil fuel plants the control room is accustomed to. This contradicts the requirements under ESO's licence that Balancing Services are "not unduly restricting new and existing service providers from competing for the provision of such services". The issues faced by demand side flexibility technologies hoping to gain access to ESO markets has been graphically represented by ESO in some recent work (see Figure 3 below).

Figure 3: ESO market barriers to demand participation

Demand Side Flexibility Archetypes		Static Fast Frequency Response	Dynamic Containment	Dynamic Moderation	Dynamic Regulation	STOR	Fast Reserve	Quick Reserve	Slow Reserve	Balancing Reserve	Local Constraint Market	Demand Flexibility Service	Balancing Mechanism
Consumer	Route to market provider												
Domestic	Supplier	Behavioral											
		EV											
		Battery & Solar											
	Independent VLP Aggregator	Behavioral											
		EV											
		Battery & Solar											
Industrial & commercial	Non VLP Aggregator	Behavioral											
		EV											
		Battery & Solar											
		Heat											
		Heat											
		Heat											
	Supplier	Fleet EV											
		Large consumer scheduled flex											
		Large consumer interruptible flex											
		Small & medium enterprise scheduled flex											
		Small & medium enterprise interruptible flex											
		"Behind the meter" Battery, Solar &/or Wind											
	Independent VLP Aggregator	District heating											
		Fleet EV											
		Large consumer scheduled flex											
		Large consumer interruptible flex											
		Small & medium enterprise scheduled flex											
		Small & medium enterprise interruptible flex											
	Non VLP Aggregator	"Behind the meter" Battery, Solar &/or Wind											
		District heating											
		Fleet EV											
		Large consumer scheduled flex											
		Large consumer interruptible flex											
		Small & medium enterprise scheduled flex											

Source: <https://www.nationalgrideso.com/document/318576/download>

Although this level of transparency is appreciated, and required under the ESO licence, these barriers have been recognised and communicated to ESO by industry over many years. It is somewhat disconcerting that it has taken this long to see them in black and white, or red as the case may be. Even more startling is that this is the state of affairs almost a decade since the launch of Power Responsive, a programme created by ESO to "ensure demand has equal opportunity with the supply side when it comes to balancing the system". While industry has continuously supported the endeavours of Power Responsive, the above map calls into question how well the rest of ESO is receiving their messages and objectives. Symptomatic of various teams with somewhat siloed aims, not atypical of a large company, this consistent divergence will not and cannot facilitate competition.

Outside of the Balancing Mechanism (BM), the predominant market for operating the electricity system, ESO runs a number of ancillary services to help with other system needs. In 2020, at the beginning of the current regulatory period, ESO committed in their business plan to deliver a new suite of ancillary markets, "unlocking the benefits of increased participation and competition".

Despite consistently emphasising the importance of delivering services that are technology agnostic, in principle and practically, these services have not delivered technological competitiveness and have been consistently delayed by the need for IT upgrades.

Dynamic Response Services Dominated by Batteries

Dynamic Response Markets are services used by ESO to respond to rapid changes in system frequency. The three services – Dynamic Containment, Moderation, and Regulation – are all extremely fast acting. Thus, only batteries have been able to compete to date. However, this was not inevitable.

At first, when designing Dynamic Containment in 2019, ESO announced that they would only

“Despite consistently emphasising the importance of delivering services that are technology agnostic, in principle and practically, these services have not delivered technological competitiveness and have been consistently delayed by the need for IT upgrades.

accept the aggregation of assets at Grid Supply Point (GSP) level. GSPs represent sections of the national grid and very small geographical areas – the UK has over 400 GSPs. Since ESO control room cannot compute bids that incorporate a decimal point (eg 0.5MW/1.5MW) all bids must be submitted in whole MW form. Therefore, the design choice to mandate assets be in a very small

geographical area would have locked out all smaller-volume demand side flexibility since there would not have been enough assets to be aggregated into a 1MW portfolio within a GSP. After consistent advocacy and proposals for alternative approaches made by industry, ESO eventually reversed their decision in 2022, although it was never made entirely clear whether any physical characteristics of the grid or control room had changed to allow this. Thus, the question must be asked whether this barrier to competition was ever actually necessary or simply a desirable outcome for ESO control room?

However, another core design feature of the entire Dynamic Services suite has prevented participation from demand side assets. Performance monitoring requirements resulted in many non-battery assets that could participate being excluded. Although the alternative approach using derived data, as proposed by the ADE and its members, was well received by the ESO, the process to get this change implemented has now taken almost five years, without a clear end in sight.

Delays such as this undermine the objectives both of current ESO licence conditions to remove barriers, increase participation by making efforts to “establish technical requirements for participation” in Balancing Services and create competitive markets. More importantly, they undermine the functions and duties of NESO and their ability to comply with licence requirements laid out above to enable “effective and non-discriminatory participation”.

Planned Reserve Services Incumbered by Delays

Reserve Services are used to ensure there is enough flexible capacity available for system needs as they occur, either increasing or decreasing electricity demand or increasing or decreasing electricity generation. Like Dynamic Services, ESO committed to introducing two new Reserve services to produce “deep, liquid and close to real time markets”.

Originally scheduled for launch in Q1 2022, in February 2022 ESO announced that the new Reserve services were delayed indefinitely. Although ESO had been designing the services for well over a year, it was only discovered as the deadline approached that their launch was “dependant on [a] number of IT systems and processes that are required to be changed”. It was unclear to industry why the need for such control room IT reforms had not been realised earlier in the design process. Despite claiming the energy crisis demanded reprioritisation when reporting on their performance, Ofgem rightly noted that the energy crisis did not change the need for IT upgrades which would have impeded delivery regardless.

Originally, the new Slow Reserve Service was due to launch first, which was welcomed by demand side flexibility providers since its design features better accommodated non-dedicated assets. In March 2023, it was announced that both services would go live almost simultaneously in Winter 2023, eighteen months after the original schedule. Further delays were announced and in Winter 2023 ESO decided, without industry engagement, that Quick Reserve would be launched first, now scheduled for late 2024. Not only did this decision push both Reserve Services further into the future, by bringing forward Quick Reserve first, it once again prioritised an ancillary service where “[b]attery and Pump Storage providers are considered key participants”.

ESO consulted on the design of Quick Reserve in Summer 2024 for launch in Winter 2024. Again, ESO has failed to implement standards that allow for the service to be technologically agnostic, requiring full delivery in 1 minute. Many flexible assets either cannot reach this output or doing so will have large impacts on the health of the asset being used. Slow Reserve is now set for release in Summer 2025.

Balancing Reserve Deemed Discriminatory by Ofgem

In Winter 2022, ESO announced the design of a new ancillary service that had not been planned previously – Balancing Reserve. Only large generators (above 50MW) would be eligible to participate in the service owing to the fact that assets would be “manually dispatched” in the Balancing Mechanism (BM). As discussed below, the BM has historically relied on control room engineers manually typing instructions to large assets to either increase or decrease their electricity generation. In the past decade, as more demand side flexible assets that are small in volume have attempted to participate in the BM, significant concerns have been raised about control room’s ability and willingness to utilise/dispatch these non-traditional assets. ESO continually denied, see below, that manual dispatch could lead to inefficiencies or that control room found dispatching smaller volume assets difficult. The design of Balancing Reserve, however, made this reality blatantly clear.

Moreover, the service was first announced at a very advanced stage of design, without industry having ever heard of its existence, with ESO hoping to launch on an expedited timeframe. Meanwhile, the planned new reserve services above were being continually delayed. Pressing forward with the design in spite of intense criticism, eventually Ofgem rejected the service as “unduly discriminatory against the involvement of units of smaller size”. It is unclear how much time and money, including on external consultants, was spent on the first design of Balancing Reserve.

Over the following months ESO redesigned the service and appeared to be more open to industry feedback, which was lauded. The final product, launched in early 2024, was

introduced alongside more exclusions for a large amount of flexible assets. This includes non-dedicated large-scale heat pumps, combined heat and power (CHP), EV charge points and home energy management systems (HEMs) as a result of dispatch flexibility rules requiring assets to be able to dispatch its contracted quantity in one or multiple consecutive increments of 1MW for ramping periods of 1 minute. While ESO continually rely on system savings from services that fail to consider the needs of demand side flexibility, they fail to recognise the chilling effect that continued market exclusion has on facilitating current and future competition.

Local Constraint Market Creates Two-Tier Market for Providers

The Local Constraints Market (LCM) aims to reduce network congestion at the Scottish boundary as ample renewable generation tries to travel down the grid. This was widely praised as a pragmatic approach to one of the most constrained areas of the country, allowing sites to benefit from increasing their electricity demand to soak up excess renewables.

However, without consultation, ESO elected to adopt an approach to payment/settlement that, although not formally discriminatory, substantively disadvantaged independent flexibility providers and businesses wishing to participate directly in the service in comparison to energy suppliers. In effect, even where a site was participating directly or through an independent provider, their supplier is inadvertently rewarded for these actions and is not obliged to pass this reward to the customer. Representing a substantive disincentive for non-suppliers hoping to participate in the service, industry quickly raised the issue with ESO in early 2023, before the service was launched.

Billed as a time limited service from 2023 until 2025, Power Responsive initially took concerns seriously and a temporary solution was drafted and consulted upon in late 2023. At the time of writing, it has still not been implemented.

As demand turn-up services become increasingly commonplace in a world where, according to Government, generation could exceed demand up to 50% of the time, it is imperative that

Case Study 1

California Independent System Operator (CAISO)

In 1996 California formed the CAISO and became the first US state to restructure its electricity market. While not fully public, CAISO is a non-profit public benefit corporation governed by a five-member Board of Governors. Appointed by the California Governor and confirmed by the State Senate, Board members serve three-year staggered terms. CAISO presents a list of recommended appointees to the Governor for each vacant position and selection is made pursuant to a Board Selection Policy which has raised concerns over political interference.

CAISO has had notable successes integrating renewables into the grid. In April 2024, California exceeded 100% of grid demand with clean energy sources for 30 out of 38 days. It is important to note that despite many successes, CAISO prohibits exporting energy from distributed batteries to the grid except in emergency conditions. This limits the amount of support batteries can provide and means they cannot be used to supply energy to the grid, only to reduce load in emergency conditions. Similarly, back in 2022, when ESO was launching the paid Demand Flexibility Service (DFS), California issued unpaid demand turn down alerts via phone messages to California residents. Of course, the Energy Emergency Alert garnered a far stronger response than the UK version - within 25 minutes energy demand dropped by 1.2GW.



all participants are able to provide these services in an equitable way and that past market orthodoxies do not undermine the decarbonisation journey.

Key Points

From the foregoing, it is plain that with regard to ancillary services ESO is not living up to its proclamation that “[a]ll our programmes across ESO market reform are targeted at increasing competition to reduce overall system costs”. Not only does the market design of ancillary services preclude technological competition, it stymies innovation, fails to take account of future consumer and whole system needs, reflects a lack of understanding of demand side flexibility, and threatens net zero. The longer demand side flexibility is precluded from markets, the longer it will take to fulfil these objectives, including getting more low carbon assets on the system. As we will go on to discuss, vast amounts of extra demand is coming online at an accelerated pace, electricity demand could double by 2050, whether or not ESO is ready for it. The only remaining question is whether control room would like to have access to any of this capacity or be responsible for paying carbon heavy plant to meet its needs.

Consumer impact

Having regard to the consumer impact of their activity involves NESO considering the impact (or likely impact) of both: their actions on current and future consumers, and the impact of current and future consumers on their activities. The current national electricity control room’s narrow interpretation of their licence conditions have made reformative change near impossible, as balancing the grid efficiently and economically in the present moment is prioritised over other obligations. This betrays a lack of concern for their duty to treat all assets fairly and justify discriminatory actions.

The statutory duty to have regard for impacts on future consumers should be game-changing in this respect. As above, DESNZ and Ofgem recently published a statutory consultation on the new licences for NESO where they referred to the changes needed to “promote a new approach to system operation” as “housekeeping”. This represents a startling lack of appreciation of the years of objections raised by the sector that ESO is systematically unable to appreciate the needs of current and future consumers who wish to participate in system operation. At the same time that the previous Government recognised “moving to net zero will depend on the choices made by consumers as well as industry”, they and Ofgem failed to propose any licence conditions that would mandate proper consideration from NESO.

It is important at this juncture to revisit the Balancing Mechanism (BM), ESO’s predominant market for operating the system in close to real time. Decisions we make on how the BM is run, who’s allowed to participate, and whose bids/offers are actually selected/dispatched by ESO have direct impacts on consumers. Owing to the changing nature of a decarbonising electricity system, balancing costs have risen in recent years and are expected to continue rising out to 2030 – the total spend in 2023/24 was £2.4bn and could rise to over £4.5bn by 2030. As discussed in the below section, the ESO team considering future market reform to reduce balancing costs have done commendable work in this area. In the short-medium-term however, the BM remains a core market for flexibility and is largely inaccessible to energy demand.

While the [European Balancing Guidelines](#) established the presumption that energy balancing services must be non-discriminatory, in practice formal equality has not always entailed substantive equality. Two issues, in particular, have dominated the landscape over the past number of years: metering requirements and dispatch efficiency. Both represent a distinct lack of appreciation for future consumer needs and the need for a cultural transformation within ESO for it to be successful as NESO.

Within various responses to consultations on the future regulation of NESO, we have proposed that a licence condition be imposed whereby if a rule, design feature or procurement decision process fails to pass even a perfunctory sniff test for discrimination, it should be treated as presumptively invalid and NESO must disclose all available evidence for robust public scrutiny. This also better aligns with [Data Best Practice Guidance](#). If the rationale for a legacy rule that now appears outdated cannot be tracked down because the team who implemented it have all moved on, the presumption should be that the rule is expeditiously reformed or repealed.

Importantly, such presumptions can of course be rebutted. Proportionality testing has long been used to balance competing interests in the administrative sphere. Put simply, when a decision, rule, or design is presumptively invalid, NESO would need to show that:

1. There is a legitimate purpose underpinning the measure;
2. The measure would achieve that legitimate purpose; and
3. The measure is reasonable and necessary to achieve the purpose; there is no less onerous or restrictive way to go about achieving the purpose. Basic principles of necessity and reasonableness would be set out in advance.

Ofgem already employs a level of proportionality testing when judging ESO designs, see Balancing Reserve above, but this reasoning should be applied far sooner and by NESO itself. Standardising the process by which change decisions are made beyond the webinar, consultation, working group routine, is an unavoidable step in the evolution of NESO and yet, there is no mention of it within the Draft Licences.

Metering standards pose an insurmountable challenge for consumer assets

Upon the entry of independent aggregators into the BM, ESO [introduced](#) new metering standards for sub-100MW participants without industry consultation or regard to the legal metering requirements for individual assets. ESO mandated that meter readings are reported at 1 second intervals within 1% accuracy. This is contrary to the legislative accuracy requirements for all domestic meters contained in the [Metering Certification Regulations 1998](#) (+2.5%/-3.5%) and [Measuring Instrument Regulations 2016](#) (+/-2%). Likewise, providing meter readings every 1 second, even when assets are not participating in the BM would impose massive data costs, essentially obliterating the business case for domestic flexibility. Objections were immediately raised bilaterally to ESO and continued to be raised for the following three years.

Taking the fastest growing domestic flexible asset, we see over 1m EVs in the UK today with a maximum peak demand of 7GW. Luckily, all EVs do not plug-in at once, but following natural demand curves the peak charging of vehicles on the road today represents approximately 500MW. This already poses a distinct system threat. As we know, this will [increase exponentially](#) in the coming years. Electrical demand for road transport could reach 28TWh by 2030 - the

equivalent of over 10% of all national electricity demand in 2023. We cannot afford to wait and see how control room will respond. This is before we even consider the electrification of heat.

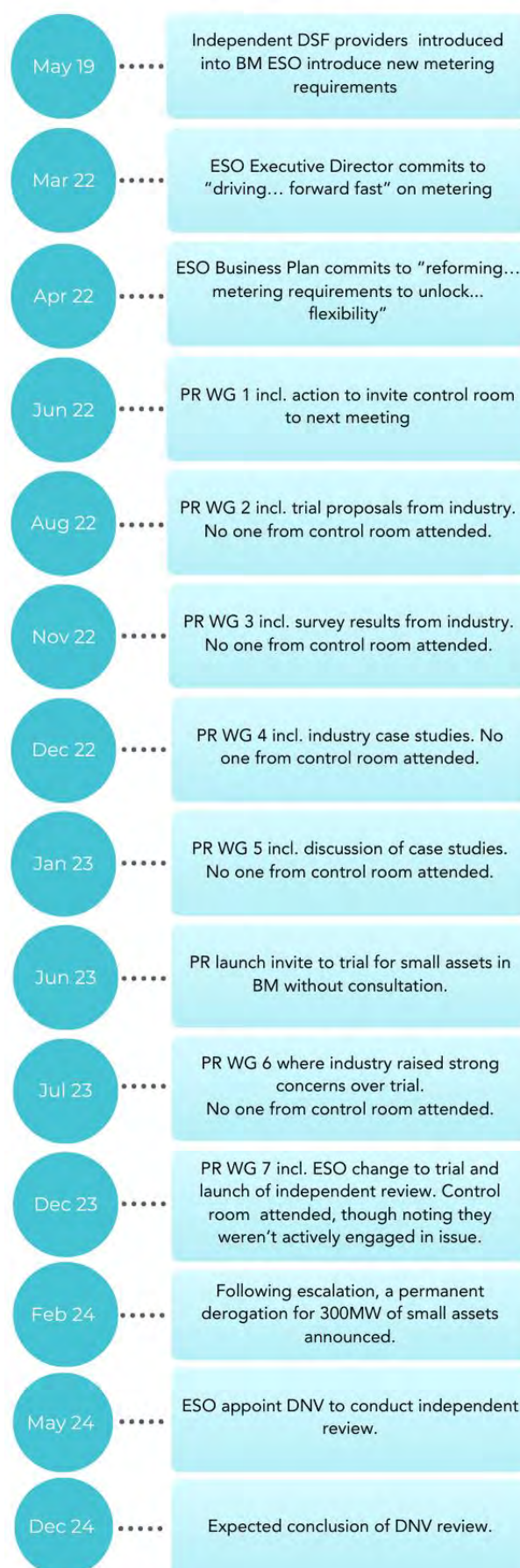
In March 2022, ESO Executive Director recognised that “one of the biggest blockers” to consumer participation in the BM is metering standards and committed to “driving... forward fast” on “changing that paradigm”. Over two years later, while some progress was made with the help of a dedicated Power Responsive industry working group (PR WG), a permanent reform has not been implemented. Figure 4 shows how it took eighteen months for a control room representative to even attend the working group, despite repeated requests.

Following heightened advocacy from the ADE and others, ESO made a permanent derogation to performance metering in the BM for 300MW of small flexible assets in February 2024. The ADE commend these relaxed standards but maintain that it should not have taken two years to reach what is essentially an interim solution. For reasons discussed below, there are also concerns over the roadmap for long-term reform given the uncertain outcomes of the independent review currently being undertaken.

Under the EV Smart Charge Point Regulations 2021 and the Energy Act 2023, consumer assets such as EV charge points and electric heating are/will be mandated to be capable of “providing demand side response services”. Despite this, ESO fail to align their markets with the clear legislative intent of these provisions. Without proper explanation to the contrary from ESO, these standards represent a disproportionate barrier to participation for consumer assets and undermine the will of parliament.

Today, current and future consumers are investing in assets that are mandated to be flexible by law but may not necessarily be rewarded for that flexibility given the market rules of a public body, NESO, which has not properly accounted for their needs. Removing barriers for flexible consumer assets to participate in ESO markets is not a ‘nice to have’ but

Figure 4: Metering Progression Timeline



an absolute imperative for NESO to be capable of balancing a decarbonised system for periods from 2025 and reach Clean Power by 2030.

Employing the above proportionality test, since there is a legitimate purpose underpinning the 1%/1s requirements – cohering to operational limits obligations – and these requirements do indeed achieve that purpose, the real questions are:

- 1) Whether they are reasonable and necessary to achieve that purpose:
 - If we subscribe to a future where British homes and businesses are just as responsible for balancing the system as large generators, it is not reasonable nor even rationale to expect millions of individual homes to invest in the same quality of meters as a handful of multi-million pound generators whose sole purpose is increasing or decreasing electricity output.
 - Nor do we consider they are necessary. Rather than approaching this from a standpoint of: ‘This is how ESO can see whether the instructions it gives are being followed because of the granularity of meter reads they have access to today and what if we take unnecessary actions if we’re not sure whether a unit is responding’, we should be asking, ‘What actions will need to be taken if we don’t have access to any information at all regarding these assets? How much more gas generation will need to be built and network to accommodate it? What will this cost consumers in the long-term?’ When put thusly, it becomes eminently clear that the current approach is not only unnecessary, it is untenable.
- 2) Whether there are any less onerous or restrictive ways to achieve that purpose:
 - The work conducted through the PR WG clearly demonstrates that there are less onerous ways of achieving ESO’s purposes.
 - Though concerned by the timeline involved, the work being undertaken by DNV will hopefully show the same.

Therefore, the current metering standards represent a disproportionate barrier to entry and will, in fact, come to undermine the legitimate purpose the ESO is trying to achieve. Yet, there is no public plan in place should the independent consultant’s research conclude the same.

Unless consumer assets are actually used in the BM, participation is pointless

Even if metering requirements were to be reformed tomorrow, there would still be immense uncertainty as to whether customer bids/offers into the BM would be accepted by control room. As discussed above, the BM has historically relied on manual dispatch, whereby control room engineers manually instruct a handful of large generation assets to either increase or decrease their electricity output.

For many years, the capability of ESO to balance the system using assets other than large generation has been questioned. This is especially so given the vintage of the control room IT systems currently in use. After persistent concerns raised by industry about control room’s ability to efficiently choose/dispatch cheaper smaller volume units, the [Dispatch Transparency Tool](#) was launched to provide a dataset of control room actions taken on a weekly basis and the reasons for any actions taken outside of the economic merit order. Although industry has been flagging persistent issues with the Tool since its launch in 2021, discussions only began

to garner momentum at a wider level and within ESO since addressing “skip rates” (where control room chooses to dispatch a more-expensive larger unit rather than a cheaper smaller unit) was adopted as a core task within the industry-ESO co-created Balancing Programme roadmap in Spring 2022.

Through this engagement, it became clear that the Dispatch Transparency Tool is not fit for purpose. At a December 2022 event, certain points were communicated to industry demonstrating the subjectivity of dispatch decision-making. In particular:

- When the control room was busy and engineers take an out-of-merit action because of its volume, this is not considered a “true skip”, rather they look to what caused the business eg constraint, frequency. In the tool, therefore, the action is attributed to operational conditions, not a result of the limitations of manual dispatch.
- When making decisions on whether to dispatch 1x20MW unit or 20x1MW units, control room takes into account discrepancies in unit forecasts. Even though the probability of average discrepancy may be similar, it is easier for them to phone the 1x20MW in case of a fault rather than 20x1MW units.
- Since engineers can more readily recall the parameters of large volume assets rather than the duration of many small assets, this can impact their decision-making.
- If engineers believe they may need fast acting units such as batteries at a later time they may choose not to accept their bids and offers in order to avoid them being unavailable later. However, if those assets are not needed later, they are left unutilised.

During this time, industry was repeatedly told that less than 1% of out-of-merit actions were unaccounted for when the core question was clearly whether the accounting process itself was justifiable. Ofgem’s Draft Determinations for the second half of ESO’s regulatory period in November 2022 acknowledged the existence of a problem and sought to require the ESO to provide a narrative to explain why units were skipped. ESO argued that such a requirement “would impose a significant regulatory burden” and Ofgem replaced the proposal with a more general requirement to add narrative within the BM Audit. At an industry event in Winter 2023, ESO finally acknowledged that manual dispatch does indeed affect dispatch efficiency and appointed LCP Delta to conduct an independent review, due for completion in December 2023. No results have been published to date, with ESO continually referencing problems with data inputs. Whether justified or not, delays of over eight months for an independent review into ESO transparency cannot fill anyone with confidence.

While the Balancing Programme has delivered some initial successes, including the launch of the first two iterations of the Open Balancing Platform (OBP) that should have increased the ability to dispatch smaller units, complaints of skip rates have continued, including in the aforementioned Power Responsive derogation for small assets. A recent trial conducted by Centrica to introduce smart heating and EVs into the BM failed to gather any useful data because the unit was never dispatched by control room despite offering down to £1/MWh.

Thus, not only are control room not using consumer assets to help balance the system, they are standing in the way of data being gathered to understand how consumer assets can be better enabled to participate, putting both existing and future consumer needs at risk.

Key Points

It is no longer feasible to consider consumer impacts so narrowly. Homes and businesses who use electricity need to benefit from the energy revolution just as much as large generators - public support for net zero depends on it. The predominant ESO balancing market demonstrates that we are exceedingly far from that future. Stricter requirements for how NESO develops, designs, and discriminates within its markets are needed within their licence. Becoming a public body mandates heightened public scrutiny and accountability, especially when consumers are being excluded from the markets they pay to fund. Enabling homes, businesses, and industry to be rewarded within the energy system cannot be taken as a naturally evolving process - it demands swift and strong action from our public institutions, not least NESO.

Whole-system impact

Having regard to the whole-system impact of their activities involves NESO considering the impact (or likely impact) of both: their actions on the whole energy system, and the impact of current and future consumers behaviours on their whole-system activities. Most importantly, NESO will need to have expertise across electricity, gas, heat, hydrogen, industrial energy and buildings decarbonisation. No longer can ESO equate electricity expertise with energy knowledge - true cross-vector expertise is demanded. Therefore, according to the current SPS, NESO “should be looking to support the delivery of market developments through a whole system lens, engaging with industry participants and recommending changes across electricity and gas that support effective market arrangements for the system”.

Although the most obvious precedents for ESO decisions are within the electricity markets discussed above, it is equally important that we consider how they generally approach their work and how this may impact whole system design.

Major concerns raised regarding ESO ability to deliver IT reform and digitalisation

NESO is expected by Government and Ofgem “to be a data-led organisation, with a strong digital and IT systems capability”. Simultaneously, there have been various occurrences that raise significant fears over the IT capabilities of ESO. As discussed above, continual delays in delivering ancillary market reforms that would allow more demand side participation have been attributed to the need for control room IT upgrades and it has been reported on several occasions that control room engineers simply do not trust aggregated portfolios of small assets.

Following years of industry concerns over ESO’s IT capabilities of choosing/dispatching small assets, Ofgem commissioned an independent review of over half a billion pounds of ESO IT investment by Zuhlke Engineering prior to ESO’s business plan for the second half of their regulatory period. Unfortunately, only the summary of the Zuhlke report was published as an Appendix of Ofgem’s RIIO-2 BP 2 Draft Determinations in November 2022. Unsurprisingly to industry, £517m (93%) out of £556m of investment raised concerns, and 55% (£307m) raised serious concerns. Repeated calls were made by ADE for Ofgem and ESO to hold a joint public session to discuss these results for those stakeholders perhaps not able to dedicate time to perusing regulatory appendices. Furthermore, the then-BEIS Select Committee on Decarbonisation of the Power Sector recommended that ESO should accelerate its IT

upgrades to facilitate better handling of smaller flexible assets, report to parliament on this progress, open market access to smaller providers, and demonstrate greater transparency when deciding which assets to dispatch.

For an independent audit to conclude half a billion pounds of largely public investment raised concerns and that “[NESO] needs are at risk” without any further public follow-up from ESO or the regulator hardly instils faith in the transparency and accountability mechanisms in place.

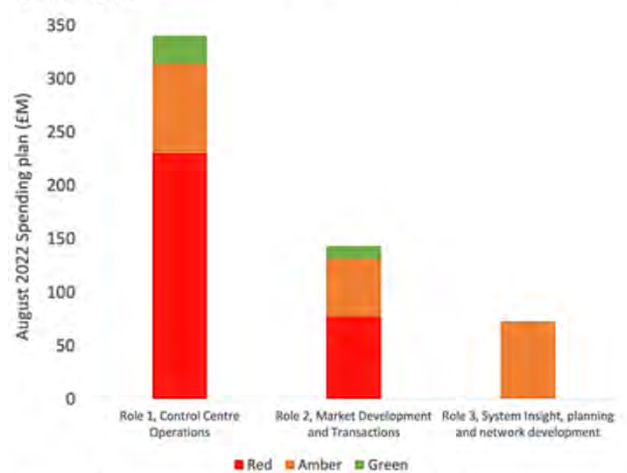
Although the report relied little on industry engagement, its conclusion that ESO “is very good at broadcasting its business intentions and is reasonably good at assuring that the products/services it plans to create are the right ones. It is poor at assuring how it goes about delivering the corresponding solutions” is frighteningly reflective of industry’s actual experience. Yet no follow-up with industry was conducted by Ofgem or ESO.

As seen above with market reform delays and manual dispatch in the BM, IT incapacibilities pose increasing risks to achieving satisfactory outcomes for the electricity system, let alone the whole energy system. Since “changes on [ESO’s] legacy systems” are cited repeatedly over the years as reasons for delayed deliverables, one would assume that ESO’s investment in future systems would prioritise adaptability. Unfortunately, according to Zuhlke, “ESO appears to have sacrificed future Critical National Infrastructure (CNI) adaptability and resilience by using an on-premises data centre and proprietary software without providing a robust justification”.

Per the Energy Digitalisation Taskforce, a “digitalisation culture needs to be embedded throughout the energy sector by promoting digital leadership, valuing digital assets, and focusing on whole system user experience”. Furthermore, a more recent independent consultant commissioned by Ofgem found that if we “do not have the right information at their fingertips to make decisions that will lead to a net zero power system by 2035, we will not achieve this fundamental objective”. Let alone Clean Power by 2030.

Rightly so, Ofgem recognises that “the management of capacity across networks, the proliferation of millions of distributed assets, the interconnected nature of different systems and operators, and the need for decentralised flexibility each require reliable and standardised data transfer to operate effectively” and has announced its plans for a Data Sharing Infrastructure to work towards this vision. Considering its whole-system statutory duties, NESO is the obvious choice to undertake developing the minimum viable product (MVP) and this is indeed what Ofgem has indicated, subject to consultation. Equally, with the foregoing in mind, it seems senseless to bestow an organisation with a patchy, at best, track record on IT delivery such an immense responsibility. Here, it is critical to delineate what NESO *should* be and what ESO *has* been. If we are purely focussed on the former, then Ofgem’s decision makes perfect sense. However, if we ascribe to the reality in which we live, Ofgem’s decision, without any acknowledgement of ESO’s shortcomings, is highly questionable.

Figure 5: Zuhlke scores using Ofgem RAG method for ESO latest spending plan



Source: [https://www.ofgem.gov.uk/sites/default/files/2022-11/Business Plan 2 Draft Determinations - Electricity System Operator.pdf](https://www.ofgem.gov.uk/sites/default/files/2022-11/Business%20Plan%20Draft%20Determinations-Electricity%20System%20Operator.pdf)

Ofgem appoints Elexon market facilitator, not NESO

Starting in April 2022, Ofgem began to consider the future of local energy governance and whether both: a) system planning and; b) local flexibility markets were best left to the collaboration of DNOs with one another, or whether a centralised body would be better equipped to deliver these needs. Ofgem chose the latter, deciding that to achieve the best whole-system impacts there was a need for a centralised body to deliver Regional Energy Strategic Plans (RESPs) and become a Market Facilitator to standardise rules across flexibility markets.

At first, NESO was the preferred option for both roles. However, after public consultation, Ofgem launched a second consultation in December 2023 indicating that there were now two bodies they were considering to undertake the Market Facilitator role: NESO and Elexon - a not-for-profit company responsible for the administration of industry codes, including the settling of the wholesale electricity market. Although NESO appeared the obvious choice for Market Facilitator given its statutory duties for system planning, operation, and whole-system impacts, the endemic concerns over transparency, stakeholder involvement, and accountability swayed a large portion of stakeholders to prefer Elexon. The deciding factor for many, including the ADE: the procedural and cultural impartiality offered by Elexon.

In July 2024, Ofgem announced that Elexon would become Market Facilitator. Although Ofgem emphasised that they believed both Elexon and NESO were capable of undertaking the role, they concluded that Elexon was best placed to perform the “most important” principles, namely, “impartiality”, “transparency”, “accountability” and an “inclusive and collaborative approach”. While we applaud the decision of Ofgem, it begs the question, if NESO have statutory duties to have regard to facilitating competition, consumer impacts, whole-system impacts, and facilitating innovation (all

Case Study 2

New York Independent System Operator (NYISO)

A non-profit, non-governmental organisation, NYISO was established in 1999 and is governed by an independent Board of Directors and a committee of stakeholder representatives. Board members have backgrounds in electricity, finance, academia, IT, communications, and public services. Stakeholder committees are composed of representatives of market sectors including transmission and generation owners, end-use consumers, public power, and environmental parties.

Of particular interest as a comparison study to NESO, NYISO has implemented a first in nation programme to integrate aggregation of distributed assets into the wholesale electricity market, including small-scale solar arrays, residential batteries, and EVs. The market rules allow assets or portfolios over 10KW to participate. Industry is generally supportive of this market and considers a successful initiative. NYISO’s inclusion of smaller, flexible assets has a strong track record of saving the grid money. As far back as August 2006 during a record peak load, demand response programs shaved the peak by an average of 865MW, providing estimated savings of \$91mn.

While NYISO’s distributed asset inclusion is laudable, they, like many others in the US, are struggling to remove fossil fuels from the grid and relies on them for security. For example, NYISO recently delayed the retirement of peaking plants in NYC in order to ensure reliability.



important attributes for the Market Facilitator) why would a position that relies most heavily on the basic principles of impartiality, inclusivity and accountability be awarded to someone else?

Elxon was deemed more likely to deliver “open and transparent markets that are not biased by the commercial interests of buyers; fair and transparent rules and processes for procuring flexibility services, that enable service providers to participate easily in open, transparent, and coordinated markets; and enhanced simplicity for market participation”.

One of the central functions of the Market Facilitator is “developing effective solutions that have strong buy-in from across industry” and given all of the above, one must question whether NESO has lost this trust before it has even started. If this was a core concern for Ofgem in choosing Elxon as Market Facilitator, it needs to be made public and as per our recommendations below, Ofgem, NESO, and industry must develop a concrete plan to restore this trust. The entire country has a stake in NESO’s success and we must acknowledge past shortcomings in order to overcome them in future.

Note: Close to the time of publication of this report, Ofgem published their Mid-scheme performance review of the ESO including a new independent audit of IT investment by Coforge. While Ofgem note that this report made them “much more confident that the ESO has the processes in place and ability to deliver its ambitious IT plan” this does not change the accountability concerns raised by the above.

ESO advocates transformative market reform to achieve net zero

Equally important is recognising areas where ESO have excelled and truly been future-facing since these are the building blocks upon which NESO must grow. ESO established a team to consider long-term electricity market reform, with the first phase of their work completed in March 2021. By Winter 2021, this work was renamed the Net Zero Market Reform (NZMR) programme. Unsurprisingly, the announcement that ESO would become NESO also coincided with the launch of Government’s Review of Electricity Market Arrangements (REMA) first consultation in Spring 2022.

Conducting various industry events whilst undertaking consulting with FTI on the case for change in wholesale market pricing, ESO showed a willingness to tackle controversial issues and recommend truly transformative change to the energy system. Arguably, when ESO came out in favour of locational marginal pricing in 2022, it may have been too soon, since they did not yet have the strategic advice function envisaged by the Energy Act. Even when the ADE disagreed with ESO on certain proposals we could appreciate the approach they were taking and that decisions were being driven by something other than maintaining the status quo.

Undoubtedly, ESO have had a significant impact on Government’s thinking over the course of REMA and indeed they were tasked with leading exploration of different dispatch mechanisms which raised concerns given their less than exemplary record for transparency on dispatch in the past. Thus, their work on REMA must be viewed in the round.

If NESO advances in the spirit of ESO’s REMA team, this is promising. However, if strategic advice is being offered to Government and the regulator as objective truth from the more traditional aspects of ESO where anything that “looks” and “behaves” like gas generation is good and non-dedicated demand side assets are untrustworthy, this is a dangerous future for both consumers and whole-system outcomes. Indeed, ESO’s recommendations for

transformational market change within REMA would hardly be an easy feat for them to implement as NESO. Unfortunately, given the current state of affairs and for the foreseeable future, any advice that resembles NESO trying to make life easier for itself should be treated with scepticism. Reaching Clean Power by 2030 will not, and should not, be easy.

Strategic planning critical for understanding industrial and commercial energy

In August 2023, the Electricity Networks Commissioner (ENC) recommended the Strategic Spatial Energy Plan (SSEP), the Centralised Strategic Network Plan (CSNP) and the Regional Energy Strategic Plan. The SSEP will operate at a national level, defining the optimal mix and locations for generation, and is the first stage of CSNP. CSNP will also be a national plan for future transmission network infrastructure. Lastly, RESPs set out to achieve similar objectives to both SSEP and CSNP, but at the distribution level. The key objectives for RESPs are to: support coordinated development of the distribution system and enable long term investment ahead of need.

Since energy demand is almost totally connected at the distribution level, we will focus here on the RESPs. Currently under consultation, RESPs will have 3 building blocks: modelling supply and demand, identifying system need, and technical coordination. Each RESP will have a Strategic Board, appointed by NESO, made up of local and devolved government, network company representatives, and wider cross-sector actors. Ofgem proposes 11 regions across GB.

The short-term RESP pathway (plans for the next 5-10 years) is ambitious and urgent enough to move towards Clean Power by 2030. Ofgem explicitly calls on NESO to keep demand flexibility in mind when modelling supply and demand, identifying system need and collecting network data. It's also positive to see heat network zoning data clearly included in the data inputs that NESO will need to consider when developing RESPs.

However, NESO's ability to execute such bold plans, at both the transmission and distribution levels must be considered. For example, in the RESPs, even though Strategic Boards will give recommendations, NESO will have final decision-making power and does not have to provide reasons for any divergence from the Board's recommendation. Given NESO's historical issues with transparency and accountability to stakeholders, this raises concerns. Furthermore, there are currently no proposed benchmarks on who can serve on the Strategic Boards and for how long (aside from a general guideline to include local government, network company representatives and others).

More generally, there is a lot of emphasis on NESO using new technologies and pushing innovation within RESPs (eg creating spatial views of demand and generation). Given NESO's history of resisting new technologies, it is not clear how this will play out. Perhaps most concerning, the framework does not discuss the 6 designated industrial clusters at all. As RESPs are beginning their work by investigating industrial demand, it is not clear that NESO has a strong understanding of the needs of dispersed sites. With roughly half of industrial emissions outside of hydrogen and CCUS clusters, we must give equal support to solutions that work to accelerate local industrial and commercial transitions, especially where electrification is not technically possible and/or financially feasible. Thus, RESPs, along with the SSEP and CSNP, could develop a detrimental hyperfocus on clusters, if they pay any real

attention to industrial energy demand at all. While the final decision on RESPs and the other national plans are yet to be seen, there are causes for concern.

Connections reform risk whole-system transformation

The state of connections in the UK has garnered international attention as “one of the longest queues in Europe”. This bottleneck poses a substantial barrier for commercial and industrial sites trying to decarbonise and electrify since increasing their connection capacity can entail timelines of well over a decade. Since we’re in the midst of an energy revolution, necessary network buildout has not been able to keep pace with the capacity seeking to join the system. The queue to connect to either the Transmission or Distribution grid now stands at 725GW. Today, there is 116GW of installed electricity supply capacity and the Future Energy Scenarios model this could rise to 386GW by 2050, nowhere close to what the current queue would have us believe.

As with so many other vital yet challenging net-zero initiatives, NESO will largely be responsible for implementing the well-reasoned Connections Action Plan (CAP). NESO are presently focused on 3 core areas: the conditions for getting clearance to progress within the queue; improving forecasting and modelling of system needs and the queue; and how special dispensation may be made for certain queued projects eg where seabed leasing timelines necessitate accelerating connection time for offshore wind. The CAP and other recommendations are much needed, but they are immense, and NESO has made some progress.

Even so, it appears through stakeholder engagement that accelerated connection of generation assets remains the priority with commercial and industrial sites wishing to increase their capacity either at the distribution or transmission level left largely in the dark. Thus, rather than encouraging

Case Study 3

Formed in 2006, EirGrid is owned by the Government and responsible for the operation of Ireland’s electricity transmission system. The Minister for the Environment, Climate and Communications appoints its Board of Directors and it is regulated by the Commission for Regulation of Utilities (CRU). EirGrid is governed and held to account through a variety of mechanisms including performance reporting, expenditure review and the right of the Minister to remove Board members. It is a strikingly similar governance regime to that proposed for NESO.

Despite running a ‘central dispatch’ system whereby the system operator has greater control of what assets are permitted to use more/less electricity in return for payment, EirGrid has faced persistent criticism of their ability/willingness to use demand side flexibility in system operation. As GB seeks to reform planning policy to allow for more data centres to be built, Ireland remains the EU headquarters for various global tech companies and thus data centres comprised 14% of national electricity demand in 2022. Although data centres could provide a significant volume of flexibility to the grid, EirGrid has failed to allow market mechanisms to treat them as a buttress to the system, rather than a burden. Just one example among many, a code modification that aimed to allow data centres to provide ancillary services on a level playing field with front-of-the-meter resources, though approved by the code panel, has been opposed and delayed by EirGrid.

Drawing significant parallels with the soon-to-be NESO, it is critical to recognise that a regulatory regime based predominantly on reputational incentives can very easily produce adverse outcomes.

energy intensive sectors to electrify, the connections queue is disincentivising electrification. We are currently working on approaches to electrifying dispersed industrial sites which represent approximately 50% of industrial demand.

Shortfalls in expertise across heat, industry and demand hinders system modelling

An important example of ESO's ability to consider whole system impacts, to date, can be found in the Future Energy Scenario (FES) reports. To date, the FES has rightly been lauded as one of the most impressive areas of ESO's portfolio. Equally, NESO will coordinate system design and planning across the whole energy system and it is therefore crucial that they address the shortfalls in their expertise across major vectors including heat and industry in order to both adequately prepare for future demand on the system and avoid significant overspending on unnecessary infrastructure.

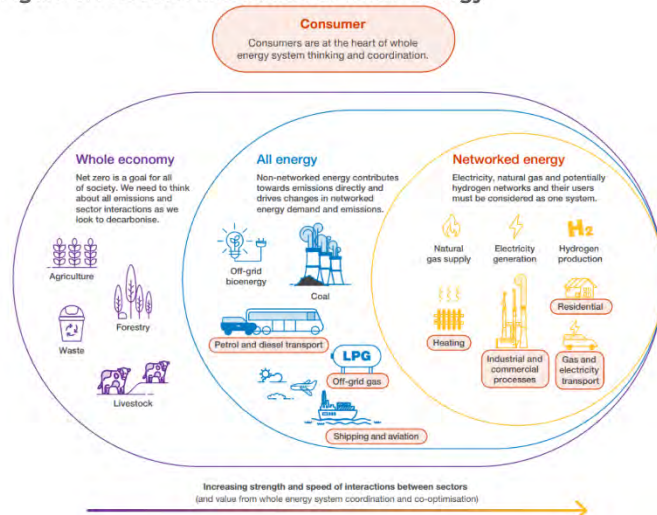
ESO's lack of experience in these areas can be clearly seen in the 2024 FES where two of the three modelled pathways to decarbonisation rely heavily on hydrogen production, including for domestic heating. It is likely valued by NESO due to its ability to act, both in production and in use, like large, traditional system assets. In contrast, the pathways give relatively little prominence to other forms of flexibility and proven technologies such as heat networks or thermal storage. These technologies could reduce overall demand, system cost, and provide much-needed flexibility. The main report lacks detail on what level of district heating coverage is expected in addition to the importance of heat networks in reducing emissions resulting from space and water heating. The supplementary workbook, however, anticipates that all net zero pathways anticipate a significant increase in district heat connections, from just over 600,000 in 2023, up to over 7,000,000 in 2050.

Ofgem outlined in 2023 the expected steps for NESO to reflect its new roles within FES. While the 2024 FES does adopt some of these requirements, reflecting 2050 timelines and changing from scenarios to pathways, in other ways it fails to reflect Ofgem decisions. For example, in their decision, Ofgem expects "pathways to be specific about the type, timing, location, and scale of investment needed, rather than illustrate possible changes in consumer or generation developments that could lead to net zero being achieved" and that "this change is important to provide more certainty for investment and planning, across industry and the supply chain."

Instead, the 2024 FES report makes a number of statements about heat pumps, assuming massive uptake and changes in consumer behaviour but providing no real plan or investment figures needed to achieve this.

The 2024 report also illustrates NESO's difficulty integrating consumers into the system. As per Ofgem recommendations, it was split into three pathways: *Reducing GB Emissions*, *The Energy Consumer*, and *The*

Figure 6: FES 2024 illustration of whole energy



Energy System. While *The Energy Consumer* section mentions the importance of domestic, commercial, and industrial demand side flexibility and thermal storage, these key solutions are underrepresented or absent in key parts of *The Energy System* section. The graphic NESO designed to represent the energy system clearly demonstrates this, see Figure 6. While claiming that the “consumer is at the heart” of everything, the small bubble representing energy demand is outside of the system. The inability to consider, plan for, and include consumer behaviour, allowing for greater incorporation of demand side flexibility will cost the system, and therefore the consumer dearly.

Key Points

The capability to achieve whole-system impacts must be considered against how ESO conducts its overarching responsibilities including digitalisation, market facilitation, forecasts for market reform, and system planning. Doubts over ESO’s ability to deliver critical digitalisation projects is foundational to the formation of NESO and publicly ignoring the findings of an independent audit that raised concerns over £513m of investment hardly instils faith. Likewise, losing the role of market facilitator largely on the grounds of transparency, accountability, and trust should necessitate greater investigation. Therefore, far more emphasis is needed on these functions moving forward. Similarly, while whole system planning and cross-vector considerations are new to the organisation, both the connections queue and the 2024 Future Energy Scenarios (FES) should indicate to all that far more work is needed to establish these capabilities, especially with regard to regional energy strategic planning. Valuing whole-system impacts, across heat, electricity, and gas, is not an amorphous concept unrelated to the functions of the ESO to date, it is critical to achieving truly clean energy as opposed to simply reaching clean electricity.

Facilitating innovation

Ofgem’s CEO stated in 2022 that NESO would ensure we “build a smart, efficient and flexible system” with Government noting that NESO would be “seeking to increase competition and innovation” within our energy system. Indeed, in the past number of years, ESO has undertaken numerous innovation projects to enable demand side flexibility and launched the Demand Flexibility Service (DFS) which projected flexibility into the mainstream and inspired sector-wide innovation.

Equally, ESO has often fallen victim to the perennial problem of innovation projects whereby success does not guarantee a route to market. Indeed, as seen above with Power Responsive’s 300MW derogation for small assets in the BM, such an endeavour is futile if those assets are never actually dispatched. While ESO have an impressive innovation strategy, they also need to set out a clear and expeditious path to ensure that successful innovation projects have a clear route to market implementation, including the removal of obstructive ESO market rules in the process.

Demand Flexibility Service (DFS) opens the door for consumer assets

The Demand Flexibility Service (DFS) was developed in the midst of the 2022 energy crisis to pay customers for support in maintaining security of supply on the grid. Mandating urgency, the crisis forced ESO and industry to intensely collaborate to devise a service that would enable UK homes and businesses to shield the electricity grid from the worst potentialities of

gas shortages. In a few short months, a service was delivered that would go on to provide enough electricity to power 10 million households. It was a shining example of what could be achieved when the appropriate level of emphasis and value was placed on demand side flexibility.

In the two years since, however, enhanced designs for the service have fallen into the same patterns addressed above regarding delayed industry engagement and lack of evidenced reasoning behind key decisions. Due to industry consultations taking place very close to when the service aims to begin in the Autumn, the timeline to get industry feedback implemented is limited. Even so, the accessibility for consumers to begin participating in flexibility has been invaluable to the progress of the sector.

Launching the DFS demonstrated innovative thinking at a time of national crisis and we have continually applauded ESO for this. While endemic institutional issues have persisted, DFS should largely be considered a success across the statutory duties for the future NESO.

Crowdflex innovation project gains new insights into potential of domestic flexibility

ESO have also led on the Crowdflex project, involving multiple suppliers, research organisations and Distribution Network Operators (DNOs) to uncover what incentivises consumer participation in demand flexibility. Work using historical data to understand how being registered to a time-of-use tariff impacted consumer behaviour, finding that evening peak demand could be reduced by 23%. The project is now in its beta phase, funded by Ofgem's Strategic Innovation Fund (SIF), where trials are being conducted to see how consumers respond to being paid in the following different ways:

- Availability payments: Where customers receive a fixed sum to make their assets available at all times, should the ESO need them to help balance the system.
- Utilisation payments: Where customers are paid for actually changing their energy demand in response to a signal from ESO.

Aiming to not only establish what is most likely to make consumers participate in energy flexibility services, Crowdflex looks to establish patterns in consumption and the capacity of consumers to be flexible. While Crowdflex continually updates on its progress, final results are expected in December 2025.

As above, this project demonstrates exactly the kinds of thinking that must be prevalent across NESO. Understanding the future of domestic demand side flexibility is necessary for system operators across transmission and distribution networks, reflecting NESO's duties to have regard to whole-system outcomes, consumer impacts and, not least, facilitating innovation. Such leadership is incredibly encouraging and should NESO develop in this manner, a promising indication for the future.

Constraints Collaboration Project trials new form of engagement

The Constraints Collaboration Project (CCP) has focussed on finding solutions to mitigate thermal constraints, particularly between England and Scotland, an issue predicted to cost between £500mn and £3bn annually by 2030.

Building upon the work of the Local Constraint Market (LCM), discussed above, the project has aimed to find a shorter-term solution, reaching out to industry participants for potential

solutions to solve this issue in reducing redispatch and curtailment of generation assets. Acknowledging that longer-term market reform through REMA, discussed above, the CCP demonstrates the right balance between long- and short-term planning.

Furthermore, the project fully utilised industry collaboration in a way that should be welcomed across the organisation. ESO reached out to industry to come forward with solutions, facilitating frequent workshops and engaging across the industry to identify the most appropriate solutions. Although the final outcomes remain to be seen, we commend ESO for the process and governance of this project. Unlike some of the examples above, rather than devising a problem statement, developing a solution in-house, and then coming to industry for feedback, at which point there is necessarily a level of commitment to that solution, ESO included industry at the point of the problem statement.

From the perspective of transparency and accountability, such an approach demonstrates a capacity to proceed from a different direction, to attempt include the ultimate users of a service within the design of that service, and to facilitate innovative approaches to system operation at a fundamental level.

Key Points

ESO has repeatedly demonstrated a capacity for innovative thinking and approaches to system operation and planning. Perhaps unsurprisingly given the foregoing, when ESO is tasked with taking a future-facing approach that considers not just what is needed right now but what will be needed over the coming years, strong results can be achieved. When attempting to translate these successes into business-as-usual arrangements, however, the same issues of agility and anachronistic systems emerge. Likewise, at times, it is not clear how much of a mandate from Ofgem ESO has to bring innovative solutions into the mainstream, even if it raises costs in the short-term. New statutory duties give equal weight to both current and future concerns and so too must Ofgem and NESO in their approach to facilitating innovation.

4 What conclusions can be drawn?

“ —
It is evident that certain core issues are prevalent and consistent, speaking to a pattern of cultural and institutional inefficiencies rather than mere coincidences.
— ”

Comparing ESO’s performance with their statutory functions and the duties discussed above, a rather stark image emerges:

Statutory Functions Statutory Duties	System Operation	Strategic Planning	Advice to Government and Regulator
Facilitating Competition	New ancillary services are dominated by batteries and gas generation, undermining market depth.	Over-focus on assets that “look” and “behave” like traditional gas generation threatens competition and future system needs.	Given the foregoing, NESO cannot provide rounded advice on facilitating competition.
Consumer Impacts	BM improvements through metering and skip rates deprioritise small volume assets and do not incentivise trust in the sector.	Given ESO’s struggles to create a BM that incorporates energy demand, their broader ability for planning and consumer impacts must be questioned.	Without a more sophisticated understanding of the needs of energy demand, reliable advice on consumer impacts will be limited.
Whole-system Impacts	Significant concerns over both ESO’s approach to and ability to deliver large IT projects raises significant concerns.	Early steps in SSEP, CSNP, and RESPs show promise but over focus on hydrogen in the most recent FES reflects traditional thinking.	Without a more sophisticated understanding of the needs of energy demand, reliable advice on consumer impacts will be limited.
Facilitating Innovation	Crowdflex and DFS led to breakthrough understanding of flexibility.	Work undertaken on the CCP and REMA demonstrate an ability to take a future-facing approach to planning.	From the foregoing, NESO can think innovatively and therefore advise on the same.

From the foregoing, it is abundantly clear that significant work must be undertaken by all stakeholders to ensure that NESO drives Clean Power by 2030. It is also evident that certain core issues are prevalent throughout the above examples, speaking to a pattern of cultural and institutional inefficiencies rather than mere coincidences.

Three overarching conclusions can be made:

1) Not enough work has been done to distinguish what ESO **has been** and what NESO **needs to be**.

- Roles and responsibilities have continually been added to the as-yet non-existent NESO without enough reflection on the enormous changes needed within the company it is being formed from.
- There is ample evidence that, even in the years since it was named as the future NESO, the day-to-day functioning of ESO has not changed to rise to the occasion.
- Ofgem and Government have both underestimated the scale of industry concerns with ESO performance and therefore failed to incorporate stronger safeguards in the SPS and licence.
- Thus, nothing has been done to address who bears the burden of proof for decisions made by the NESO. When there is one gatekeeper to the marketplace, the burden of proof is not upon those seeking access to prove “why” but upon the gatekeeper to prove “why not?”.

2) Transparency is not synonymous with accountability.

- As acknowledged above, ESO have made some strides towards greater transparency.
- However, transparency is a means to an end, not an end in itself. Without consequent accountability, transparency is a mere reminder of the failures industry has been flagging for years.
- Some teams within ESO excel at publishing forward-looking work that declare the right objectives for a future defined by demand flexibility. However, the reality of market design, development and rules undermine and contradict this vision on a regular basis. At times, therefore, it is difficult to know which side of the ESO to believe.

“—
Transparency is a means to an end, not an end in itself. Without consequent accountability, transparency is a mere reminder of the failures industry has been flagging for years.
—”

3) Clean Power by 2030 is not achievable without a NESO that is radically different to ESO.

- The standard timelines for making changes within ESO is incompatible with net zero and incompatible with Clean Power by 2030.
- Arbitrary decisions and designs taken without stakeholder engagement ultimately slow down processes and lead to inefficient outcomes when ESO must backtrack and discard previous work.
- Previous notions that ESO could simply naturally evolve for the first few years of NESO poses a distinct threat to Clean Power by 2030. Substantial changes to this approach are needed now to avoid a business-as-usual attitude.

5 How do we move forward?

“—
Explaining shortfalls, embracing challenges, and executing change is imperative for our system operator to reach Clean Power by 2030.
—”

On behalf of Empowering Energy Demand, the ADE and its members are ready to collaborate with Parliament, Government, Ofgem, and NESO to move expeditiously towards a future where UK homes, businesses, and industry are rewarded for the critical support they can provide the energy system.

From the foregoing, we recommend the following:

Responsible Party	Recommendation
PARLIAMENT	An inquiry into the priorities and needs of the NESO transition is launched by the Parliamentary Select Committee for Energy Security and Net Zero.
GOVERNMENT	When formally designating NESO, Government makes explicit the areas in need of urgent change in order to reach Clean Power by 2030 The Strategy and Policy Statement is amended to: • Recognise the significant cultural reformation needed within NESO for it to be an asset in reaching Clean Power by 2030; • Emphasise that given its unique position in the energy system, NESO carries a strong burden of proof for its decisions; • Highlight the priority role that demand side participation must play in system transformation and NESO's role in promoting it; and • Clarify the role that NESO advice will play in Government decision-making.
OFGEM	Multiple amendments are made to the ESO licence to reflect the additionality it is supposed to provide to the legislation and the clearer expectations that are needed when reputational incentives are the core regulatory lever: • Burden of proof: ◦ Set out that decisions that appear discriminatory are presumptively invalid. Therefore, NESO has a burden of proof to rebut this presumption, rather than requiring stakeholders to prove why decisions are wrong.

OFGEM

- Set out that decisions that appear discriminatory are presumptively invalid. Therefore, NESO has a burden of proof to rebut this presumption, rather than requiring stakeholders to prove why decisions are wrong.
- To do so, it would be standard practice for NESO to demonstrate proportionality testing, to prove:
 - There is a legitimate purpose underpinning the measure;
 - The measure would achieve that legitimate purpose; and
 - The measure is reasonable and necessary to achieve the purpose; there is no less onerous or restrictive way to go about achieving the purpose.
- Basic principles of necessity and reasonableness would be set out in advance in the Regulatory Instructions and Guidance (RIGs) where it is made clear that control room incapacilities, as opposed to system or energy needs, are not a justifiable reason for discriminatory treatment of assets in the design, procurement or decision-making on balancing services.
- Ethical Walls:
 - Since NESO represents a significant consolidation of power within one organisation, the licences must make provision for the separation of powers within NESO.
 - Licences clarify that where a team within NESO is directly benefitting from a function eg market design/strategic planning/providing advice, that team is not designing that function.
 - Building Ethical Walls between teams within NESO that may incur actual or perceived conflicts of interest with one another is imperative to establish public trust within an organisation that so clearly could fall into mission creep.
- Under Condition C9 - 'Procurement and use of Balancing Services':
 - Add 'Design' of balancing services rather than just 'Procurement and use'.
 - Explicitly prohibit any design, procurement, or use of balancing services that disproportionately discriminates against certain technology types based on technical differences such as volume or being a single or aggregated portfolio. This should ensure that lack of familiarity or trust in certain technology types does not impact design, procurement, or use within markets.
- Public forums:
 - While ESO have made efforts of varying success to increase transparency, Ofgem has an obvious role to play in connecting transparency to accountability.
 - The status quo - bilateral meetings and ad hoc workshops where both ESO and Ofgem are present - is no longer sufficient given the scale of the challenge to reach Clean Power by 2030.

OFGEM	Therefore, licences should mandate that on a quarterly basis Ofgem runs public forums where senior Ofgem and NESO officials present on public concerns and the work being undertaken to address them including proportionality analysis (above), with the chance for questions and answers.
NESO	NESO embraces and supports the above recommendations, including publicly acknowledging the need for massive cultural transformation and the concrete steps being taken to implement it. The Power Responsive programme is reformed to: - Have a stronger organisational mandate (including a name change) whereby recommendations are considered presumptively valid and to be employed expeditiously, not subject to the purview of control room; - Create more direct links to licence obligations, such as those considered above, thereby ensuring equal incentives and weight to their work; - Incorporate within its remit reform of all NESO balancing markets in coordination with the Market Facilitator; - Establish Councils similar to the Markets Advisory Council (MAC) whereby Power Responsive and other Senior NESO representatives meet with different types of energy users to better understand their needs and capabilities. Initially, such groups could represent: - Industrial energy users with high/variable load factors; - Commercial energy users with high persistent load factors; - Domestic energy user representatives with high variable aggregated load factors; and - Dedicated flexibility providers who already have strong representation within the Power Responsive Steering Group and may have crossover with any of the above groups. - Ensure the programme is adequately resourced to fulfil the above. Regional Energy Strategic Planners (RESPs) are established so that: - Energy demand utilisation is at the heart of their remit and outlook. - Industrial decarbonisation through a variety of pathways is well-understood and modelled. - Heat network zoning and other large heat infrastructure projects are properly reflected within plans, including the flexibility they can provide. Whole-system modelling ensures that energy demand is better represented in FES, including as the presumptive flexibility solution before first-of-a-kind technologies such as hydrogen.

About Us

Empowering Energy Demand hopes that this report has set out the roadmap for expeditious reform, the steps taken to date, and the next steps for realising this shared vision.

The Association for Decentralised Energy (ADE) is the UK's leading decentralised energy advocate, focused on creating a more cost effective, low-carbon and user-led energy system. Our Mission, Empowering Energy Demand, involves embracing the value of a decarbonised, demand-led energy system, creating a future where households, businesses and industry are properly rewarded. The current electricity system is creaking under the demands of a rapidly changing system. We must harness the millions of electric vehicles (EVs), heat pumps and the immense industrial demand we have right now to lower bills and keep our electricity system operable. Instead, we're not utilising their potential. Even more than that, heat and industrial energy are decarbonising with long-term effects on the energy system – creating new infrastructure and unlocking even greater sources of flexibility. The Government, Ofgem, the Climate Change Committee and others all recognise that households, businesses and industry should play an active role in a decarbonised electricity system. Now is the time to make this a reality.

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