

## Written evidence submitted by Ofgem (GRI0106)

### Introduction

1. As the energy regulator, Ofgem has a pivotal role in paving the way for the energy sector to decarbonise, ensuring that happens at the lowest cost to consumers. Our principal and most fundamental objective will always be to protect the interests of both current and future consumers.
2. Ofgem has welcomed the Government's intention to give the regulator a statutory duty to support the Government in meeting its legal obligation to reach net zero by 2050. This new mandate directly links consumers' interests to specific net zero targets for the first time.
3. Reaching the net zero targets for 2035, a net zero clean power system, and 2050, a net zero economy, will require building huge amounts of new infrastructure while keeping the costs of the net zero transition as low as possible for consumers.
4. To ensure the system can become truly smart and flexible, better coordination of generation and network investment through more effective system planning is essential, along with the acceleration of infrastructure build-out and faster connections to the grid.
5. Ofgem is working at pace and closely coordinating with Government to bring forward the Future System Operator, Centralised Strategic Network Plan (CSNP), explore Regional System Planners (RSPs) and ensuring the frameworks for future systems and network regulation (FSNR) are adaptable and enable a transformation of the energy system in the coming future. Ofgem is holistically reviewing this set of proposals in order to ensure that consumers reap the benefits of flexibility to reduce peak demand and the UK has an effective system in place that can provide affordable, green, homegrown power to homes and businesses at the lowest possible cost to consumers.
6. Department for Energy Security and Net Zero modelling suggests that net zero could increase electricity network costs by £40-110bn (PV 2021-2050, 2020 prices) compared to a baseline of £230-240bn. This means total electricity network costs could be £270-350bn under the net zero scenarios.
7. It is important to note, however, that this analysis considers the impact of net zero on electricity networks only, so it does not capture savings in other parts of the energy system, such as reduced gas heating and petrol/diesel costs which will result from electrification of other sectors. The estimated increase in network costs reflects an increase in electricity demand rather than an increase in unit costs.

### **Does the current national and DNO grid deliver the capacity needed for the future and, if not, what are the solutions?**

8. The transition to net zero creates challenges for networks which require adaptation and investment. The electrification of industry, heat and transport is expected to significantly increase demand while generation becomes increasingly decentralised and weather dependent as more renewables are brought onto the system.
9. Networks are already planning for and investing in this future with the support of Ofgem, for example through the Accelerating Onshore Electricity Transmission<sup>1</sup> framework (ASTI), which initially applies to around £20bn of investment. Ofgem will robustly examine the

---

<sup>1</sup> [Decision on accelerating onshore electricity transmission investment | Ofgem](#)

performance of networks in delivering new infrastructure and will intervene where necessary.

10. To get the best out of our energy system we need to ensure the national and local arrangements for system planning and operation work together to optimise the system as a whole, including both national and more local solutions. Ofgem is reforming distribution system operation governance arrangements to ensure they are fit for purpose for the future system and work effectively alongside the Future System Operator (FSO). This includes recent consultation on proposals for new regional system planners (RSPs), which would liaise cross-vector and nationally to facilitate a whole system approach, developing regional strategic plans that enable national, regional and local ambitions and priorities. To do this they must coordinate, facilitate and ensure effective participation across actors from the national to the local level, making sure a place-based understanding is central to how the regional energy system is planned.<sup>2</sup>
11. At the transmission level, the Electricity System Operator (ESO) is developing a Centralised Strategic Network Plan<sup>3</sup> (CSNP) to identify the network upgrades needed to meet 2035 and 2050 targets for decarbonisation.
12. Ensuring that these generation assets can connect when and where they are needed will be crucial in achieving net zero, as well as in delivering affordability for consumers and maintaining security of supply. Currently, developers looking to connect renewable energy projects to the electricity grid are facing waits of more than 15 years, threatening the UK's net-zero ambitions. In recent years, the time it takes for developers to connect renewable energy projects to the national grid has increased. Britain currently has a connection queue based on a first-come, first-served approach which means that stalled, unviable and often highly speculative projects are blocking ready-to-go solar, wind and other renewable schemes.
13. Ofgem has pledged significant and urgent reform within two years to speed up low carbon energy and new demand connection to the electricity grid, in a policy review launched on 16 May.<sup>4</sup>
14. Ofgem supports ESO's five-point plan<sup>5</sup> and the Energy Networks Association industry programmes, aiming to manage constraints and clear the connections backlog, as well as ESO's longer-term connections reform consultation<sup>6</sup>. As part of Ofgem's work plan, the regulator will monitor the performance of these short-term initiatives, ensuring that they are delivering against commitments, and intervening if they are not. Ofgem will also be using its own connections reform work plan to build upon ESO's consultation, complementing existing work rather than duplicating it.
15. In view of the scale of the challenge, Ofgem will consider whether substantial changes to the current connections queue methodology are required and how changes are applied to both new applicants and those parties already in the queue with a connection agreement. Ofgem

---

<sup>2</sup> [Consultation: Future of local energy institutions and governance | Ofgem](#)

<sup>3</sup> [ETYS and our future Network Planning Process | ESO \(nationalgrideso.com\)](#)

<sup>4</sup> [Ofgem launches policy review on reforming the electricity connections system | Ofgem](#)

<sup>5</sup> [ESO leads the way with major initiative to accelerate connections to the electricity transmission grid | ESO \(nationalgrideso.com\)](#)

<sup>6</sup> [Connections Reform consultation now open | ESO \(nationalgrideso.com\)](#)

will consider whether access to the system needs further control, and the different ways that this could be done, looking across both generation and demand. Ofgem will also consider how to prioritise to make best use of the available capacity, including the potential roles for connectees in making those trade-offs, and ensure those that are ready to connect can do so more quickly.

16. As part of Ofgem's work plan, and as signalled in the government's Powering Up Britain report, a connections action plan will be published later this summer. Ofgem is working closely with government to jointly progress the plan, considering this in the wider context of our own reform package.

**Has the organisation of the National Grid proved a barrier to the installation of renewable energy sources, and if so what could be done to remedy this?**

17. Ofgem recognises that the past and current pace of infrastructure development has not been sufficient to meet the government's 2035 and 2050 net zero targets. Given the scale and range of factors affecting the future development of our gas and electricity networks, Ofgem is exploring the most appropriate regulatory framework for the challenges and opportunities that lie ahead.
18. The current 'RIIO' framework, which sets the price controls and determines the investment into GB gas and electricity networks, is in place until 2026. However, to achieve the government's ambitious goals of a net zero power system by 2035, and net zero target of 2050, we need to plan ahead, stepping up efforts to radically restructure our energy networks at pace. Ofgem consulted earlier this year on the overarching framework design for the network price controls from 2026 onwards<sup>7</sup>.
19. In the review of GB energy system operation published in January 2021<sup>8</sup>, Ofgem recommended to Government that the system operators are given additional responsibilities and that the system operator for the electricity is made fully independent from the transmission network owner. In April 2022, Ofgem and Government published a joint decision<sup>9</sup> setting out our collective commitment to proceed with the creation of the FSO, as an expert, impartial body with an important duty to facilitate net zero while maintaining a resilient and affordable system.
20. As a trusted and expert body at the centre of the gas and electricity systems, the FSO will play an important role in coordinating and ensuring strategic planning across the sector. It will have an ambitious long-term vision and provide independent advice to government and Ofgem. Further, the FSO will adopt a 'whole system' approach within the energy system through responsibilities in operating, strategic network planning, long-term forecasting, and market strategy. Through these roles, the FSO will drive progress towards net zero while maintaining energy security and minimising costs for consumers.

**Should there be more innovation and devolution in the development of the Grid?**

---

<sup>7</sup> [Consultation on frameworks for future systems and network regulation: enabling an energy system for the future | Ofgem](#)

<sup>8</sup> [Review of GB energy system operation | Ofgem](#)

<sup>9</sup> [Proposals for a Future System Operator role - GOV.UK \(www.gov.uk\)](#)

21. A diverse set of on-demand technologies, using a broader definition than simply generation, including flexibility, storage and interconnection to other countries, is likely to deliver greater system resilience and increased security of supply.
22. While on-demand generation technologies will have an important role, increasing focus should be on a range of less conventional technologies to balance supply and demand, in particular demand side response (DSR). Smart digital assets can help keep the GB electricity system balanced and help demand better follow renewable and low carbon supply. This can have further benefits in terms of minimising additional network costs, as well as reducing the need for on-demand generation technologies which may be costly and have low rates of usage.
23. DSR already participates in multiple markets, and the ESO-led Demand Flexibility Service demonstrated its potential through last winter. Ofgem recently published a Call for Input on the Future of Distributed Flexibility<sup>10</sup>, considering how to unlock the value of distributed flexibility at scale across multiple markets. Uptake of consumer energy assets such as electric vehicles is increasing rapidly, and it is important that the ability to harness the potential of these assets keeps pace.
24. Flexibility could deliver savings of £3.2 to 4.7bn per year by 2030 compared to the use of thermal generation: 25-60% through reduced low carbon generation investment; 25-40% through cheaper reserve services; and 10-20% through reduced distribution network reinforcement<sup>11</sup>; and up to £10bn/year in system cost reduction in 2050.<sup>12</sup> Modelling by the Carbon Trust and Imperial College London showed that deploying demand side flexibility, could save around £5bn per annum in 2050.<sup>13</sup>
25. Between now and 2028, Ofgem is requiring Distribution Network Operators (DNOs) to invest heavily in a combination of direct monitoring of the low voltage networks, and modelling tools to assess the state of the networks. Using these techniques, the sector can develop a better understanding of the needs of the grid and therefore develop innovative products and solutions to alleviate network constraints and support the rollout of low carbon assets.
26. Improved data and digital infrastructure is needed to underpin on-demand technologies. Digital infrastructure is a new innovative form of infrastructure required to complement more traditional infrastructure such as generation technology and wires. Ofgem recently launched a consultation on updates to Data Best Practice Guidance and Digitalisation Strategy and Action Plan Guidance<sup>14</sup>, to further open up energy system data where appropriate and drive digitalisation activities. Ofgem's Call for Input on the Future of Distributed Flexibility also sought views on what digital infrastructure is needed to unlock the full value of distributed flexibility.

**What changes should be made to the planning system to enable it to increase the use of renewable energy? Is our planning system able to deliver more rapid development of new local infrastructure?**

---

<sup>10</sup> [Call for Input: The Future of Distributed Flexibility | Ofgem](#)

<sup>11</sup> Roadmap For Flexibility Services to 2030; Poyry and Imperial College London; [ROADMAP FOR FLEXIBILITY SERVICES TO 2030 \(theccc.org.uk\)](#)

<sup>12</sup> 2012 prices; Smart Systems and Flexibility Plan 2021, Electricity System Flexibility Modelling Annex; UK GOV; [Smart systems and flexibility plan 2021: Appendix I - Electricity system flexibility modelling \(publishing.service.gov.uk\)](#)

<sup>13</sup> Page 106 of Flexibility in Great Britain 2021; Carbon Trust and Imperial College London; [Key findings - Flexibility in Great Britain - The Carbon Trust](#)

<sup>14</sup> [Consultation on updates to Data Best Practice Guidance and Digitalisation Strategy and Action Plan Guidance | Ofgem](#)

27. Bold reforms are needed to accelerate the delivery of electricity transmission infrastructure needed to end the reliance on fossil fuels for power by 2035.
28. Ofgem has welcomed the ambitious, highly detailed programme to remove barriers to planning and delivering transmission network infrastructure and connecting renewable energy generation set out by Electricity Networks Commissioner Nick Winser<sup>15</sup>.
29. The report builds on Ofgem's work to establish strategic national and regional planning; unlock and accelerate infrastructure investment; and end delays in grid connections to homes, businesses and public services. It is essential that national and local arrangements for network planning work together effectively to optimise the energy system as a whole.
30. The Regional System Planners proposed by Ofgem would be responsible for developing strategic regional energy system plans which reflect regional contexts and priorities. The RSPs will be required to coordinate and facilitate real participation of a wide range of local actors in the process, ensuring democratic accountability throughout. This includes network operators, local planning representatives and councils, town planners, developers and, vitally, the communities they serve.

**Would regional, or nodal, pricing of energy facilitate a more flexible development of Grid infrastructure?**

31. Ofgem is working closely with the Department of Energy Security and Net Zero on their Review of Electricity Market Arrangements<sup>16</sup> (REMA). REMA is designing market arrangements that will support the GB electricity market working towards their net zero goals. There is a strong case for reform, but any significant changes to the market would be complex and need careful consideration. Ofgem is working closely with the Department to build the evidence base around the full range of options considered as part of the first REMA consultation (published in June 2022).
32. The need for more accurate locational price signals was identified as a key issue within the 2022 REMA consultation, with DESNZ considering a range of options for addressing the significant locational challenge the GB energy system faces.
33. Nodal and zonal pricing would divide the national electricity network into different nodes or zones, each with their own wholesale electricity price which reflects the cost of supplying electricity at that location. This differs from the current system which has a single national wholesale price. With zonal pricing the network would be divided into seven zones each with individual wholesale prices. With nodal pricing the network would be divided into a potentially greater number of nodes, each with individual wholesale prices.
34. Ofgem's locational pricing assessment is providing the Department with high-quality analysis and systems modelling to inform decisions on whether these options should be taken forward. As part of this work, Ofgem commissioned FTI to perform modelling and analysis of the impact of a shift to both nodal and zonal pricing in the GB system in the period 2025-2040. The work investigated a range of scenarios based on National Grid ESO's Future Energy Scenarios.
35. The FTI analysis suggests a shift to locational wholesale pricing could result in significant system and consumer benefits:

---

<sup>15</sup> [Accelerating electricity transmission network deployment: Electricity Networks Commissioner's recommendations](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/114444/accelerating-electricity-transmission-network-deployment.pdf) - GOV.UK ([www.gov.uk](https://www.gov.uk))

<sup>16</sup> [Review of electricity market arrangements](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/114444/review-of-electricity-market-arrangements.pdf) - GOV.UK ([www.gov.uk](https://www.gov.uk))

- a. Socioeconomic benefits of between £6bn to £24bn and consumer benefits of between £15bn and £51bn for different scenarios.
  - b. The socioeconomic and consumer benefits of transitioning to a nodal system are roughly twice those of a zonal system.
36. While this indicates locational pricing might deliver significant consumer benefit and enable a high-renewables, high-flexibility energy system at lower cost, several design and implementation challenges could reduce or remove the benefits of this. We continue to support DESNZ in identifying and fully assessing the entire range of factors that need to inform any final decision, and alternative approaches could also deliver some of these benefits.
37. Ofgem is also considering a range of benefits and challenges beyond these modelled results to support the Department's forthcoming consultation on REMA this autumn and understand the wider implications of a change to locational marginal pricing.

### **What can be usefully learned from power transmission systems in other countries?**

38. As part of Ofgem's work to consider the future system operation model, the approaches taken by other countries was explore and considered in detail.<sup>17</sup>
39. While the Independent System Operator (ISO) model proposed for Great Britain (the Future System Operator) is well established and used in several jurisdictions around the world, there is no single dominant model. Despite a wide range of ownership and governance structures, ISOs are typically state owned (for example in Ireland and mainland Europe) or mutualised companies such as public benefit corporations (typical of ISOs in the USA). Private, for-profit models are rare.
40. International System Operator models work to create accountability through various means, including:
- a. The majority of organisations regardless of ownership model are licenced and subject to independent economic regulation with performance frameworks publicly accessible and roles and relationships defined in the regulatory framework.
  - b. Several governments have taken on shareholder responsibilities such as holding the board to account through full or partial ownership. Within GB certain organisations in other sectors are directly accountable to Ministers and Parliament in this way.
  - c. The use of membership-based arrangements or advisory committees comprised of industry representatives and consumer groups to challenge and hold the board to account.
41. To ensure the FSO is independent and is free from actual or perceived conflicts of interest, Ofgem and Government concluded that the most effective model is to establish the FSO as a public corporation, with operational independence from government<sup>18</sup>. The FSO will be licensed and regulated by Ofgem and funded by consumers through price control arrangements. As part of the price control regimes, Ofgem can implement incentive regimes for the FSO to promote high levels of operational performance, innovation, and ambition.

---

<sup>17</sup> [Review of GB energy system operation | Ofgem](#)

<sup>18</sup> [Proposals for a Future System Operator role - GOV.UK \(www.gov.uk\)](#)

*September 2023*