

ED3 Framework Consultation

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We are consulting on the framework for the next electricity distribution price control, which will begin in April 2028. We would like to hear the views of people and organisations with an interest in using and connecting to the distribution network, those with an interest in providing services and supporting the development of the network, as well as consumer groups and the distribution network operators (DNOs) themselves. We would also welcome responses from other stakeholders and the public.

This document outlines the scope, purpose and questions of the consultation and how you can get involved. Once the consultation is closed, we will consider all responses. We want to be transparent in our consultations. We will publish the non-confidential responses we receive alongside a decision on next steps on our website at [ofgem.gov.uk/consultations](https://www.ofgem.gov.uk/consultations). If you want your response – in whole or in part – to be considered confidential, please tell us in your response and explain why. Please clearly mark the parts of your response that you consider to be confidential, and if possible, put the confidential material in separate appendices to your response.

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Foreword

The next electricity distribution price control period (ED3), beginning 1 April 2028, will have a critical role in enabling the energy system transformation required to achieve the government's Clean Energy Superpower mission, which includes Clean Power by 2030 (CP2030) and accelerating to net zero by 2050. This transition will be influenced by future national and devolved government decisions in relation to energy policy, the decarbonisation of heat and choices for how to reach the UK's statutory net zero target and five-year carbon budgets. However, all pathways show increased electrification of demand and decentralised renewable generation both during the next price control period and beyond. Therefore, ensuring that electricity distribution (ED) networks have the necessary capacity is a key priority for the ED3 framework.

The development of regional energy strategic plans (RESPs), under the National Energy System Operator's (NESO) new strategic energy planning function, will ensure that local needs and future priorities feed directly into DNO network development planning. This will provide an essential building block for ED3 and enable proactive, anticipatory, place-based investment. Much of this proactive investment will be needed in the lower voltage parts of the distribution network, connecting homes and businesses across GB.

Although network investments are paid for by consumers over many decades, a step-change in the level of investment in ED3 could see an increase in the network component of energy bills. We are cognisant that this would occur at a time when many consumers continue to struggle to pay for the energy they need. This is why we must try to keep the costs of infrastructure needed for net zero as low as possible, which can be achieved through maintaining a low cost of capital and driving further efficiency through innovation, digitalisation and supply chain growth. We should also not forget the benefits that network investment is designed to create: reducing the risk of future network constraints, speeding up connections, and enabling the rapid uptake of new low carbon technologies (LCTs). This will help to ensure that consumers and communities have greater access to lower-cost, domestically-sourced renewable energy and remain at the heart of the energy system, so that bills can remain affordable for all.

The resilience of the network must also remain a priority during this period. Climate change is increasing the frequency of damaging storms, incidences of flooding and the risk of interruptions, with severe consequences for those becoming increasingly reliant on electricity for their health, heating and transport. Consumer protection and further improvements in quality of service remain vital, especially for fuel poor and other vulnerable customers.

Decisions in respect of ED3 will be taken with our duties to support net zero and economic growth at the fore. We recognise the impact that our regulation has on the wider economy, particularly on the supply chain and partner businesses that the DNOs will rely on to deliver this transformation. We will design a regulatory framework that leverages strategic planning inputs and gives greater long-term visibility of the pipeline of work. This should bolster the confidence and growth of energy sector supply chain capacity, building on the work that we have already done in the electricity transmission sector and creating more certainty and scale for those looking to grow their supply chains and invest in the UK.

The transformation that is needed over the ED3 period is unprecedented in its complexity, scale and pace and it is essential that we explore the changes that might be appropriate to make to the regulatory framework to secure the best outcomes for consumers in the short and long term. Our initial analysis suggests that some elements of the existing RIIO-ED2 framework may still be suitable, whilst others may need to evolve or adapt more substantially.

We expect more substantial change in those areas that relate to capital investment programmes, whereby under-delivery in the ED3 period could put net zero goals and economic growth at risk. This framework consultation sets out our thinking around alternative options and seeks views on possible future models.

Inevitably, securing the investment for net zero requires the support of the financial markets. A more proactive approach to network investment will likely create a step change in the amount of new capital required for this sector. We recognise that maintaining investor confidence and a low cost of finance overall will require consistent and proportionate regulation which evolves in a rational and predictable way. This means finding an appropriate balance of risk and reward in our price controls and leaning into any challenges to the financeability or investability of the DNOs.

The ED3 period, covering the transition from the end of this decade into the 2030s, will see considerable changes, opportunities and challenges for the energy sector. Managing these will only be possible if we take a more collaborative and proactive regulatory approach. We are determined to ensure that ED3 enables the clean, affordable and secure ED system that our country needs.

Akshay Kaul

Director General, Infrastructure

1. Executive summary

- 1.1 The electricity distribution (ED) network in Great Britain (GB) provides the essential infrastructure to transport electricity between the transmission network, embedded generators, storage assets, homes and businesses. The private, licenced distribution network operators (DNO) that own and operate this network are regulated by us under a price control framework which is reviewed and amended periodically through the price control process.
- 1.2 The upcoming ED3 price control period, starting 1 April 2028, will be critical in delivering the energy system transformation required to enable increased electrification of demand and the integration of more renewable generation; aligning delivery timelines with government's 'Clean Power by 2030' (CP2030) and net zero by 2050 targets¹; and having regard for sustainable economic growth in all our regulatory activities.
- 1.3 This consultation seeks input from stakeholders on various aspects of the proposed ED3 framework, including the overarching objectives, regulatory models, consumer outcomes, and specific measures to address the upcoming challenges and opportunities in the ED sector.
- 1.4 By gathering feedback, we aim to refine the framework, to ensure it effectively enables the DNOs to deliver this core part of the transition to a net zero economy, while protecting consumer interests and promoting sustainable economic growth.

Drivers for change

- 1.5 Electricity demand is expected to increase significantly during the 2030s across all net zero pathways, as electrification gathers pace, even in scenarios where hydrogen plays a more significant role. Electrification of heat and transport will drive this growth, with projections indicating a rise from 22% of final energy demand in 2023 to 39% by 2035. At the same time the energy system is becoming more decentralised, with growth in distributed energy resources (DER) providing flexible demand-side response (DSR), generation and storage in support of a more intermittent energy system.

¹ The UK is committed to reaching net zero by 2050. This means that the total GHG emissions would be equal to the emissions removed from the atmosphere, with the aim of limiting global warming and resultant climate change. All of the UK must meet net zero by 2050, in line with the target set out in legislation. In addition to the UK-wide target, Scotland has set its own and is aiming to become a net zero economy by 2045.

- 1.6 The establishment of a strategic planning role for the National Energy System Operator (NESO) and the production of RESPs, will enable coordinated energy system development across multiple vectors, including the gas sector at regional level, enabling the needs and priorities of communities to inform DNO network development plans and support a more proactive and input based approach to ED network investment through the ED3 price control.
- 1.7 Higher demand and renewable generation will significantly increase connection volumes during ED3, on both the primary (higher voltages) and secondary (low voltage) parts of the network. We continue to work with industry, Department for Energy Security and Net Zero (DESNZ), NESO and the DNOs to address problems that are materialising and will publish our end to end review of connections shortly.
- 1.8 A resilient and reliable system remains a fundamental priority for consumers. Electricity networks are increasingly at risk from extreme weather resulting from climate change and with increased demand and a greater reliance on electricity for essential services, including heating and transport, it will be critical that the DNOs are focused on resilience in the ED3 period and take a proactive, risk-based approach to future proofing their networks.

Objectives and consumer outcomes

- 1.9 This consultation is structured around four consumer outcomes, set out below. These are consistent with Ofgem’s four consumer interests: fair prices, quality and standards, low cost transition, and resilience, and support and enable our proposed overarching objective for ED3; to ensure that ED networks are ready with the necessary capacity, to meet decarbonisation goals at least cost, based on whole system value.
- 1.10 **Networks for net zero:** By 2035, nearly half of the primary network and a fifth of the secondary network could be operating at maximum capacity without additional interventions. The risks and benefits of over/under building are changing; we think that ED3 is the point at which a more proactive approach to the provision of new capacity through asset investment is necessary, looking ahead, to deliver the network that is needed for a net zero future rather than waiting for demand to materialise in the short term.
- 1.11 We explore the implications of this more proactive approach through the consultation and propose that the role of distributed flexibility is likely to change in ED3. We think that the focus during this period should be less on DNOs procuring flexibility to defer future investments, and instead proactively building

networks that allow flexibility to deliver for the markets where it can deliver the greatest value, managing system intermittency.

- 1.12 We think the RESPs will be central to this more proactive approach, providing a structured and consistent method for determining system need. Using this output from the RESPs to inform DNO network development plans, we set out how the ED3 price control should provide clearer guidance, expectations and controls to ensure that increases in network capacity are delivered. We also consider a more programmatic approach to network development, with the potential to smooth out long-term build profiles, reduce connection timescales, and manage supply chain and workforce pinch points, supporting the rapid uptake of LCTs by consumers.
- 1.13 This is the area where we think there is the greatest scope for change to the existing regulatory arrangements and the consultation explores different regulatory models to achieve this, considering the balance of key price control levers, such as totex², outputs and incentives, ex ante allowances and the role of inputs. We propose that this part of the price control should become more similar to a Plan and Deliver archetype, where regulation is the mechanism for implementing investments consistent with the longer-term strategic planning of the system.
- 1.14 **Responsible business:** We are keen to explore how we can strengthen the voice of the consumer in the setting and deliver of the ED3 price control and seek stakeholder feedback about how we might best achieve this. We think that a progressive regulatory approach, taking a long-term view and providing greater certainty to supply chain and investors will be in consumers' interest, but we want to test these principles with consumers and wider stakeholders.
- 1.15 Network companies have made significant steps forward in terms of quality of service for consumers, particularly over the RIIO-ED1 period. We are interested in maintaining and build on the gains seen to date and learning from other sectors to understand approaches that might deliver further improvements for consumers, including addressing wider social and environmental challenges. We also ask questions about building trust through greater transparency and accountability.

² Totex is defined in [RIIO-ED2 regulatory instructions and guidance | Ofgem](#), Annex A, Glossary v1.0, p.230.

- 1.16 We also consider in this section how our approach to cost assessment might evolve and how we will ensure that DNOs are financially responsible and resilient. These points are critical to ensuring value for money for consumers. Distribution charges represent about 40% of the total network charges on a typical consumer bill.
- 1.17 We expect that a more proactive approach to network investment is likely to have an impact on bills, all else being equal. However, by continually challenging the DNOs towards frontier efficiency and beyond, ensuring that innovation and digitalisation programmes are delivering for consumers and maintaining a low cost of capital, we will minimise bill increases as far as possible. We will also ensure that protections are in place through the price control for the most vulnerable customers; the ED sector has a key role to play in delivering a fair energy transition.
- 1.18 **Smarter networks:** Ambitious decarbonisation and electrification plans demand a smarter, more flexible, and digitally enabled energy system. Distribution System Operators (DSOs) have made good progress in developing decentralised flexibility markets and should build on these gains by enabling greater access and participation for demand-side response, storage, and distributed generation.
- 1.19 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. The sector is still on a digitalisation journey and whilst there have been big steps forward, data needs to be of higher quality and more accessible for system participants and connecting customers than it is today.
- 1.20 Modernizing regulatory reporting and leveraging Artificial Intelligence (AI) can further enhance planning, management, and real-time operations, despite associated risks. Innovation remains a key priority, with frameworks like the Strategic Innovation Fund (SIF) and Network Innovation Allowance (NIA) supporting disruptive technologies and business models. Ensuring that innovation is shared and deployed across networks is essential for achieving transformative impacts and we explore how policies in this area might adapt for ED3.
- 1.21 **Resilient and sustainable networks:** Effective asset stewardship is central to ensuring that networks remain resilient to increasing climate, cyber and deliverability risks. With greater electrification of GB’s critical infrastructure,

- individual consumers will be increasingly alive to the resilience of their electricity network. We explore through the consultation how Network Asset Risk Metric (NARM) might operate alongside a more programmatic and proactive approach to asset investment and whether taking a more anticipatory and longer term view of asset health could better meet future demand and generation requirements.
- 1.22 Threats from climate change are increasing with many more damaging storms putting networks at risk. We use this consultation to explore how our approach to climate resilience in the ED sector needs to evolve and how this might interact with other policy areas. This includes considering how DNO climate resilience strategies might translate into action.
- 1.23 Separately we look at the role that the ED networks have in reducing emissions from their own operations. Network losses are the most significant contributor to DNO greenhouse gas (GHG) emissions. Losses increase with asset utilisation and in this period where demand is growing, it is essential that we look more closely at the role of the regulatory framework in reducing ED losses, as part of a longer term, asset investment strategy.
- 1.24 Our approach to supporting energy networks with their vital cyber security programmes has evolved through our wider RIIO-3 price control work. We use this consultation to explore whether the approach that we are taking in other sectors, including aligning our regulation more closely to the Government’s wider Network and Information Systems Regulations (NIS Regulations), is also the right approach for ED.
- 1.25 Finally, supply chain pressures and skilled labour shortages could significantly challenge the timely delivery of new capacity. We invite stakeholder views on whether a more strategic approach to network investment, increased collaboration among network companies on traineeship programs and standardisation of professional qualifications could help to minimise delivery risk.
- 1.26 This is a vital period for the ED sector and through this consultation we explore what achieving these consumer outcomes and our core objective might mean for the ED3 framework. We want to use this consultation to seek feedback from a wide range of stakeholders, to ensure that the choices that we make over the coming months and years, deliver on our net zero and growth duties and are in the interests of consumers. We believe that a progressive ED3 regulatory framework can achieve these goals; one that drives more proactive investment,

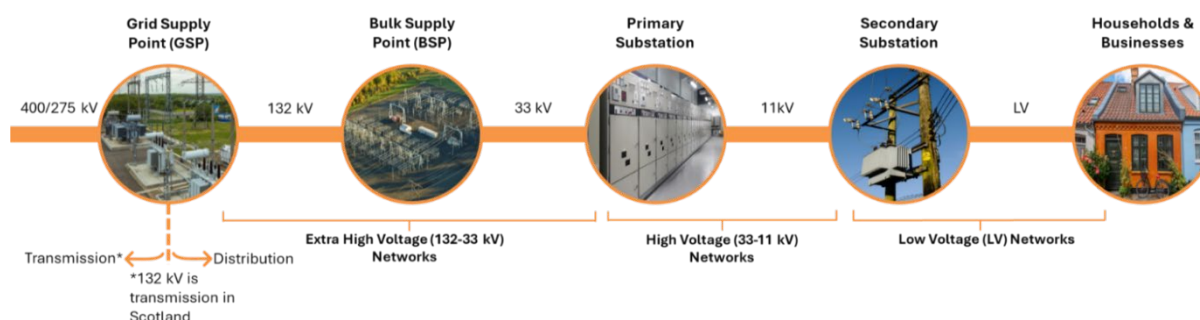
ensures that DNO are acting responsibly, is supportive of innovation and digitalisation and enables a more holistic approach to asset health and resilience.

2. Introduction

Background: Electricity Distribution and RIIO

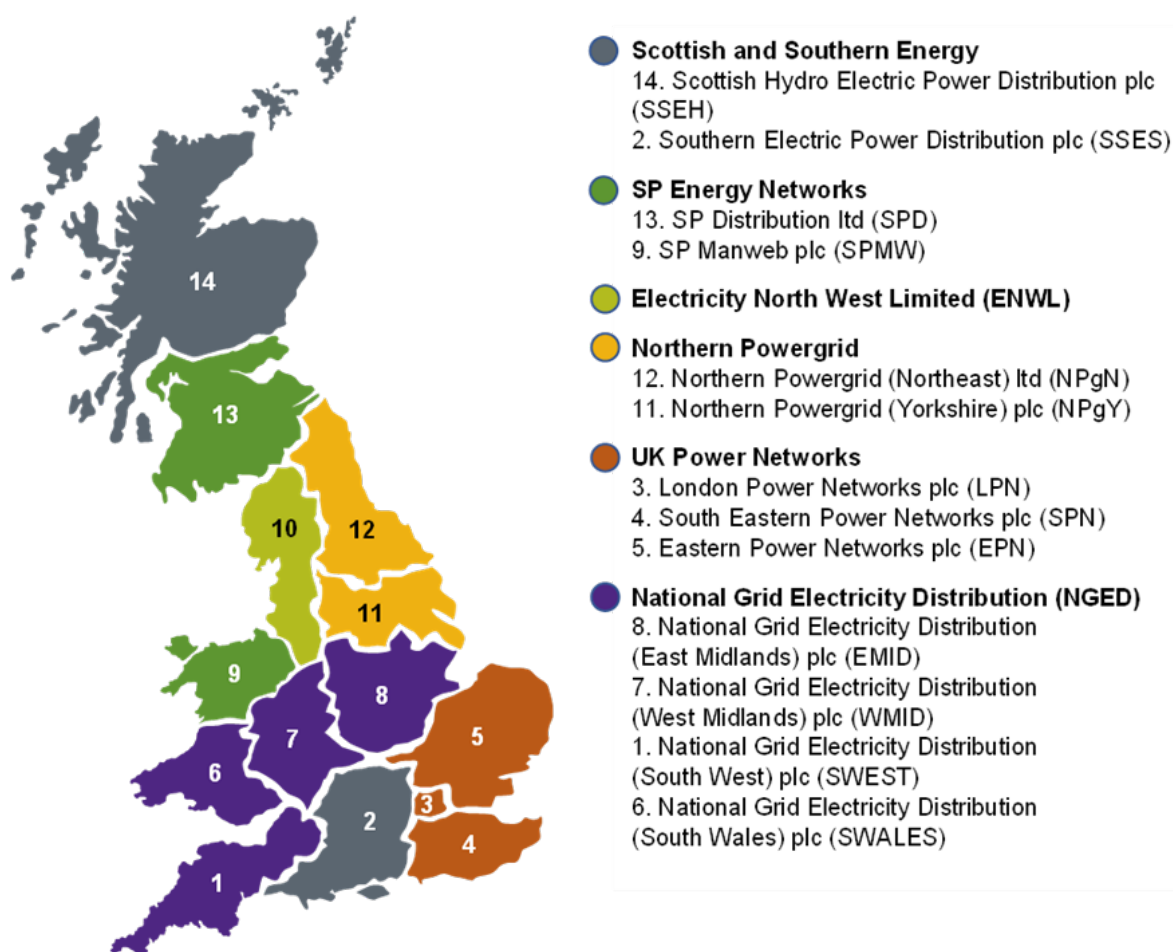
- 2.1 The ED network comprises approximately 800,000km of buried and overground cables across GB, transporting energy from where it is generated to our homes and businesses. Private companies own and operate these networks, and consumers pay for them through energy bills.

Figure 1: Electricity distribution network



- 2.2 The typical ED network is depicted in Figure 1. Broadly, bulk supply points serve as an interface between the high voltage transmission network and a local distribution network, ensuring that electricity is at a suitable voltage for further distribution to primary substations. The primary network further distributes electricity from substations (33kV/11kV) to various areas within a city or town via underground cables or overhead lines. The secondary network steps down the voltage at 11kV distribution transformers for safe delivery to homes and businesses via secondary distribution cables and low voltage service lines. The distribution network also transports power from generation sources that are connected directly to the distribution networks.
- 2.3 There are 14 electricity distribution licensees across GB, managed by six DNOs. The acquisition of Electricity North West Limited (ENWL) by Iberdrola (subject to approvals) will bring this licensee into the same group as Scottish Power Electricity Networks (SPEN), reducing the number of DNO group companies to five. The current structure is shown in Figure 2.

Figure 2: GB's DNOs



2.4 DNOs operate in regions where they largely have a monopoly on network services. That is why we set the revenues they can recover from consumers. In setting the price control, we are required to further our principal objective and to have regard to our statutory duties. Our principal objective is to protect the interests of current and future energy consumers, including their interests in the fulfilment of the UK’s net zero targets. This includes ensuring that both existing and future consumers pay a fair price for this transformation, as well as the cost of running these networks and that they get the services they require. We do this through a price control process.

2.5 We have used the RIIO framework for the economic regulation of ED networks since 2015 as our approach to running the price control. RIIO involves setting baseline allowances to deliver core service and minimum standards and incentives to deliver innovation and outputs that consumers value.

2.6 RIIO-ED1 ran from April 2015 to March 2023. RIIO-ED2 started in April 2023 and will conclude on 31 March 2028, at which point new arrangements be implemented through the Electricity Distribution Licence. ED3 will start on 1

April 2028. The price controls for the electricity transmission (ET), gas distribution (GD) and gas transmission (GT) sectors run two years ahead of ED, so their third RIIO period will start in April 2026.³

What are we consulting on?

- 2.7 This is our ED3 Framework Consultation. It is your opportunity to tell us if we are focussing on the things that matter most to consumers and users of the network and to let us have your views on the approaches that we might take to achieve these outcomes. This feedback will be a vital part of our process towards making our Framework Decision for ED3.

Next steps: ED3 timetable

- 2.8 In addition to providing written feedback to this consultation, you may also wish to participate in ED3 stakeholder working groups. We plan to commence stakeholder working groups on the key areas covered by this framework consultation before the end of this year. Initially, these will be structured around the consumer outcomes described in Chapter 4, with more specific subgroups getting underway in 2025. We expect working groups to continue through to the methodology decision in 2026 (see below).
- 2.9 To be included on future correspondence about working groups, please email RIIO3@ofgem.gov.uk and our team will include you on ED3 communications and provide you with access to the [RIIO Engagement Portal](#) where we will shortly publish a calendar of working group meetings.
- 2.10 Subject to consideration of the responses that we receive to this consultation, we intend to issue a decision on the ED3 framework in Q2 2025. Our indicative timeline for setting ED3 is shown Table 1 and remains subject to change, particularly as our timetable is dependent upon key external inputs, such as the completion of the National Infrastructure Committee (NIC) ED review.

³ [RIIO-3 Sector Specific Methodology Decision, July 2024](#)

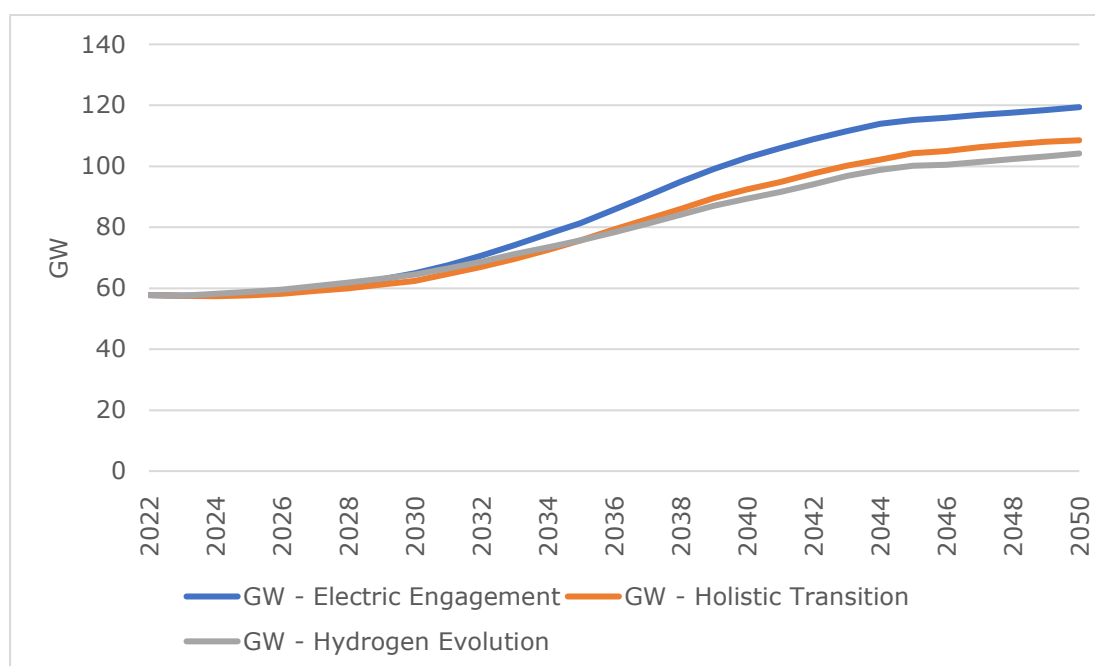
Table 1: Indicative ED3 timetable and related milestones

Date	Milestone
November 2024	Framework Consultation
Q1 2025	NIC Recommendations to Government following ED Review
Q1 2025	Policy decision on the Regional Energy Strategic Plan (RESP) framework
Spring 2025	Framework Decision
Q3 2025	Sector Specific Methodology Consultation (SSMC)
Q4 2025	Draft Business Plan Guidance (BPG)
Q1 2026	Transitional RESP (tRESP) Output
Spring 2026	Sector Specific Methodology Decision (SSMD) and Final BPG
Q4 2026	DNO Business Plan submission
2026	DESNZ Decision on hydrogen for heat
Q2 2027	Draft Determinations
Q4 2027	Final Determinations and licence consultation
Q1 2028	Licence decision
1 April 2028	ED3 starts

3. Drivers for change

- 3.1 **Overview:** Despite a decrease in electricity demand since RIIO-ED2, future electrification to meet net zero targets will increase demand from new sources of consumption. This and increased distributed generation will require significant increase in network capacity. Consumers and other network users must be able to connect promptly, without waiting for this capacity to come online, and with consistent and seamless processes.
- 3.2 **Demand:** Energy efficiency, reduced industrial demand, and higher prices decreased electricity demand during RIIO-ED1, continuing into RIIO-ED2. Some uncertainty remains over the exact extent and speed of electrification and the transition away from natural gas in the future. However, all net zero compliant pathways agree that widespread electrification will significantly increase demand, with Future Energy Scenarios (FES) 2024 estimating 328-334TWh by 2030, up from 285TWh today.⁴ Peak demand growth is expected to accelerate during ED3, stressing the distribution system (Figure 3).

Figure 3: Peak demand growth across the NESO's 2024 FES pathways



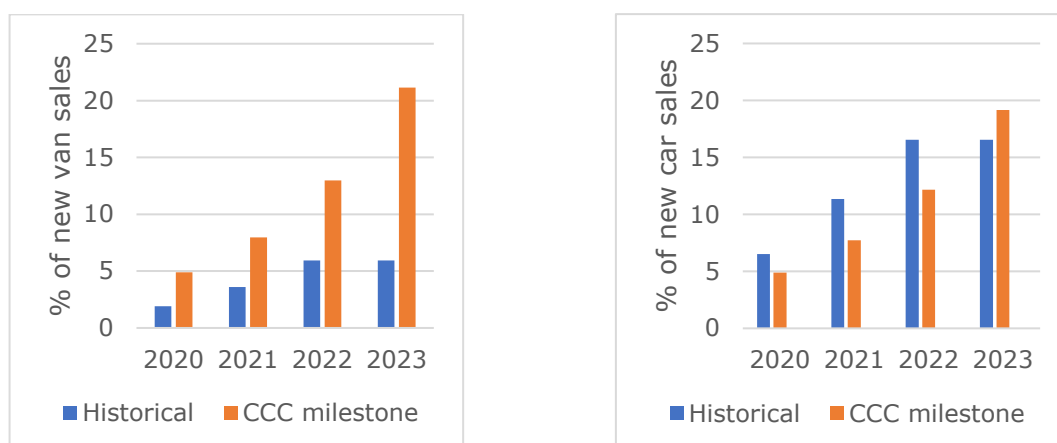
- 3.3 **Decentralised energy:** The energy system is becoming more decentralised with growth in DER like renewables, storage, and electrified heating and transport. The government’s Local Power Plan aims to invest £1bn annually in

⁴ [NESO Future Energy Scenarios](#)

local energy, encourage smart demand management and accelerate local renewable power projects in areas with supply/demand imbalances.⁵

- 3.4 **Transport:** Sales of new battery electric vehicles (BEVs) are rising as technology advances and adoption barriers decrease. The second-hand market is also growing, with Autotrader reporting increased demand for <5-year-old cars in 2023 (9.5% vs. 5.2% in 2022). The Society of Motor Manufacturers and Traders noted a record 52.6% growth in second-hand BEV sales in Q2 2024. However, the Climate Change Committee (CCC) indicated that BEV sales are slightly off track to meet the 2030 zero emission vehicle (ZEV) target of 80% of new car sales (Figure 4). Van sales are significantly off track.
- 3.5 The rollout of public charging infrastructure is crucial for rapid BEV sales growth. Policies like the Rapid Charging Fund and the Local Electric Vehicle Infrastructure Fund can support this. Improved data sharing is needed for better planning of BEV infrastructure, especially for large connections such as rapid chargers, fleet depots, and destination charging facilities.

Figure 4: BEV - % of new van sales and % of new car sales vs CCC Target⁶



- 3.6 **Heat:** While a decision from government is still awaited on the strategic role of hydrogen for heating, widespread electrification of heat is also needed in all scenarios to reach net zero. However, despite consensus on the importance of heat pumps, only 1% of homes use them, far below the CCC’s 10% target by 2030. Heat pump installations rose by just 4% from 2022 to 2023, with 60,000 installations in 2023, well short of the 600,000 annual target by 2028. However, demand is expected to grow, as evidenced by the Boiler Upgrade Scheme (BUS)

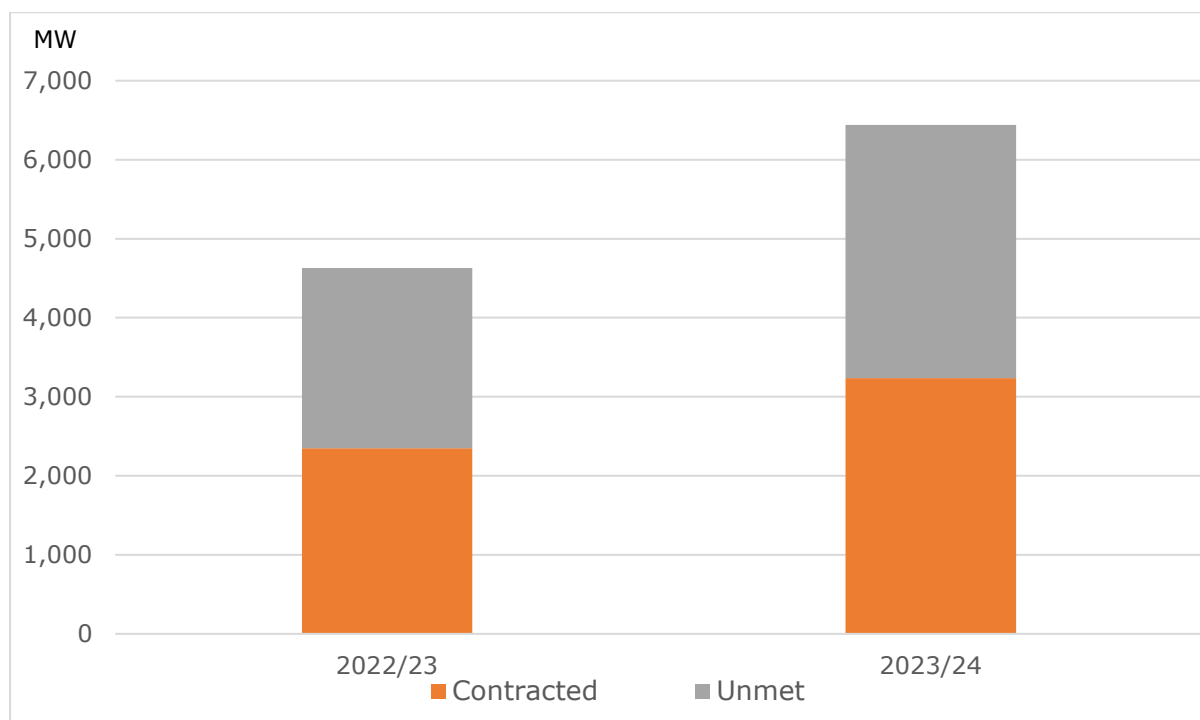
⁵ [Labour Party, 2024, p9](#)

⁶ [Progress in reducing emissions 2024 Report to Parliament - Climate Change Committee \(theccc.org.uk\)](#)

funding claims rising to 60% in 2023 from 32% in 2022, with similar trends in 2024. The government is also considering rebalancing policy costs across electricity and gas to incentivise uptake.

- 3.7 **Strategic planning:** We are shifting to a strategically planned energy system with the establishment of a strategic planning role for NESO. With this new role NESO will create a strategic energy plan for GB. This includes RESPs, the Strategic Spatial Energy Plan (SSEP), and the Centralised Strategic Network Plan (CSNP). RESPs will enable the coordinated development of the energy system across multiple vectors at a regional level and provide confidence in capacity requirements for these different regions, supporting proactive distribution network investment. Ofgem’s recent consultation on the Regional Energy Strategic Plan (RESP) policy framework will lead to a formal decision in Q1 2025, including draft RESP Methodology Guidance for NESO, which is expected to start developing RESPs by mid/late 2025. A transitional RESP (tRESP) output is planned for Q1 2026 to inform DNO business planning for ED3, evolving into a comprehensive, cross-vector, region-specific output.
- 3.8 **System flexibility:** Increased system flexibility, including DSR at the consumer level, is crucial for balancing the wider system, and making productive use of excess cheap electricity. Reducing system peaks in this way will also have a beneficial impact in reducing network needs. While heat and storage will contribute to DSR in the long-term, BEVs will dominate consumer flexibility in the short term. The UK is seen as leading in vehicle-to-everything (V2X) technology, with Octopus reporting 1GW of capacity available from 150,000 EVs on their Intelligent Octopus Go tariff as of May 2024.
- 3.9 Flexibility and reconfiguration may offer opportunities to manage network constraints in the short to medium term. However, given the amount of new demand and distributed generation that will need to be connected by 2050, the use of flexibility in this way in the 2030s will simply defer, not avoid, investment.
- 3.10 RIIIO-ED2’s DSO Incentive encourages alternatives to traditional reinforcement, including flexibility. Annual data from the Energy Networks Association (ENA) show the volume of services contracted by DNOs has increased (Figure 5). However, almost half of peak volume tendered in 2023/24 was unmet, similar to the previous year. The new Market Facilitator, introduced in August 2024, should help improve access to flexibility.

Figure 5: Distributed flexibility services contracted vs unmet in tender between 2022/23 and 2023/24⁷



3.11 **Connections:** In 2023, together with government, we introduced the Connections Action Plan (CAP) to address the unprecedented growth of connection queues at both distribution and transmission levels. The challenge is most acute at the transmission level, impacting distribution-level timelines, especially for larger projects connecting at higher voltages, but increasingly now for smaller projects as well. Currently, nearly two-thirds of those seeking distribution network connections depend on or await transmission reinforcement assessment. Other delays stem from capacity limitations in parts of the distribution network and the increased number of applications received by DNOs. We will soon publish a consultation/call for input as part of our end to end review of connections, which will explore these issues further and consider options to address inefficiencies and delays in the connection process.

3.12 The growth of electrification and distributed generation will significantly increase connection volumes in the next ED period. LCT applications alone are expected to rise from 18,000 per week in 2024 to 55,000 per week by 2028. This presents a major challenge requiring a skilled workforce, components, and

⁷ Data sourced from: [Open Networks - 2024 Flexibility Figures – Energy Networks Association \(ENA\)](#)

logistical coordination. Failure to keep pace with demand could result in longer wait times between connection offers and installations. These issues are likely to be localised, potentially causing disparities in waiting times for customers in different areas. We will publish our end to end review of electricity connections shortly which seeks to identify the challenges and proposes potential solutions.

- 3.13 **REMA:** The government's Review of Electricity Market Arrangements (REMA) is exploring changes to the GB electricity market design, including zonal pricing. Our Distribution Use of System (DUoS) Significant Code Review (SCR) will assess if changes are needed for efficient distribution system use and alignment with new REMA signals and transmission arrangements. This highlights the challenges of a fixed price control period. In ED3, it will be crucial to align short-term decisions with long-term goals, while retaining the flexibility to adapt policy areas affected by those decisions.
- 3.14 **Climate Resilience:** UK Climate Projections show warmer, wetter winters; hotter, drier summers; and more frequent extreme weather events, with trends expected to continue due to historical and ongoing emissions.⁸ Different regions will experience these effects to varying degrees and it is essential to protect consumers against these threats to their energy access. The CCC indicates we are not on track to meet our energy system adaptation needs. Through ED3, we aim to strengthen the distribution system's resilience to climate change.

<p>Q1. Do you agree with our characterisation of the wider context for ED3? Are there any other areas of context that you consider material for ED3?</p>

⁸ [UK Climate Projections \(UKCP\) - Met Office](#)

4. ED3 objective and consumer outcomes

- 4.1 Our duties have recently been updated by government to include net zero and growth. The net zero duty defines our principal objective to include consumers' interests in meeting the 2050 net zero target and other associated targets. This means we will take decisions, using government's delivery plans as our baseline, that proactively enable net zero. Fulfilling this duty also requires us to better understand the full range of consumer interests in the transition to net zero, to better help deliver a fair and cost-effective transition that works for them. Our new growth duty also requires us to have regard to the promotion of sustainable economic growth through our regulatory activities.
- 4.2 For ED3 this means that the price control should ensure that current and future consumers' interests are met by electricity distribution networks providing the necessary network capacity, to enable decarbonisation goals, at least cost, based on whole system value; this is proposed as the overarching objective for ED3.
- 4.3 We have used our consumer interest framework⁹ to develop four key consumer outcomes that we want ED3 to achieve. Our proposed ED3 consumer outcomes are closely aligned with the consumer interest framework with some augmentation to reflect the critical role that the ED sector has in the net zero transition, its contribution to delivering on our net zero and growth duties and its close proximity to consumers.
- 4.4 Our four proposed consumer outcomes for ED3 are as follows:
- **Networks for net zero** – strategically planned network investment, providing capacity and access for users when it is needed at least cost based on whole system value for current and future users.
 - **Responsible businesses** – delivering a high-quality service befitting of essential infrastructure, focusing on social, environmental and economic outcomes, including robust consumer protections, long-term value for money, financial resilience and supporting sustainable economic growth.
 - **Resilient and sustainable networks** – networks are safe and managed in a way that promotes long-term asset health and resilience and considers risks in the delivery of new and upgraded assets.

⁹ [Ofgem Forward Work Programme 2023-24](#)

- **Smarter networks** – leveraging data, digitalisation and innovative solutions to optimise networks and their role in the overall system, increasing the transparency and value of network data to stakeholders.

4.5 Further detail behind each consumer outcome, as well as more specific consultation questions relating to each, are set out in Chapters 6 to 9.

<p>Q2. What are your views on our overarching objective and proposed consumer outcomes?</p>
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5. Regulatory framework

- 5.1 The overarching objective and consumer outcomes described above are defined in the context of a period of significant change, summarised in the drivers for change in Chapter 3. These transformational changes, including increasing electrification, more decentralised generation and storage, the role of strategic planning, the role of flexibility and the impacts of climate change, together create opportunities and challenges for the ED3 regulatory framework. This consultation is an opportunity to gather evidence on the most appropriate regulatory model to facilitate the delivery of the key consumer outcomes effectively and efficiently.
- 5.2 Whilst the RIIO model has served ED consumers well since 2015 and evolved significantly from RIIO-ED1 to RIIO-ED2, given the drivers for change described in the previous chapter, it is logical to explore whether the RIIO-ED2 framework and RIIO model need further evolution for ED3. The remainder of this chapter sets out some of the high-level options under consideration and considers how these might support the overall objective and consumer outcomes.

Existing frameworks and possible ways to analyse

- 5.3 Prior to taking our Framework Decision for RIIO-3 in 2023, we undertook a review of regulatory options for Future Systems and Network Regulation (FSNR).¹⁰ This work considered three alternative framework archetypes:
- **Plan and deliver:** where regulation is a mechanism for implementing investments consistent with the longer-term strategic planning of the system.
 - **Incentive regulation:** where regulation is used to provide incentives to network companies to deliver against pre-specified output requirements at low cost and high quality, with rewards and/or penalties set against specified targets.
 - **Freedom and accountability:** similar to 'ex post' regulation, where regulation is focused on ensuring that network companies are meeting broad objectives, with incentives focused on overall delivery.
- 5.4 For this ED3 framework consultation we have considered these same archetypes through four regulatory dimensions that we consider to be most relevant to meeting the consumer outcomes in ED3. Each is further defined below:

¹⁰ [Decision on frameworks for future systems and network regulation | Ofgem](#)

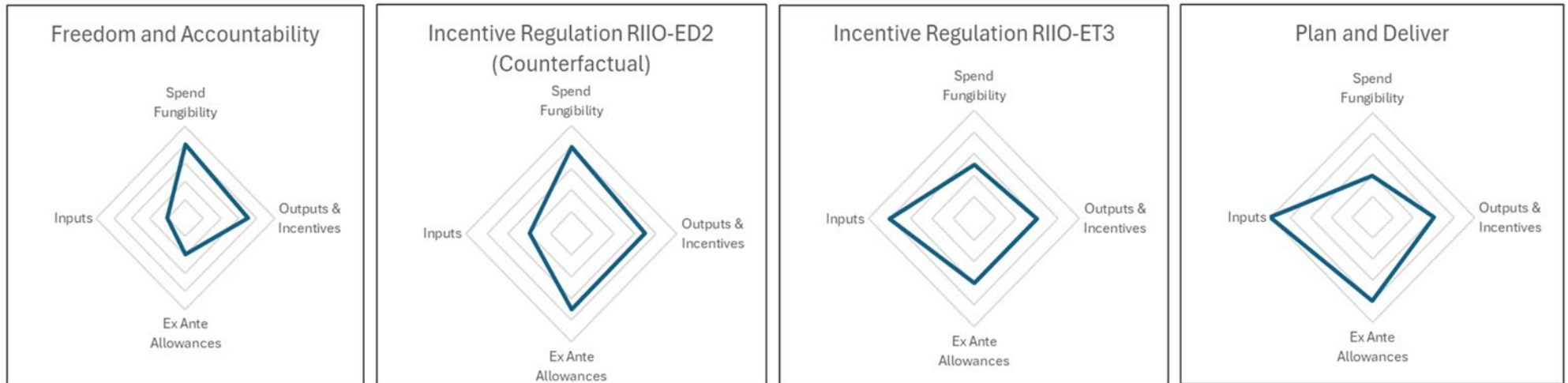
- **Spend fungibility:** The totex framework provides an agreed amount of allowances (typically ex ante) that can be recovered from consumers. The use of totex is designed to incentivise efficiency and innovation across the activities in the price control with cost savings shared with consumers through the totex incentive mechanism (TIM). However, without appropriate controls around the delivery of consumer-focused outputs, such a model could also have unintended consequences. For example, and at best, this approach could have the effect of incentivising companies to maximise short-term efficiency, delivering the minimum required to meet outputs over the length of the specific price control period. Additionally, and at worst, it could potentially lead to underinvestment, which is not in consumers' interests, particularly in a situation where a significant expansion of network infrastructure is needed to support the net zero transition. Baseline totex (fixed allowances) under RIIO-ED2 represent around 75% of allowances, with the remainder (variable allowances) being linked directly to delivered work through volume drivers.
- **Outputs and incentives:** a fundamental lever to drive efficiency and innovation in the achievement of consumer and system outcomes. This seeks to align consumer value and shareholder value, such as via financial and reputational incentives. The definition and monitoring of the outcome is a critical success factor, as is managing the tension between short-term and long-term outcomes.
- **Ex ante allowances:** the extent to which allowances are determined and agreed at the outset rather than during or after the control period. Ex ante allowances provide certainty for companies to keep the cost of capital low and the potential for more structured and efficient delivery partnerships with the supply chain. In the future, such certainty may be helpful in mitigating supply chain and workforce challenges. Whilst the ex ante approach seeks to encourage spend efficiency through the ability of the company to outperform (to be shared with the consumer), information asymmetry needs to be carefully managed to ensure that ex ante allowances are set at an efficient level at the outset. Ex ante allowances, coupled with a TIM, also provides a level of risk protection for companies where there is overspend against the allowance.
- **Inputs:** the extent to which the regulator is prescriptive about certain minimum requirements, deliverables or types of solutions that it considers critical to achieving an output. This could reduce some gaming or

underspend risk, but, unless carefully designed, could also dilute the power of incentives, especially around efficiency and innovation, and potentially introduce ambiguity around a company’s responsibility for discharging its duties, such as in relation to security of supply. Such approaches are potentially resource intensive for the regulator, but as a minimum some input assumptions and guiderails around aspects of the load package in particular might be helpful, based on clear principles and rules.

- 5.5 The framework archetypes are represented in Figure 6 below, with a summary of how each is characterised against these four dimensions. Each dimension can be adjusted through the price control framework to achieve the necessary balance between different outcomes.
- 5.6 Incentive Regulation is represented by two models: one showing the version of incentive regulation currently in place for RIIO-ED2, which represents our counterfactual; the other showing the incentive regulation being developed for ET3 following our FSNR work and reflecting our RIIO-3 Sector Specific Methodology Decision (SSMD),¹¹ published in July 2024. In practice the diagrams are oversimplified as different parts of both the RIIO-ED2 and ET3 price controls have different weightings towards these dimensions but overall, these help to illustrate and compare the relative priorities for each framework option and a potential spectrum of the forms of incentive regulation.
- 5.7 In ET, we proposed that projects selected by the NESO and included in the CSNP will be subject to a form of “Plan and Deliver” regulation and we are consulting on the introduction of a Centralised Strategic Network Plan Funding Mechanism (CSNP-F) to provide for this approach. This mechanism follows the introduction of the Accelerated Strategic Transmission Investment framework (ASTI) during RIIO-2, which was also targeted at supporting additional investment during (and beyond) a price control period, without that additional investment being considered inefficient overspend. For the rest of the network investment and operations, we adopted a five-year price control based on RIIO-2. We considered that the introduction of a more fundamentally different approach of “Freedom and Accountability” was not justified in light of the significant risks and additional complexity for all parties that such a change would bring.

¹¹ [Ofgem - RIIO-3 Sector Specific Methodology Decision for the Gas Distribution, Gas Transmission and Electricity Transmission Sectors, July 2024](#)

Figure 6: Regulatory model frameworks



Dimensions \ Models	Freedom and Accountability	Incentive Regulation RIIO-ED2 (Counterfactual)	Incentive Regulation RIIO-ET3	Plan and Deliver
Spend Fungibility	Highly fungible regime with ability to spend across categories. Ex post assessment reduces gaming through reallocation but increases disallowance risk.	75% baseline totex, with the remaining 25% variable, linked to specific volume drivers and Use-It-Or-Lose-It (UIOLI) allowances.	Likely that allowances will be majority non-fungible between cost categories, with all high value one-off expenditure (eg a new subsea cable project) tied to specific outputs.	Allowances are majority non-fungible between cost categories including separation between capital and operating costs for example.
Outputs & Incentives	Largely output based regulation with strong incentives driving behaviours based on clear objectives and targets.	Largely output based regulation with strong incentives driving behaviours based on clear objectives and targets.	Likely to be largely input biased, with increasing regulatory/NESO direction in terms of specific solutions, projects and deliverables.	Controls are heavily input biased, with greater regulatory/NESO direction in terms of specific solutions, projects and deliverables.
Ex Ante Allowances	Allowances and outputs are assessed ex post.	Majority of allowances are cost assessed and agreed ex ante but with some ex post evaluation and uncertainty mechanisms in period.	Large volume of allowances are cost assessed and agreed ex ante but with some ex post evaluation and significant use of uncertainty mechanisms in period.	Minority of funding is agreed ex ante, with substantial allowances set in period through uncertainty mechanisms and ex post evaluation afterwards.
Inputs	No/few specific inputs.	Few specific inputs.	Many inputs with regulator (and NESO) becoming increasingly interventionist and specific about optimum solutions and deliverables.	Many inputs with regulator (and NESO) becoming increasingly interventionist and specific about optimum solutions and deliverables. Rules based model.

Options for change to the current RIIO-ED2 framework

5.8 Whilst there are similarities with the context that has influenced the design of RIIO-ED3, there are some important differences between electricity transmission and distribution, which mean that the future regulatory framework for ED3 needs to be considered separately. These differences include:

- the nature of the strategic planning – much greater regional focus;
- the higher degree, and impact, of the uncertainty of individual consumer behaviour and choices and other aspects of distribution connected supply and demand on network capacity requirements;
- the variation in the size of projects and associated unit costs – ranging from consumer connections to large substations;
- the opportunity to defer network upgrades through the use of demand side flexibility and other means; and
- the shorter timescales for delivery of upgrades.

These aspects will be key in developing a suitable design approach to the overall price control for ED3 that leverages relevant precedent designs but ensures it is tailored for this sector.

5.9 We expect the **role and influence of strategic planning** to develop significantly during the period to 2033. RESPs will form part of the overarching strategic energy plan for GB that NESO is producing. Along with the SSEP and CSNP, RESP will provide greater direction to ensure energy networks meet the needs of energy consumers. For DNOs, these changes will provide a clearer pathway against which they must plan their networks. The policy decision on RESP, expected in early 2025, will provide a clearer view on what signals and outputs we should expect the RESPs to provide.

5.10 The timing of ED3 Business Plan submissions and the setting of ex ante allowances does not align with the expected production of the first full RESPs, which are expected to be available in 2027/28. The NESO will produce a tRESP in Q1 2026 which is planned to be used by DNOs as the basis for their ED3 Business Plans. Therefore, depending on the exact nature of the enduring RESP product, we may also need a re-opener or other mechanism within the regulatory framework to allow the outputs from RESPs to inform or adapt DNO delivery plans within the price control period.

5.11 In RIIO-ED2, the costs and outputs associated with investment in the networks are set as follows:

- DNOs provide Business Plan volume and cost submissions in accordance with Ofgem guidance, which are subject to benchmarking and upfront cost assessment (discussed in Chapters 6 and 7);
- DNOs provide Business Plan output submissions in accordance with Ofgem guidance, which are subject to a combination of bespoke review and benchmarking (discussed in Chapter 7);
- DNOs then seek additional allowances to reflect changes in demand; these are implemented through uncertainty mechanisms. Changes in volume are included in the price control, such that allowances are only granted where DNOs actually make investments, so consumers are protected from funding underinvestment (discussed in Chapter 6); and
- Subject to these uncertainty mechanisms, DNOs then have incentives to keep costs down, where they can do so whilst meeting output requirements, including the use of flexibility services rather than investment in the physical network, if that reduces cost during the price control period. Any cost savings are shared with consumers.

5.12 In our view, the changes to the role of strategic planning raise fundamental questions for the effectiveness of these mechanisms taken together. The approach taken in RIIO-ED2 was to set baseline allowances to enable the network to meet the 'System Transformation' FES scenario, the slowest of the three net zero compliant FES scenarios at the time, and to design uncertainty mechanisms to allow networks to increase their investment above this level, where more rapid decarbonisation was driving higher needs. This reflected both fundamental uncertainty of future expectations, and management of the risk that companies over-estimate the total infrastructure need in Business Plans, do not need to deliver this if the demand does not materialise, and return only a portion of the consumer-funded ex ante allowance to consumers due to the totex sharing factor.¹²

5.13 Going into ED3, the role of strategic planning means that the incentives on DNOs are likely to need to change. Whereas in previous periods of lower demand growth lower investment was seen as good for consumers, as the cost savings could be shared between consumers and DNOs, it is apparent from Figure 3 that the ED3 period is the point at which growth in peak demand should begin to accelerate if we are on track to meet net zero. Therefore, in the ED3 period we expect that a continuation of low levels of investment would increase

¹² [CEPA Review of RIIO Framework and RIIO-1 Performance](#)

the risk of network capacity not being available when needed and the risk that consumers bear higher costs in the longer term. The latter might arise due to connection delays, repeated interventions if incremental investments are not right-sized first time, higher electricity losses and the need to use more expensive balancing actions to manage the wider power system if DSR cannot be accessed due to network constraints.

- 5.14 Even if capacity is managed for the demand that materialises within the regulatory period, through a combination of network upgrades and flexibility (something that we have promoted through our 'flexibility first' approach in RIIO-ED2), without more anticipatory investment, the total costs over the period to 2050 could potentially be higher. This is because the risk and costs of capacity not being available during a critical period for decarbonisation, when demand is growing very quickly, could outweigh the risk and costs of building assets early and these being underutilised for a period of time. This change in the balance of risk – if true – would change the way that we think about network upgrades and anticipatory investment in ED3.
- 5.15 Therefore, it will be important for us to set out at the methodology stage how the DNOs should use the tRESP in ED3, as a key input to their network planning process, to provide clear guidance around the extent to which we expect network investments to anticipate future demand, aligned with system need and strategic priorities, and the circumstances where we might mandate network investment over non-capex solutions. In this way, what matters for consumers in the new strategic energy planning environment is the delivery of outputs against clearer inputs and a robust incentive and control framework to ensure that these outputs are met. Such an approach also enables the DNOs to establish longer term order books with the supply chain, helping to manage deliverability risks.
- 5.16 As a result, the incentives on DNOs may need to adapt from RIIO-ED2. We welcome views as part of this framework consultation as to how this should happen. The key elements we are considering are:
- **Protecting against under delivery** through the use of output delivery metrics, such as price control deliverables (PCDs), to assure on delivery of planned investments that are underpinned by clearer inputs. In RIIO-ED2, we used PCDs for some activities, including some network reinforcements, and DNOs may have allowances clawed back for material underspend. In ED3, we are considering extending the role of PCDs to primary reinforcements and introducing an overall delivery metric to ensure that, at

least in aggregate, secondary reinforcement delivery is consistent with agreed ex ante investment and Business Plans and associated inputs, such as a RESP. We welcome views on how to measure aggregate DNO delivery against plans, to ensure that DNOs are held to account for any under delivery, especially where such under delivery relates to projects that have been specified by us as being required (inputs), for example, to align with the requirements of a RESP. We also welcome views on the extent to which Ofgem should specify parameters for DNO plans, including what are the potential benefits, risks and practical challenges of doing so.

- **Building adaptability to reflect changes to developments on the ground.** Whilst we are seeking a more planned approach, we recognise that it will not be possible to foresee five years ahead the exact energy network needs at each location. DNO delivery plans will therefore need to adapt. Potentially much of this change can be accommodated within the plans and deliverables specified above and should be a factor in their design. However, in ED3 we will likely need mechanisms to support unexpected changes. We welcome views on how to incorporate adaptive mechanisms within the overall planned approach. We also particularly welcome views on whether the current volume drivers, or adapted versions of them, would be sufficient, or whether some other form of uncertainty mechanism might be necessary.
- **Building adaptability to changes in overall pathways and regional plans.** We also seek views on what should be done when a RESP plan is revised and whether a re-opener might be a suitable mechanism in this situation. We are also interested in whether such a change should be at the DNOs' request, or should the production of the RESP or Ofgem be able to trigger the re-opener and how frequently such a change might be considered. This is effectively the approach under the ET frameworks under RIIO-2 and RIIO-3, where the CSNP can require electricity transmission owners (ETOs) to make additional investments, with the costs of those funded under the ASTI and CSNP-F re-opener mechanisms and output delivery incentives attached to achieving specified delivery dates.
- We are also seeking views on how to combine this approach with an **approach to maintaining asset health and climate resilience.** In particular, we wish to see any health-led asset replacement investment decisions account for future demand growth on a consistent basis. There are potential regulatory and business risks that come from two different

mechanisms which may have overlaps. We are interested in understanding whether there might be a risk of two different approaches resulting in gaps or duplication between these areas, and to what extent a planned and input-led approach could be combined to cover significant aspects of all capital investments. We explore this point further in Chapter 9.

- We are also considering the **approaches to cost assessment for capital investment projects**. Our current methodology includes the award of allowances on an ex ante basis. There are however potential difficulties in accurately determining the costs for this new growth period, the requirements to enable a degree of adaptability and known supply chain constraints. We therefore wish to consider the merits of the RIIO-ET3 'stage gates' approach as well as ex post or cost-plus methodologies for this element of the planned capital investments. There are risks and potential inefficiencies of this approach and we are keen to hear stakeholder views on these approaches.
- Finally, we are looking at **implications for cost incentives**. The current totex approach equalises incentives for capital and operating costs, including flexibility. We welcome views on whether further changes to the cost assessment or totex approach might be appropriate so that DNOs are not inadvertently incentivised to underspend on capital investment volume in order to appear more efficient, either in respect of their Business Plan submissions or in-period.

5.17 For the next ED price control, our initial thinking is that a mix of Plan and Deliver and Incentive Regulation may also be appropriate for the following reasons.

- The introduction of a new, independent regional strategic energy planning function provides the necessary basis to move towards 'Plan and Deliver' with greater clarity of system need (a key 'input') on a sub-regional basis. In the context of network expansion, we consider that a more proactive approach to network development might be necessary, using this improved planning input, to ensure that DNOs are delivering investments consistent with the longer-term needs of the network and aligned with wider strategic energy system plans. This could mean that the ED3 framework is **more input based in terms of network investment, compared to RIIO-ED2**.
- At this stage our view is that the regulation of the non-load related activities of the networks will be less suited to the 'Plan and Deliver' approach. For these, our current view is that 'Incentive Regulation' is likely more

appropriate than 'Freedom and Accountability' and is best done within a RIIO-type framework that is familiar and has already delivered for consumers (particularly with regard to driving service improvements and frontier cost efficiency). Our starting assumption therefore is that **outputs and incentives will remain central to the regulation of non-load activities**. However, we will need to consider whether there are overlaps between load and non-load investment which mean that those outputs and incentives should evolve to protect the interests of consumers.

- In an environment where RESPs provide greater certainty of future demand and generation pathways, and where there is a need to secure the future capacity and resilience of the network, we believe that there may be a case for tighter controls relating to capital investment delivery. This could mean allowances for some network investment activities could be ring fenced from wider totex. In this way, we think that it may be appropriate to reduce the **fungibility of allowances in the future, when compared with RIIO-ED2**.
- We consider that assessing and agreeing planned interventions that are aligned with RESPs at the start of the price control (**ex ante**) provides certainty to DNOs, their investors and supply chain and enables us to monitor and enforce the delivery of investments in period. Whilst the enduring RESP output will not be available at the point when companies are developing their Business Plans, a re-opener (potentially similar to the existing load-related expenditure (LRE) re-opener) could be used in period to manage changes to Business Plans arising from updated or more detailed RESP output.

5.18 At this stage we think that it may not be appropriate to move fully towards an ex post style of regulation (in line with the 'Freedom and Accountability' archetype), in which networks do what they believe is needed in period, and incentives are limited to meeting defined outputs. Whilst this approach may be effective in giving confidence to DNOs that choose to invest more, it does not hold DNOs to account or protect consumers if they use that freedom to deliver less investment than that identified through the strategic energy planning processes or they deliver excessive or unnecessary investments. We therefore think that this may not align with the transition to a more strategically planned system, where there is greater clarity around the network investments that are needed in the short and medium term (through the RESPs). However, as discussed in 5.16 above, there may be challenges in applying the same

approach based on ex ante cost incentives as in RIIO-ED2. Therefore, we will review whether more of the changes between planned and outturn costs should be assessed ex post or on a pass through basis to facilitate the achievement of Consumer Outcome 1. We welcome stakeholder views on this principle in response to Question 9.

- 5.19 A move away from a more DNO-led, output-based model towards an independent system planner-led, input-based model, will have consequences for the regulatory framework. We are therefore looking through this consultation to explore stakeholder views on specific changes to the regulatory arrangements that might be needed to best meet the proposed consumer outcomes. Whilst questions around changes to the overall framework relate mainly to network investments and preparing the network for net zero, we are also interested in feedback on where these or other more substantial changes to the model used for RIIO-ED2, might deliver better outcomes for consumers and the areas where the greatest benefits and impacts might be achieved through such changes. We propose to assess these alternatives to the evolved RIIO-ED2 counterfactual as part of our framework decision and will undertake an Impact Assessment where appropriate to assess proposed material changes.¹³

- Q3.** Do you agree that the network investment elements of the framework should be more input based?
- Q4.** Do you agree that we should consider introducing additional controls around network investments and what features should these controls contain?
- Q5.** Do you agree that the incentives on DNOs will need to adapt from RIIO-ED2 and if so, how?
- Q6.** Do you agree that there is still a role for re-openers in ED3, particularly given the timing of the future full RESP output and how should these be triggered?
- Q7.** Using RIIO-ED2 as the counterfactual, what alternative regulatory models or characteristics are needed in ED3 to ensure the DNOs deliver the above consumer outcomes? What are the trade-offs we should consider?
- Q8.** Do you agree that the regulatory framework for ED3 should have features of the Plan and Deliver model for network investment and Incentive Regulation model for other elements?
- Q9.** Do you think that there is a greater role for elements of ex post regulation or of cost pass through in ED3, either specifically in assessing cost changes resulting

¹³ [Future Systems and Network Regulation Core Document \(ofgem.gov.uk\)](https://www.ofgem.gov.uk/future-systems-and-network-regulation-core-document)

from changes to investment requirements during the period, or more broadly to reflect the changing context?

6. Networks for net zero

- 6.1 The next ED price control will be a critical period for delivering the infrastructure required to achieve the UK government’s CP2030 target and a net zero economy by 2050. As outlined in Chapter 3, electricity distribution networks need to be ready for an unprecedented increase in the electrification of transport and heat as well as growing volumes of local low-carbon generation and storage during the 2030s.
- 6.2 Preparing the ED networks for the additional electricity demand (“load”) will require significant investment to expand the capacity of the network.¹⁴ Upgrading the ED networks is different from addressing the transmission capacity constraints currently delaying new connections. The latter involves a limited number of very large upgrades with long lead times of typically 10-14 years.¹⁵ For ED, the challenge of meeting increasing peak demand is characterised by the need to make hundreds of thousands of (mostly) small, replicable, labour-intensive, local interventions to the individual network assets.¹⁶ Whilst some larger primary reinforcement projects are similar in scale and complexity to some transmission projects, typical lead times for most reinforcement projects on the lower voltage parts of the distribution network are much shorter than transmission, though there is some uncertainty around the timing and location of low-carbon technology uptake.¹⁷
- 6.3 This chapter first summarises the current situation and regulatory arrangements for LRE, including DNOs’ LRE in year one of RIIO-ED2. Then we consider some of the key challenges and opportunities for delivering networks for net zero and lastly explore the implications of these for the LRE regulatory arrangements in ED3.

Context

- 6.4 With an average 44% spare capacity currently available on the primary network and more than 60% on the secondary network, one possible view is that there is not a widespread distribution capacity “problem” today.¹⁸ However, network

¹⁴ Analysis for the 2022 *Electricity Networks: Enabling the transition to net zero* report estimated £60-£180 billion of load related investment in ED networks could be required. The lower end of this range equates to an annual spend of £2.4 billion over the next 25 years.

¹⁵ [Electricity networks: transmission acceleration action plan - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/94444/electricity-networks-transmission-acceleration-action-plan-2022.pdf)

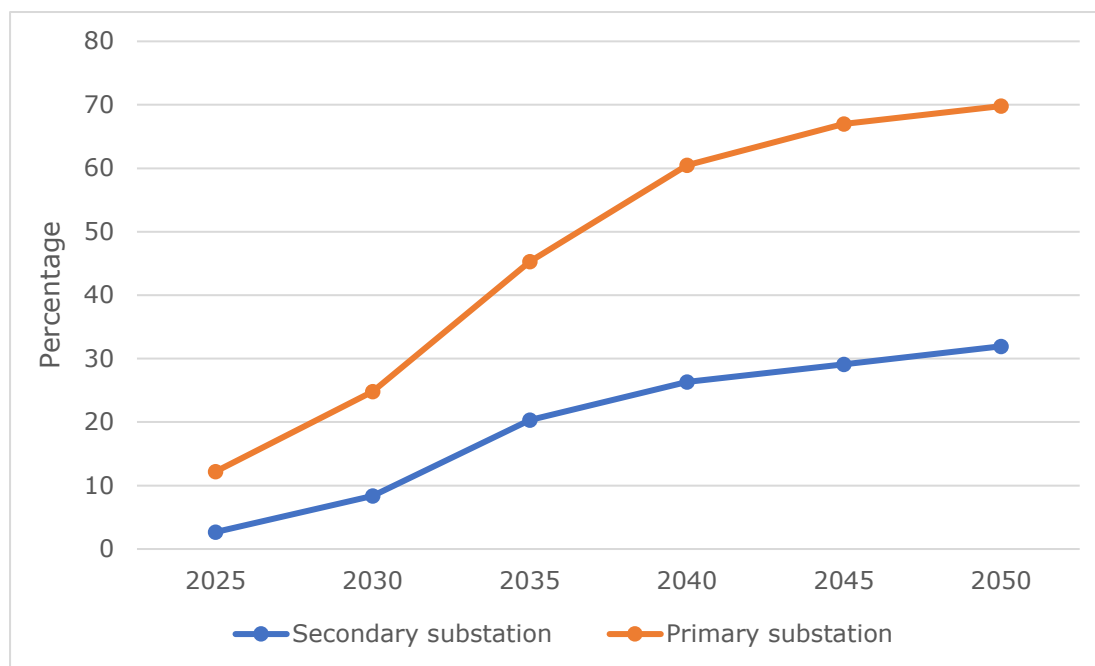
¹⁶ The electricity distribution networks in GB comprise around 800,000km of cable and circa 600,000 primary and secondary substations.

¹⁷ The typical duration for primary network reinforcement projects is 1-3 years and 2-6 months for upgrading the secondary network.

¹⁸ Ofgem analysis of DNO’s 2022/23 annual regulatory return data.

utilisation forecasts suggest that by 2035 nearly half of the primary network and 20% of the secondary network could be operating at maximum capacity at peak demand in the absence of intervention additional to that planned in RIIO-ED2 (see Figure 7). This potential growth in constraints is acute over the 2025-2040 period, making ED3 a critical period to enable the appropriate network interventions to be made ahead of a constraint problem arising.

Figure 7: Distribution substations operating at maximum capacity at peak demand in GB¹⁹



Load-related expenditure in RIIO-ED2

6.5 We had two main objectives when we set the LRE package in RIIO-ED2:

- The DNOs have sufficient funding to enable net zero and that LCTs and the connection of new clean energy sources do not face installation or operational delays.
- Consumers are protected by keeping costs as low as possible, avoiding investment in network upgrades that are not required.

6.6 Over RIIO-ED2, the DNOs have a total of £3.1 billion baseline funding (circa 14% of the total ex ante allowances) to deliver new connections and network capacity upgrades to meet the demand growth projected in the 2021 FES “system transformation” scenario.^{20 21}

¹⁹ Ofgem calculations from substation headroom data provided by the DNOs.

²⁰ The RIIO-ED2 LRE package is 40% higher than the LRE allowances in RIIO-ED1.

²¹ As a percentage of the LRE baseline, funding for connections, and reinforcing the primary and secondary networks is 32%, 23% and 30% respectively.

- 6.7 The LRE package also includes several uncertainty mechanisms that will allow networks to recover their costs in case of greater LCT take-up than is assumed in the baseline. The secondary reinforcement volume driver adjusts funding automatically (based on agreed unit costs) so that DNOs can add capacity (either through traditional reinforcement or flexibility solutions) to meet increased demand from EV chargers and heat pumps.²² RIIO-ED2 also includes a load-related re-opener – accessible at given times during the price control period – in which the DNOs can make the needs case and request efficient funding for larger, more complex reinforcements on the primary network. In the absence of the load-related re-opener being triggered for primary reinforcement work, under- or over-spend against the primary reinforcement ex ante allowance is subject to the totex sharing factor, with certain protections for consumers.
- 6.8 RIIO-ED2 protects consumers from the DNOs underspending against their LRE allowances by:
- providing for an ex post review of primary reinforcement spend where a DNO spends less than 80% of their ex ante allowance over the RIIO-ED2 period. Where such underspend is found to be due to under delivery, rather than cost efficiencies, allowances can be returned to consumers in full; and
 - automatically returning allowances based on a fixed unit rate if lower volumes of secondary reinforcement projects are delivered than forecast.
- 6.9 Alongside the LRE package, RIIO-ED2 also introduced arrangements to encourage the DNOs to undertake DSO functions (see Chapter 8). This included using flexible solutions (“network flex”) to reduce peak load, secure the network during periods of planned maintenance, and to manage faults. The use of network flex was promoted to help to reduce the costs of meeting network capacity requirements within RIIO-ED2 (if network flex is available at a lower cost compared to traditional reinforcement) and to help facilitate the long-term development of the distribution-based flex market.
- 6.10 In year one of RIIO-ED2, total DNO LRE averaged less than half the annual allowance.²³ Reasons for the underspend include lower demand than forecast in

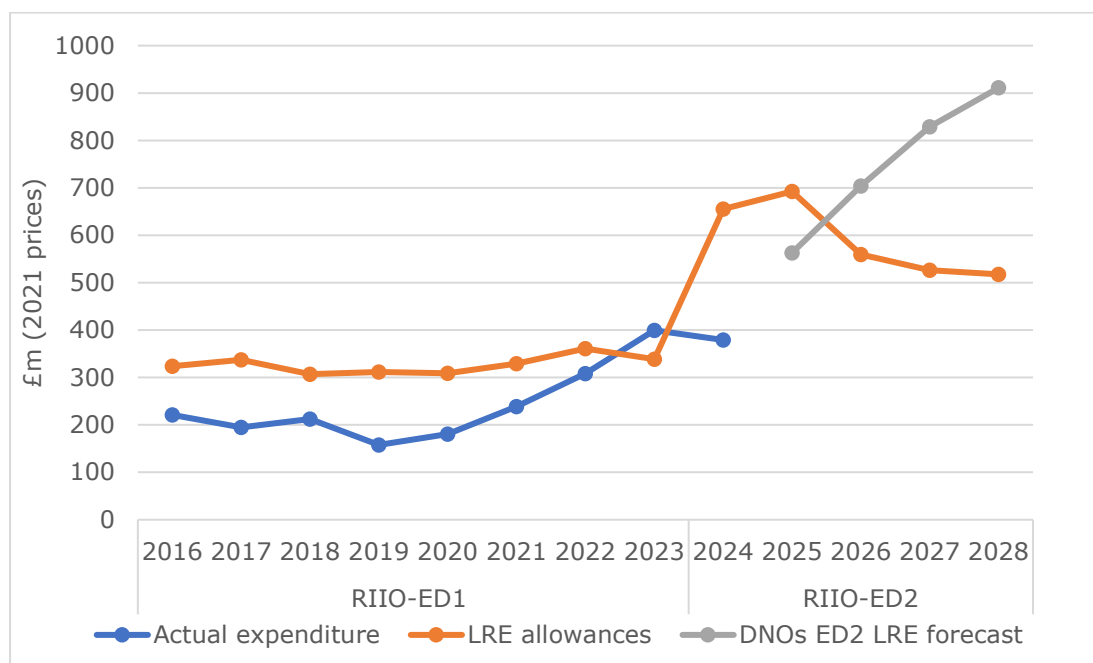
²² Flexible solutions can involve a variety of services to address local network constraints including paying distribution-connected generation or storage to increase output at peak demand or paying consumers to reduce their demand at certain times of the day to avoid network congestion.

²³ In Year 1 of RIIO-ED2, DNO LRE was circa £315m compared with an ex ante forecast of £655m.

some areas and delivery and mobilisation challenges, including the supply chain.²⁴

- 6.11 Counter to the overall trend, the DNOs spent approximately 130% of year one allowances to deliver low voltage services, including unlooping existing domestic connections.
- 6.12 In terms of network capacity, the DNOs delivered almost 1,257MVA net additional capacity, of which around 75% was released through network flex. The amount of additional capacity is less than the 1,930MVA net increase delivered in 2022/23 (of which 48% was delivered by network flex).²⁵ Further details on the challenges around the use of network flex solutions are set out in paragraphs 6.23-6.29.
- 6.13 Despite the significant underspend in year one of RIIO-ED2, all DNOs expect to achieve their RIIO-ED2 load-related programmes on the basis that connections and demand will increase. Figure 8 highlights the DNOs’ annual forecasts for the remainder of RIIO-ED2. The forecasts show LRE ramping up sharply to a level of spend substantially higher at the end of the period than has been realised historically eg compared to the annual average in RIIO-ED1.

Figure 8: Historical and forecast LRE



²⁴ For example, heat pump uptake is approximately 25% of the FES 2021 forecasts.

²⁵ RIIO-ED2 Year 1 submitted RRP.

6.14 If LCT uptake and connections accelerate rapidly during RIIO-ED2, as implied by DNOs' LRE forecasts, delivering the required network capacity in time and efficiently could be very challenging. Current global supply chain pressures and skilled labour shortages are not expected to abate any time soon, potentially adding to lead times and/or increasing the cost of traditional reinforcement. As an alternative, we might expect to see the DNOs use more network flex in RIIO-ED2, but this is assuming distribution-based flex will be available. While most DNOs have had some success contracting for network flex to date, a large proportion of tenders are going unmet (see paragraph 3.10). A possible reason for this is that distribution flexibility service providers may be more attracted to participating in system-level flex markets due to the potential to earn greater revenues.

Q10. What is the potential availability of distribution-based flex across GB for DNOs in the short term and on the journey to net zero during ED3?

6.15 In our view, the early picture from the current price control is that the DNOs are falling behind in delivering the network upgrades expected in RIIO-ED2. It will be very challenging to get back on track given the current headwinds, but it is important that the DNOs build some momentum before ED3 and put delivering at pace and volume to the test. Delivery challenges and opportunities.

6.16 Given the quantum of investment needed to prepare the distribution networks for net zero we consider some of the challenges and opportunities that are most pertinent to effective and efficient delivery.

6.17 **Supply chain and workforce:** Global competition for supply chains and a looming skills shortage across the UK infrastructure and utilities sectors are contributing to rising cost pressures, extended lead times and pose significant delivery risks. In Chapter 9 we consider these issues in detail and only raise here to highlight these issues are aggravated further by a lack of long-term certainty about future investment requirements, which constrains the appetite for supply chains to make long-term commitments to growing capacity for the UK.

6.18 **Future energy supply and demand uncertainty:** Although there is consensus that the amount of new distribution capacity for net zero will be significant, future network requirements out to 2050 vary according to different pathways for future energy supply and demand. As a result, there is uncertainty about the location, timing and scale of new capacity needed. This uncertainty leads to various risks as follows:

- new network capacity is not available in time and net zero goals are missed; or
 - responding to certain need through incremental investment ends up costing more as repeated interventions are required at the same site for subsequent additional needs; or
 - there is overinvestment in network (or it is made earlier than needed).
- 6.19 Given the significant spare capacity that has existed on distribution networks historically, our approach to managing these risks has typically focused on protecting customers from the costs of unnecessary and uneconomic network investment. Hence, there has been a relatively high hurdle for the network companies to substantiate the future network need and that the associated network investment carries a low risk of unnecessary costs for consumers.
- 6.20 However, given there is now greater certainty, under all net zero pathways, that domestic heating and transport will undergo widespread electrification and the nature of upgrading the distribution networks, we consider that the hierarchy of risks has changed. Preparing the secondary network for increased electrification will be very labour-intensive and time consuming, similar in some respects to the mandatory 30-year Iron Mains Replacement Programme for gas distribution.²⁶ If upgrading the network is delayed until there is firm evidence that LCT demand is 'taking off' there is a material risk it could be too late to respond in time.
- 6.21 The potential risk and consumer impact of delayed network build, or not building capacity 'right first time' (eg network constraints, delayed connections and additional network costs), now looks like it could be much greater than the impact of investing earlier than needed and incurring some extra financing costs for a short period of time. The risk of asset stranding in the context of the long-term pathway to net zero also appears to be much lower on a national basis. In other words, the risk and downside from overinvestment in a future characterised by rapid demand growth will reduce and the risk and downside for consumers from delayed investment will increase.
- 6.22 In our view, the new risk hierarchy potentially justifies a more proactive stance to delivering network capacity in ED3 on the basis that it is in consumers'

²⁶ The Iron Mains Replacement Programme initiated in 2002 by the Health and Safety Executive requires that gas distribution networks replace aging iron gas pipes if they are located near occupied buildings to reduce the risk of gas explosions and enhance the security and reliability of gas distribution networks. For more information see: [Gas mains replacement programme: the story so far - Utility Week](#)

interests to avert the risk that the distribution networks become a blocker to net zero.

- 6.23 **Network flexibility and the risk of suboptimal outcomes:** In RIIO-ED2, the flex first principle promotes the consideration of lower-cost non-network solutions to manage extra demand associated with the transition to net zero.²⁷
- 6.24 Network flex can be used to support a capacity requirement on an interim basis and provide option value by avoiding a potentially inefficient incremental network intervention while assessing the potential future load growth and a traditional reinforcement. Alternatively, network flex can be used to reduce the risk of network overloads if demand growth is accelerating and there is a long lead time associated with asset-based interventions. However, it is unlikely that network flex can be used to permanently defer reinforcement for substations that reach capacity during ED3.
- 6.25 In year one of RIIO-ED2, the use of network flex to meet capacity requirements varied widely across DNOs.
- 6.26 In principle, we support the use of network flex as a tool to run distribution networks efficiently. However, we think that in a period of high expected demand growth, such as ED3, high penetration of flex on the network to meet capacity requirements could lead to a risk of sub-optimal outcomes. For example, a focus on network flex to defer investment (driven by the within-period totex efficiency incentive) could result in a steeper trajectory for network reinforcement at the same time that demand growth is accelerating rapidly. This could aggravate existing skills shortages and supply chain pressures, increasing cost pressures and longer lead times, and ultimately mean that the network capacity is not available when it is needed.
- 6.27 Another potential issue is that using network flex to minimise investment in local networks could come into conflict with facilitating system-wide flexibility. The latter will be vital for managing the integration of intermittent renewable generation efficiently, especially as we move to a clean power system by 2030. If DNOs focus on network flex to defer network reinforcement, without proper consideration of wider system needs, this may not be optimal from a wider system perspective ie making sure the network can facilitate increased demand when supply from renewables on the wider power system is high, avoiding

²⁷ Networks also use flexibility to run networks more efficiently by adjusting the output of a generator or the demand load of a user to manage voltage issues and abnormal network conditions, and to recover supply in the event of a fault.

constraint costs and generation over-build (see Chapter 8 for further discussion).

6.28 We also think it is important to look at wider system needs and impacts, including the effect of higher network loading on power losses, when evaluating the option of using flex on the local network (see Chapter 9 for further discussion on power losses and network flex).

6.29 We are keen to explore what role network flex (as opposed to system flex) should play during ED3 and whether there is a risk that network flex could be counterproductive, ie lead to higher whole system costs if too much reinforcement is deferred to a future period. For the sake of clarity, we recognise the strong use case for network flex as an interim measure to alleviate capacity requirements if reinforcement has a long lead time, and for managing operational aspects such as voltage and securing supply after a network fault.

Q11. To what extent are global supply chain and workforce pressures contributing to longer lead times for delivery network reinforcement?

Q12. Do you agree that the risk and downside for consumers of network underinvestment in network reinforcement would be greater than the downside of overinvestment?

Q13. What are the benefits and risks to deliverability if network reinforcement is deferred to future periods?

Q14. What do you see as the role of distribution-based flexibility, both in the short and longer term, to manage distribution network constraints?

Q15. How do we ensure that network flexibility is used only when it is in consumers' long-term interests in ED3?

Q16. How are unexpected constraints dealt with currently? How quickly can these be eased, and what is the impact of these unexpected constraints (eg on LCT uptake)?

6.30 **Regional Energy Strategic Plans:** To achieve net zero efficiently it is imperative that there is greater foresight of the location of new low-carbon generation, future increases in electricity demand and storage, and cross-vector developments such as industrial clusters, hydrogen hubs and heat networks. This will enable DNOs to coordinate network planning with these developments and target network investment in the right place ahead of need.

- 6.31 We recently consulted on the policy framework for the NESO to develop RESPs for each region in GB.²⁸ Each RESP will set out an independent, cross-vector view of the spatial development of energy supply and demand within a region that is consistent with local net zero strategies, the national level FES pathways and SSEP.²⁹
- 6.32 The RESP will increase foresight in the short and longer-term development of the regional energy system and provide more robust strategic planning signals to the DNOs of future network requirements. In turn, we expect DNOs to use the RESP to develop longer-term strategies for facilitating net zero on their networks including the opportunities for distribution-level strategic and anticipatory network investment.
- 6.33 Our ambition is that the first full suite of RESP outputs will be available in 2028. This will be after the DNOs have developed and submitted their Business Plans for ED3. Consequently, we are considering the timing and scope of a tRESP output to align timelines and provide input for the DNOs to prepare their detailed network plans for ED3. We will also take account of the tRESP in our Business Plan Guidance when taking decisions on methodology for SSMD and making our determinations in 2027.
- 6.34 Although a decision is still to be taken on the tRESP outputs to be delivered in early 2026, our initial view is that the following would be beneficial for ED3 business planning:
- regionally specific short- and long-term pathways for input into DFES modelling, based primarily on the regionalisation of FES25, as well as local priorities and opportunities for strategic investment, where practicable;
 - a set of consistent methods and assumptions to derive network need. For example, assumptions on how peak demands are derived, common approaches to consideration of local government input. This will also inform FES25 pathway development; and
 - coordination of wider stakeholder engagement and cross vector input on local priorities, particularly around strategic investment, cross vector interactions and facilitating conversations where there are a range of delivery options available.

²⁸ [Regional Energy Strategic Plan policy framework consultation | Ofgem](#)

²⁹ This will comprise a directive short term pathway which branches into a number of long-term pathways which bound a range of futures consistent with delivery of net zero goals.

- 6.35 When a decision has been taken on the enduring RESP outputs, we will further consider how to manage the interactions with the price control over ED3 eg a load-related uncertainty mechanism. It may also inform our decision on the length of the ED3 price control, given the potential for enduring RESP outputs to be updated on a three-yearly basis.
- 6.36 **Strategic and anticipatory investment:** Historically, DNOs have not generally made strategic (large bespoke projects or network-wide programmes of smaller upgrades) or anticipatory (ahead of uncertain need) investments in the distribution networks. This is due to a variety of reasons including:
- a large residual of capacity headroom;
 - a relatively short lead time to complete network upgrades; and
 - large uncertainty over future demand growth.
- 6.37 These factors (and others) meant that there was not a compelling needs case. Instead, DNOs generally plan for network development over a 10-year horizon and follow a 'just-in-time' (JIT) investment approach for projects to meet certain need within the price control period.³⁰
- 6.38 Due to the drivers of change (see Chapter 3) and the systemic developments such as the RESP and CP2030, we think there is greater scope in ED3 for some strategic and anticipatory investment in the distribution networks to help contribute to the efficient delivery of networks for net zero.³¹ In particular, we envisage that greater certainty about the rate and extent of electrification for net zero and the introduction of RESPs will be transformative for DNOs network planning and investment decision-making.
- 6.39 With greater foresight of the long-term energy developments in a region, the DNOs will be in a better position to identify future network needs for net zero and to assess the costs and benefits of different investment strategies for delivering the required upgrades.
- 6.40 Some of the long-term efficiencies and consumer benefits that could be derived from strategic and anticipatory investment in ED3 are:

³⁰ DNOs' network planning is typically informed by estimating peak demand down to a secondary substation level, based on a 'Best View' of future supply and demand, and modelling future network loading over half-hour time periods and seasons to identify the parts of the network that are likely to need upgrading over a ten-year window.

³¹ [BEIS - Electricity networks strategic framework appendix-1, August 2022](#)

- greater economies of scale from taking a more programmatic approach to network investment, in particular, high volume, replicable upgrades on the secondary network and service lines;
- future-proofing JIT interventions to reduce lifetime costs by sizing elements of works for long-term need eg civils where the combined upgrade and additional marginal cost is less than the combined net present value of upgrading for certain need and the cost of upgrading in 15 years as a retrofit;
- identifying low regret anticipatory investment to smooth the profile of network upgrades to help alleviate future supply chain and workforce pinch points likely in the 2030s;
- giving the supply chain more certainty on long-term volumes in order to adjust production capacity;
- building momentum early in the price control counter to the historical trend for network reinforcement delivery to start slowly;
- fewer power losses through reduced network loading; and
- fewer disruptions/inconvenience to communities through touching the network once. Strategic planning should also enable ED companies to collaborate with other utilities to coordinate street works and reduce interruptions from essential planned works more effectively.

6.41 The potential risks and consumer downsides that could arise with strategic and anticipatory investment in ED3 include:

- front-loading network investment early in ED3 could exacerbate supply chain pressures and skills shortages without appropriate targeting;
- consumers would bear additional costs in a price control period than would be the case if the anticipatory investment was not included. However, this is a timing issue as it is bringing forward investment ahead of need that would otherwise have been made in a future price control period;³² and
- as we will not have perfect foresight of future need there is a risk that consumers would unnecessarily bear the costs of assets that turn out not to be needed in the future. However, as discussed above, we think that the introduction of the RESP and the convergence across net zero pathways on the growth in electrification are reducing this potential risk and impact.

³² The cost to consumers would be a function of the allowed return on capital and depreciation that the network could recover for the investment. For example, if extra capacity is not utilised for five years, the additional timing cost is of the order of 20% of the investment cost.

- 6.42 **Interactions with asset health expenditure:** There could also be synergies with asset-health investments that are required to maintain the network and replace ageing distribution assets. Many assets on networks are due for condition-based replacement and this potentially provides opportunities to re-size capacity for future demand at the same time; an issue that is explored further in Chapter 9.
- 6.43 **Political commitment:** The UK and Scottish governments' strong commitment to a predominantly renewable power system by the start of the next decade and the longer-term net zero targets are reducing the divergence in the net zero pathways. There is increasing certainty about the significant role that DER will play in a decarbonised power system, including domestic demand through the electrification of transport and heating, meaning that electricity distribution is increasingly a low-regrets investment.

- Q17.** Do you agree that the tRESP output outlined for early 2026 will help create a level playing field for DNOs' business planning and support the ED3 objective and consumer outcomes?
- Q18.** Can anticipatory network reinforcement be used to smooth the long-term build profile to avoid creating pinch points for the supply chain and workforce? What are the risks and trade-offs?
- Q19.** Do you agree that investment optioneering should aim to reduce the lifetime costs by sizing elements of works for long-term need, including considering the impact of thermal losses?
- Q20.** Is a 5-year price control (2028-33) the right duration to achieve the objective of securing timely network capacity for the net zero transition at least cost to consumers over the long run?

Implications for ED3 LRE regulatory framework

- 6.44 Our proposed "networks for net zero" consumer outcome is for strategically planned networks that are ready for net zero at least cost based on whole system value for current and future consumers.
- 6.45 As discussed in the previous chapter, we think that the balance of risks typically associated with network investment is changing. From a whole-system perspective, we consider that the potential consumer downsides from delayed investment are increasing while the potential downsides of early network investment are reducing.
- 6.46 The change in the balance of risks poses some important questions for the future LRE arrangements for ED3:

- does the balance between network reinforcement (including strategic and anticipatory investment) and network flex matter for the networks for net zero consumer outcome?; and
- what changes to the LRE regulatory model for ED3 might be needed to secure the networks for net zero consumer outcome?

- 6.47 On the first question, we think a 'flex first' approach to defer network investment could be out of step with the expected context for ED3. While network flex may ease some supply chain constraints early in ED3, it also risks higher network loading that could increase network losses and limit the benefits of DER to the wider system, leading to higher system costs overall. Therefore, the use of network flex to defer network investment in ED3 is likely undesirable.
- 6.48 On the other hand, a proactive capital investment programme to reduce the risk of network constraints when electricity demand and distributed generation are growing in ED3 is likely advantageous.
- 6.49 In the context of network expansion, moving towards a 'Plan and Deliver' model (see Chapter 5) for LRE could be an option for ED3 to ensure that DNOs are delivering investments consistent with the longer-term needs of the network and aligned with wider strategic energy system plans. However, this would likely require several changes in the ED3 LRE framework relative to the RIIO-ED2 arrangements, which we explore next.
- 6.50 **Network investment allowances and spend fungibility:** In a model of ex ante allowances, we envisage that allowances for the planned investments to meet future load growth would be designated solely for the delivery of an agreed investment plan. There is consideration in Chapter 9 as to options for how asset health and resilience expenditure might be included to allow for such future-proofing investment in the round, particularly given expected changes (more interdependency) in the drivers for network investment. These allowances could not be spent across other cost categories. High-value expenditure for strategic investment (large projects or large programmes of smaller upgrades) would be tied to a specific deliverable. We recognise that this will need to be designed carefully, recognising that the most efficient investment programme for DNOs may be to have some latitude to reprioritise the allowances. For example, the DNOs' investment plans may be best adapted to reflect the benefits of anticipatory (upsizing a JIT or non-load investment for future need) and adaptive JIT network investment in response to developments as long as

the delivered investments do not diverge materially from the delivery metrics that are agreed for an investment plan (see below).

- 6.51 In an ex post / cost pass through model for such agreed plans, given a different approach would be taken, there is necessarily a different treatment of these costs.
- 6.52 **Network investment outputs and incentives:** With a greater focus on delivering networks for net zero in ED3, the investment framework would need to strengthen the accountability of DNOs for the delivery of an agreed investment plan. It should be straightforward to prescribe PCDs for strategic investments based on the specific projects or programmes of work, with target delivery dates or a programme schedule over the price control period. However, we consider it would not be practical to assign specific PCDs for the high volume of anticipatory and JIT investments that are likely to make up a significant proportion of each DNO's investment plan. Instead, the framework may need to assign some delivery metrics to monitor the aggregate delivery of anticipatory and JIT investment against the agreed investment plan. Aggregate delivery metrics could track delivery against the expected benefits from an investment plan as well as the activities. Potential parameters could include net capacity additions to meet certain future need, the volume of firm connections enabled, the mix of interventions deployed etc. The RIIO-ED2 secondary reinforcement volume driver provides a framework that could potentially be used/adapted to define these parameters for higher volume activities.
- 6.53 **Ex ante allowances:** Whilst most of the allowance for an agreed investment plan could be cost-assessed and agreed up front, some ex post evaluation may be necessary for any project/programme specific PCDs or if the aggregate delivery metrics diverge significantly from an agreed investment plan. Some additional allowances could be set in the period through uncertainty mechanisms (see 'Managing uncertainty' section), eg to allow the RESP outputs to inform or adapt DNO delivery plans within the price control period. We ask a question (Q9) about the use of ex post and cost pass through methodologies in Chapter 5.
- 6.54 **Inputs:** We expect that an agreed investment plan could comprise elements of strategic, anticipatory as well as adaptive JIT network investments. We expect the DNOs to continue to lead detailed network planning with input from NESO to validate strategic investment and taking into account regulatory guiderails we might develop to inform optioneering and investment decisions. This could include guidance based on clear principles and rules on the role of different

network solutions during ED3 such as network flexibility, reducing lifetime costs by sizing elements of works for long-term need and thermal efficiency, and adapting option evaluation to consider the wider system costs and benefits of ED network interventions eg losses and access to DER.

- 6.55 We are also exploring to what extent an evolved approach to cost benefit analysis (CBA) might be an alternative, or complementary, measure to taking a more directive stance. This could, for example, involve taking into account a wider set of factors (social, economic, environmental, etc) that reflect positive or negative externalities, which could lead to a different decision on anticipatory investment compared to the traditional CBA methods. As ever, there is often a challenge to the measurability of these wider factors, which will need to be robust if they could materially impact decision-making. We welcome stakeholder views on this. We also refer to the role of CBAs in Chapter 9, alongside a specific question relating to their evolution for ED3.
- 6.56 The benefits of a more proactive stance in the LRE framework for ED3:
- consistency of outcomes for consumers given a certain set of inputs, with reduced ability for outcomes to be unduly influenced by particular corporate investment strategies and/or shareholder agendas;
 - higher confidence that programme of network upgrades in ED3 and future price control periods is feasible, reducing the threat of compounding deliverability risks in the future of an unmanageable scale of investment;
 - stronger accountability for DNOs to scale up delivery capability and to signal long-term requirements for supply chains and workforce skills to increase UK-based capacity;
 - consistency in the drivers behind DNOs' LRE submissions and a more comparable basis for assessing need and the efficient cost of delivering such need (and net zero more generally); and
 - streamlining decision-making post Final Determinations.
- 6.57 There are also some potential downsides, including:
- more investment than would otherwise be needed in the price control period or investment in the wrong place leading to higher costs for consumers than necessary; and
 - ED3 mandate/guidelines on network investment not aligning with the DNOs' licence obligations or statutory requirements, or even interfering with their directors' statutory duties in the extreme.

- Q21.** To what extent should the price control be more directive on specific anticipatory and strategic investments to achieve the 'networks for net zero' consumer outcome?
- Q22.** Do you agree with our characterisation of strategic and anticipatory investment and our expectation that these activities would have different regulatory drivers and controls?
- Q23.** Should the price control provide more guidance or guardrails around the use of particular network solutions to achieve the 'networks for net zero' consumer outcome?
- Q24.** Should we consider how we might bring all network capex investment together within the framework, irrespective of driver (eg load, asset health, resilience), to ensure a common approach to future proofing and delivery?

Managing uncertainty

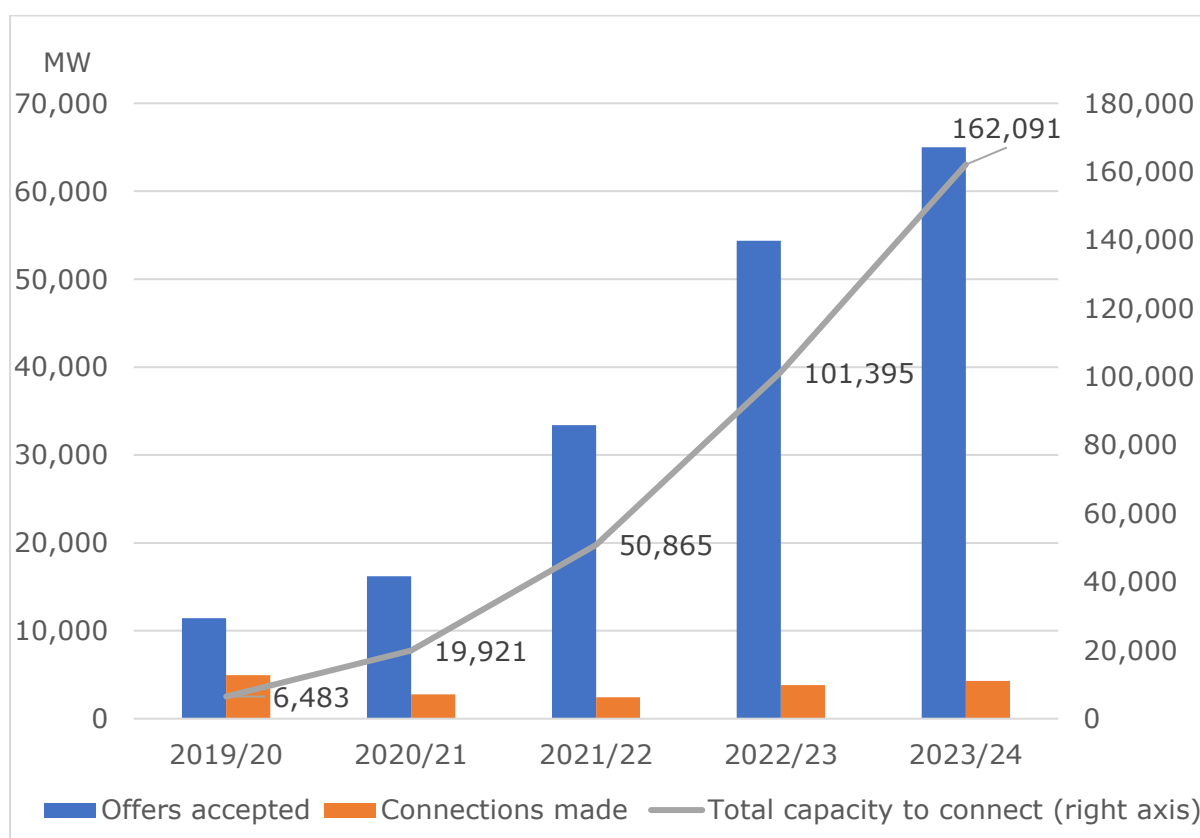
- 6.58 Setting LRE allowances at the start of the price control typically creates risks that forecast allowances are set too low or too high. This means that in the event demand growth turns out to be higher than forecast, a DNO could face financial constraints to deliver the network capacity. Conversely, consumers need protection if the opposite is true. To manage these risks in RIIO-ED2 we introduced several uncertainty mechanisms to adjust the baseline funding for the volumes that are delivered.
- 6.59 Moving to a more planned approach to preparing the ED networks for net zero could help to alleviate some of these risks. We expect that taking a more proactive, planned approach to building a net zero ready network would significantly reduce the risk that baseline allowances are set too low, particularly for larger reinforcements or large programmes of smaller value works. However, we also recognise that it might be difficult to plan for the very small interventions that could be needed to upgrade the last few meters of the network eg service provision equipment that connect homes and premises to the network, such as fuses and power cables.
- 6.60 Consequently, we think that there could be a case for retaining some form of volume driver in ED3 to automatically adjust allowances for small-scale activities that are demand driven, or other unforeseen circumstances. We are interested in how we might apply some guiderails on the circumstances when the mechanisms should be used in the context of a more programmatic approach to reinforcement.

6.61 As highlighted in Chapter 5, it is likely that some form of LRE re-opener would also be needed in ED3 to allow the full outputs from RESPs to inform or adapt DNO delivery plans within the price control period.

Timely distribution connections

6.62 There has been a significant increase in projects seeking to connect to distribution networks over the last five years. Figure 9 highlights that the capacity of projects contracted to connect has increased roughly 24 times since 2019/20.

Figure 9: Total capacity contracted to connect to GB ED network

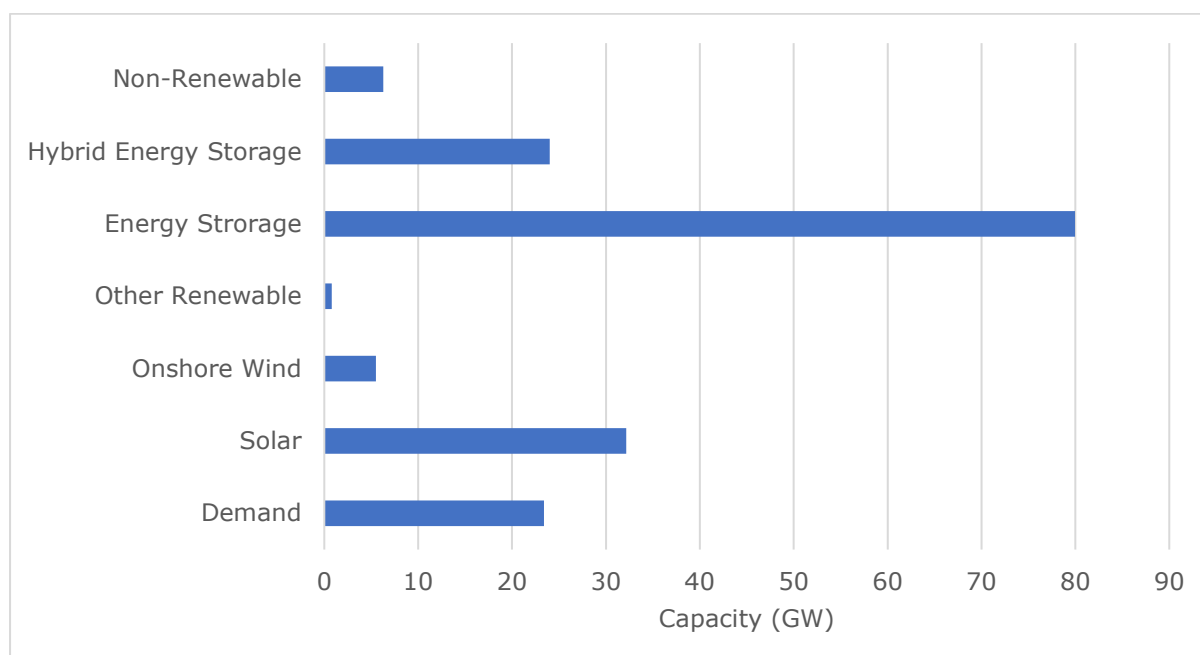


6.63 As of September 2024, there is approximately 143GW of new generation seeking to connect to the distribution network. In addition to the 549GW of projects holding transmission connection agreements³³, the total capacity of new generation seeking a connection in GB far exceeds the 220-265GW of additional electricity supply capacity needed for net zero in 2050.³⁴

³³ [Connections action plan: speeding up connections to the electricity network across Great Britain - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/118114/connections-action-plan-speeding-up-connections-to-the-electricity-network-across-great-britain.pdf)

³⁴ In 2023 the installed electricity supply capacity was 116GW. Additional capacity needed for net zero taken from FES 2024 Data Workbook: Tab ES.06 - Installed electricity supply capacity.

Figure 10: Accepted ED connection offers, categorised by type

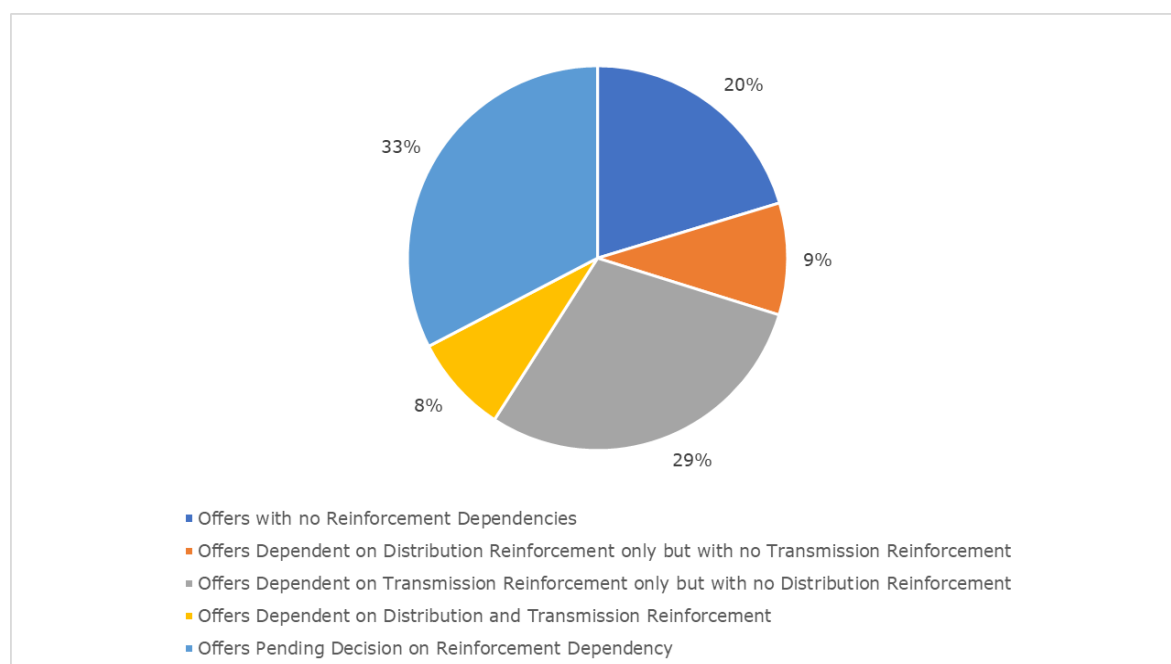


6.64 As Figure 10 demonstrates, 80GW of energy storage connections dominate, followed by solar and hybrid energy storage³⁵ with 32GW and 24GW respectively. Some major demand connections can also be affected by constraints at grid supply points, making up 23GW of the connections pipeline.

6.65 Typically demand and generation connections at lower voltage (<1MVA) are not reliant on transmission upgrades but the volume of connections is ramping up, especially for connecting LCTs. However, distributed generation projects over 1MW require an assessment of impacts at the transmission level, which can lead to delays to the project as well as impose additional costs if transmission reinforcement is identified. Figure 11 below illustrates the type of reinforcement required before the projects can connect to the distribution network.

³⁵ Storage integrated with generation (behind the same point of connection).

Figure 11: Reinforcement dependencies for ED connections (>1MW)



6.66 Figure 11 illustrates that the queue of >1MW connections is predominantly made up of offers where the relevant TO has yet to determine the reinforcement required, at 33% of connection offers. This is followed by offers where only transmission reinforcement is required, which makes up 29% of the distribution queue. The size of offers where only distribution network reinforcement is required is smaller at 9%.

6.67 To circumvent the issues of limited network capacity, DNOs offer flexible or non-firm connections to customers. These connections either limit the times or capacity a generator or demand customer can export or import. These connections are facilitated through the network control system known as Active Network Management (ANM).

6.68 DNOs are proactively managing their distribution connection queues by ensuring that milestones are included in pre-2017 generation connection contracts, progressing connection customer cancellations and extending the insertion of milestones into demand connection contracts. Additionally, the interaction between transmission and distribution is being improved to allow DNOs to actively manage connections within ‘technical limits’ set by the ESO at GSPs and standardising firm connections to battery energy storage customers. Collectively the DNOs have determined that a maximum 63GW³⁶ of capacity could potentially be released onto the network as a result of the ‘technical limits’

³⁶ ENA Strategic Connections Group - October 2024

- initiative, though the total capacity of projects that will accept the flexible connection terms being offered, is expected to be much lower.
- 6.69 Delays faced by most major distribution connections are typically due to non-ED factors such as a lack of project funding and transmission capacity constraints. Some types of distributed generation, such as battery storage, have the potential to present technical complexities but generally can connect after some distribution reinforcement is completed.
- 6.70 Smaller connections (<1MVA) at lower voltages have been less affected by delays to date. DNOs do not have a direct role in installing LCTs such as heat pumps and EV chargers in homes. However, in some cases DNOs need to carry out works to upgrade the LV service cable connecting an individual property or to replace a fuse if the third-party installer identifies an adequacy or safety issue with the existing LV service equipment.³⁷
- 6.71 The time to connect (TTC) incentive has been effective in driving down the time taken to make new connections at lower voltages, however with customer uptake of LCTs expected to accelerate rapidly in the future, it is important that we consider how incentives might evolve to ensure timely upgrades to existing connections and ensure that the DNOs prepare for a large increase in the volume of smaller connection works, in order to avoid undue delays in LCT connections in future.³⁸
- 6.72 As detailed in Chapter 7 below, the end to end connections review being carried out under our wider electricity connections workstream has identified a number of potential areas where improvements could be made to address specific issues relating to electricity connections at both transmission and distribution voltages. Our proposed planned, anticipatory approach should help ensure that networks are there when they are needed to facilitate immediate household connectivity in many cases, but reforms to connection standards and incentives may also be required. We discuss these reforms further in Chapter 7.

³⁷ Third-party installers of LCTs must assess that the power supply to a property is adequate for the new equipment to connect. They must apply to the local DNO prior to installation if they identify an adequacy or safety issue with the existing service equipment.

³⁸ To make the process of applying for a domestic low-carbon connection simpler and faster for installers, the Energy Networks Association has created an online connection application portal for both electric vehicle charging points and heat pumps. The platform is capable of auto-approving applications: [ENACONNECTDIRECT \(energynetworks.org\)](https://www.energynetworks.org/ENACONNECTDIRECT)

7. Responsible business

- 7.1 DNOs are providers of essential infrastructure and have a critical role to play in delivering sustainable economic growth and supporting the transition to net zero in an increasingly electrified and decentralised energy system. It is key that they maintain a strong sense of ownership of consumer and decarbonisation outcomes and public trust, beyond delivering the core duties and obligations provided by statute and regulatory framework.
- 7.2 Concepts of organisational legitimacy, credibility and trust are particularly relevant to stakeholders, and there are mechanisms within the RIIO-ED2 price control that seek to drive high performance in these areas, including in relation to consumer protection, enhanced stakeholder engagement, long-term value for money and cost assessment, responsible financing, reporting and accountability.
- 7.3 This chapter explores these areas in detail, and we seek stakeholder views on how these might develop for the ED3 price control.

Social purpose

- 7.4 Central to the RIIO-ED2 price control is our fundamental objective to protect consumers. This overarching outcome permeates through many parts of the price control framework, supported now also by Ofgem’s consumer interest framework, from quality of service incentives, specific obligations relating to vulnerable customers, asset health and network reliability, incentives that drive operational improvements and the efficiency framework that drives best value for consumers and creates strong incentives for continuous and sustainable improvement. This focus on consumer outcomes remains central to the development of the ED3 framework, which, similarly to RIIO-3, should be underpinned by the principle of acceleration with accountability.
- 7.5 The price control has typically focused on driving improvements in key areas for consumers where the outcomes can be valued using traditional cost benefit methods, using economic regulatory tools to ensure value for money.
- 7.6 We are interested in learning from the experience of other regulators and sectors both in the UK and internationally, to understand whether there are alternative or additional approaches that might deliver further improvements for consumers, including addressing wider social and environmental challenges and externalities where outcomes are less easily measured, compared or valued, for example relating to governance, community engagement, nature and biodiversity, consumer insight and culture.

- 7.7 We want to ensure that ED networks are focused on delivering the consumer outcomes outlined in Chapter 4 and held accountable for delivering these outcomes. This means companies building network infrastructure in the right place and at the right time, whilst maintaining quality of service and asset health so that risks are not inadvertently stored up for the future.
- 7.8 Transparency is key to driving greater accountability. In April 2024 we decided to make certain modifications to the Regulatory Financial Performance Reporting (RFPR) template and associated Regulatory Instructions and Guidance (RIGs) for network companies.³⁹ These changes impose more rigorous standards of disclosure on companies, enabling us to better monitor performance and financial resilience and to assess compliance with price control obligations. We welcome stakeholder views about whether we should go further and how we can continue to encourage greater transparency through regulatory or other forms of reporting.

- Q25.** How can we better strengthen accountability for consumer outcomes?
- Q26.** What are your views on ED company reporting and the overall transparency of performance and compliance?

Enhanced stakeholder engagement

- 7.9 Stakeholder engagement is a core element of network regulation. By stakeholders, we mean individuals, companies, organisations or communities that are impacted directly and indirectly by the activities of the network companies. This includes existing and future consumers. For RIIO-ED2 we introduced the requirement for DNOs to establish Customer Engagement Groups (CEGs), to provide challenge to DNOs on whether their Business Plans addressed the needs and preferences of consumers.
- 7.10 As part of our review of future network regulation in 2023 (FSNR) we decided that it was vital to maintain a clear objective for network companies to keep consumers and other stakeholders at the centre of network business planning and in the delivery of outputs and outcomes.
- 7.11 Therefore, for RIIO-3 we have mandated the appointment of Independent Stakeholder Groups (ISGs) by each network company and set out the overall terms of reference for these groups. These groups will provide challenge and scrutiny to the network companies both as they develop their Business Plans,

³⁹ [Ofgem - Decision on 2024 modifications to the Regulatory Financial Performance Reporting \(RFPR\) for RIIO-2, June 2024](#)

and on an enduring basis during RIIO-3, holding the network companies to account in the delivery of these plans.

- 7.12 In the same way, we propose adopting the same position for ED3 as we have in other sectors, with a requirement for DNOs to appoint ISGs, with the terms of reference that are substantially the same as those described in Chapter 2 of the RIIO-3 Business Plan Guidance.⁴⁰
- 7.13 The development of RESPs provides a further opportunity for place-based engagement. DNOs will be expected to work closely with the NESO, local and regional government, communities and developers of energy services and projects, to support the development of RESPs. Our Regional Energy Strategic Planning policy framework consultation sets out how each RESP Strategic Board should facilitate transparency, heighten visibility of regional priorities and provide oversight of the RESP development.⁴¹
- 7.14 As the detailed methodology and governance around future regional energy strategic planning remains under development, we expect licensees to continue to lead on stakeholder engagement, building on the progress we have seen in this area RIIO-ED1 and RIIO-ED2.

Q27. Do you consider that ISGs alone are sufficient to ensure high quality and effective consumer and stakeholder engagement throughout the ED3 price control? What alternative or complementary approaches should we consider?

- 7.15 We are also considering how we can best ensure that the voice of consumers and communities remains central to our policy development and decisions during the ED3 price control setting process. We believe that inclusive research, demonstrating the diverse needs and perspectives of consumers underpins good consumer outcomes. We want to ensure that the consumer voice is heard throughout the ED3 process; this is key to Ofgem. We believe that more can be done in this space. Having greater insight directly from across all consumer types ensures their evolving needs and perspectives are effectively accounted for. We are considering the use of a range of methodologies to do this, for example through the use of more deliberative, qualitative approaches to inform our thinking and understanding of the consumer need.
- 7.16 We also consider that network companies should demonstrate how they have developed their own inclusive research and stakeholder engagement

⁴⁰ [RIIO-3 Business Plan Guidance \(ofgem.gov.uk\)](https://www.ofgem.gov.uk/riio-3-business-plan-guidance)

⁴¹ [Ofgem - Regional Energy Strategic Plan policy framework consultation, July 2024](#)

programmes to ensure that consumer views are effectively accounted for in the ED3 process. This includes broad engagement with consumers as DNOs consider the development and construction of projects on their networks. All such research would have to be independent and conducted within recognised market research guidelines.

- Q28.** Do you agree that Ofgem should adopt research approaches, such as deliberative techniques to ensure that the consumer voice is heard and considered throughout the ED3 and company Business Plan process?
- Q29.** How should our approach to enhanced stakeholder engagement be adapted to better include the perspectives of all vulnerable customers, including those that are seldom heard, digitally disengaged/excluded and those that are worst served?
- Q30.** What alternative or additional approaches might we use to ensure that the consumer voice remains central to our policy setting process?

Delivering high quality of service

Broad Measure of Customer Satisfaction

- 7.17 We expect DNOs to deliver high quality services that meet customers' needs. For ED3, DNOs should continue to provide a high quality of service to customers that require a new connection, seek information from the network in the event of a supply interruption, have made a general enquiry and to customers that have raised complaints; ensuring that they are dealt with quickly and effectively.
- 7.18 In RIIO-ED2, we reiterated our expectation that companies put consumers at the core of their business operations and put in place an enhanced engagement framework to further drive this. In ED3, we will intensify our customer-centric approach to setting DNO delivery outputs and calibrating incentives. Our key incentive in this area is the Broad Measure of Customer Satisfaction (BMCS). The BMCS consists of the:
- Customer Satisfaction Survey (CSS): where DNOs are incentivised to continue to improve the quality of customer service; and
 - Complaints Metric (CM): where DNOs are incentivised to manage customer complaints efficiently and resolve them satisfactorily.
- 7.19 The BMCS was carried over from RIIO-ED1 with some adjustments made to the scope and the introduction of new reporting metrics to account for lessons

learned from Storm Arwen as laid out in our report published in June 2022.⁴²

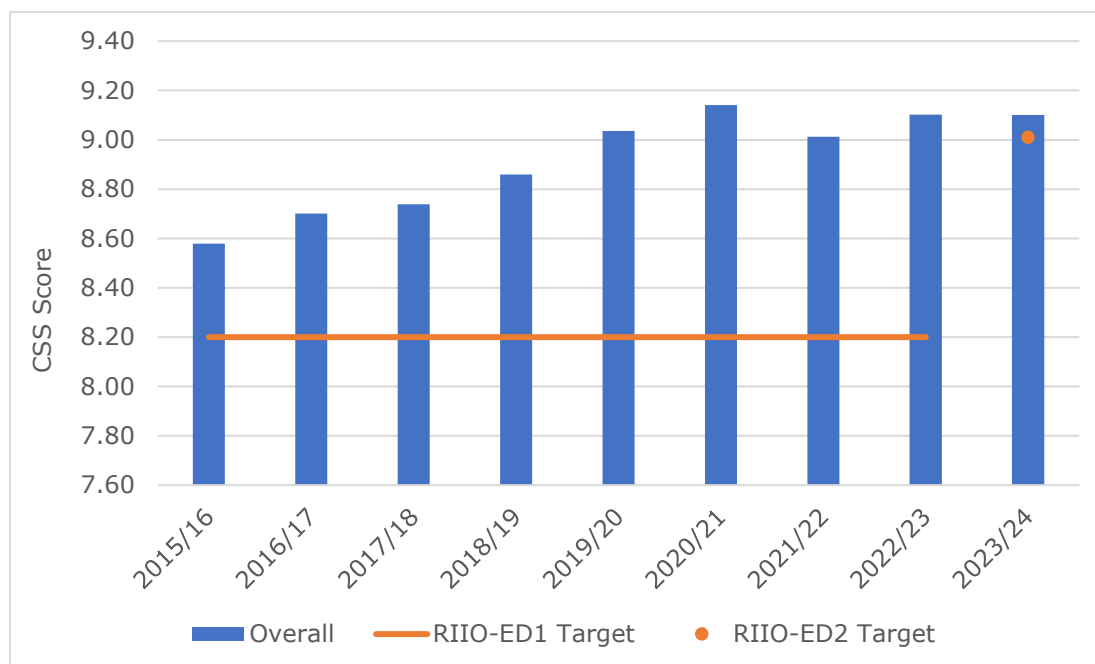
The intention of these modifications is to ensure that DNOs maintain a high level of responsiveness to customers in the context of continued and more frequent severe weather events.

- 7.20 DNO performance in relation to the CSS element of the BMCS incentive improved between 2015-16 and 2020-21 and maintained a high level of performance from 2021-22 to 2023-24. From the start of RIIO-ED1 to the first year of RIIO-ED2, there has been a 6% increase in customer satisfaction. As evidenced in Figure 12 below, all DNOs scored above the 8.2 target score and the majority of DNOs went above the maximum reward score of 8.9 in the RIIO-ED1 period of 2015/16 to 2022/23. It demonstrates the effectiveness of the BMCS incentive in ensuring that DNOs provide a high level of customer service in terms of general enquiries, connections, interruptions and in the handling of complaints. The total rewards paid to all DNOs over the 8-year RIIO-ED1 period in relation to the BMCS was c. £321m.⁴³
- 7.21 Data from the first year of RIIO-ED2 is shown on the graph as well as the new target of 9.01. On average, DNOs have performed better than the improved target in the first year of RIIO-ED2, with incentive rewards available to those DNOs that achieve a score >9.12.

⁴² [Storm Arwen Report | Ofgem](#)

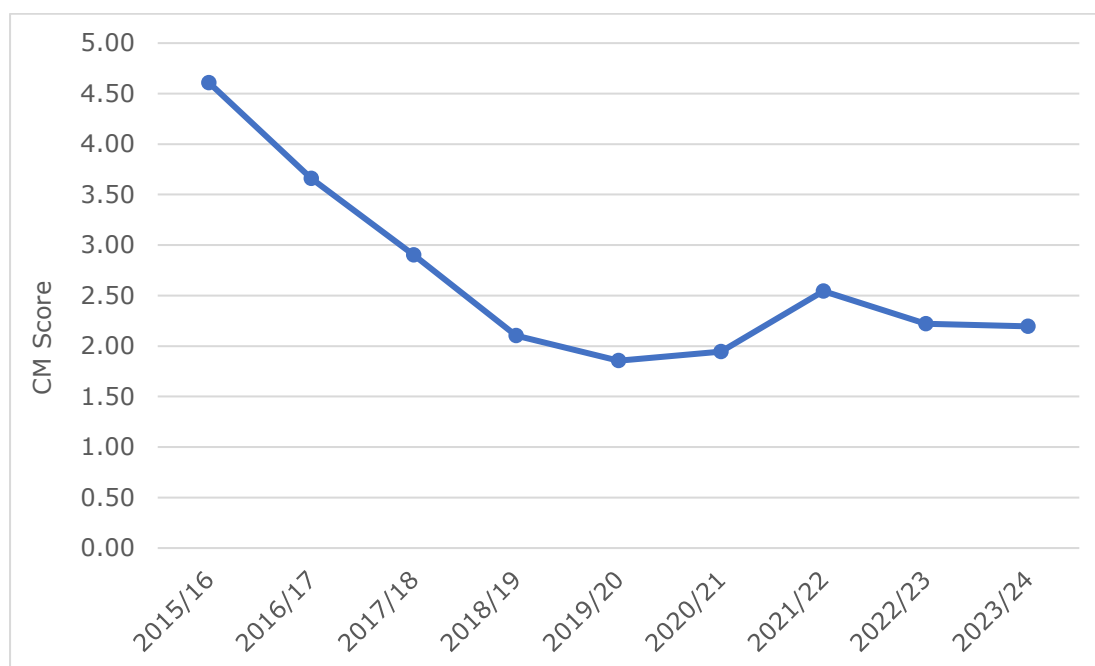
⁴³ BMCS included three elements in RIIO-ED1; CSS, CM and a separate stakeholder engagement and consumer vulnerability (SECV) incentive.

Figure 12: CSS industry average performance 2015/16 to 2023/24



7.22 Alongside the CSS, the Complaints Metric (CM) ensures DNOs maintain good performance in their handling of complaints. We were satisfied with DNO performance in RIIO-ED1, with all DNOs, on average, performing better than the common target of 8.33, and the time taken to resolve complaints, falling 52.2% from the start of RIIO-ED1 to the first year of RIIO-ED2. Similar to BMCS the incentive was rolled over for RIIO-ED2, with a shorter target of 2.80 to reflect the improvements made in RIIO-ED1. Performance against CM from the start of RIIO-ED1 to Year 1 of RIIO-ED2 is illustrated in Figure 13 below. Good performance is demonstrated through a falling CM score, as it indicates DNOs are resolving complaints quicker.

Figure 13: CM industry average performance 2015/16 to 2023/24⁴⁴



7.23 At this stage we are inclined towards continuing both of these metrics in ED3 with sharper, more stretching targets. However, we welcome stakeholder views on whether the incentive has served its purpose of establishing high quality customer service or whether these levels should become embedded into the DNOs service culture as BAU. This includes whether it is in the consumer interest to continue to offer a reward incentive to drive further performance improvements.

7.24 We are also interested in how these (or new) metrics might be adapted to better reflect a wider range of interactions between the DNO and its customers. The ED3 period will see increasing numbers of small connections and a greater reliance on the DNOs to support the timely and reliable delivery of heat and transport decarbonisation. In this evolving situation, the existing metrics may not fully represent the full range of services that DNOs provide.

Q31. Has the BMCS incentive served its purpose in driving performance improvements and how can we adapt the metrics to better incentivise performance across a wider range of interactions between DNOs and their customers, particularly relating to connections?

⁴⁴ CM score is made up of 4 measures under different weightings. These are: complaints unresolved after one day (10%), complaints unresolved in 31 days (30%), repeat complaints (50%), the number of Energy Ombudsman decisions that go against the DNO (as a % of total complaints) (10%).

Supporting customers in vulnerable situations

- 7.25 In the transition towards increased electrification, there will be a range of benefits for all consumers. However, some consumers, especially those in vulnerable situations may be at risk of being excluded from these benefits and could suffer from new forms of detriment. Therefore, both in RIIO-ED1 and RIIO-ED2, we ensured that our framework incentivised DNOs to provide appropriate support and services to consumers in vulnerable situations.
- 7.26 In RIIO-ED2, we:
- introduced key principles and baseline expectations for service provision to customers in vulnerable situations;
 - replaced the RIIO-ED1 Stakeholder Engagement and Customer Vulnerability (SECV) with the Customer Vulnerability Incentive (CVI). The CVI ensures that DNOs are held accountable for delivering their vulnerability strategies and incentivises them to develop ambitious and best practice initiatives;
 - introduced the Annual Vulnerability Report (AVR) to ensure all incentive performance is reported and published for full transparency to all stakeholders; and
 - introduced the Treating Domestic Customer Fairly licence obligation which places an obligation on licensees to treat all domestic customers fairly and have the measures in place to deliver positive outcomes for such customers.
- 7.27 The CVI scores DNOs on performance against five metrics, which we have set targets, deadbands, caps and collars for. These metrics are:
- Priority Services Register (PSR) Reach – the total number of households registered on the PSR out of the total number of PSR eligible households in a company’s region;
 - value of fuel poverty services delivered and value of low carbon transition services delivered – these two metrics measure the value of services delivered by a DNO or its representative, relating to fuel poverty or low carbon transition, in ensuring no one is left behind by the energy system transition, where a service has been provided or a job has been completed; and
 - average customer satisfaction for customers who receive fuel poverty services and low carbon transition support services – these two metrics measure customers satisfaction with DNO or its representative's service provision.
- 7.28 Performance data against the CVI is limited as it was only introduced in RIIO-ED2. Additionally, the CVI is not an annual performance metric; instead,

performance is assessed in year two and year five of the price control. As a result, data against the value delivered and customer satisfaction of fuel poverty and low carbon transition services metrics are not robust enough to comment on at this stage. However, the PSR Reach metric provides some insight into DNO performance towards the year two target with the majority of DNOs being close to or surpassing its year two target after the first year RIIO-ED2 and some DNOs surpassing their year five target in the first year of the price control.

- 7.29 We would like to understand how the incentive could be adapted for ED3, eg improving the delivery of the customer satisfaction surveys given advances in communication channels driven by technology. We would like to gather stakeholder views on the baseline expectations for customers in vulnerable situations and the reputational element of the incentive, the AVR, and whether this is an effective incentive.
- 7.30 Additionally, in the transition to net zero, greater electrification can materialise in a number of ways, including through increased electrification of domestic heating and cooking. Given the likely increasing prominence in the electrified heating of and cooking in homes, we are keen to hear views on whether it might be beneficial to replicate some of the protections for customers in vulnerable situations that currently exist for GD, but not ED. For example, the Guaranteed Standards of Performance (GSoPs) for customers on the Gas Distribution Networks' (GDNs) PSR.⁴⁵

<p>Q32. How should the CVI be adapted for ED3 and should we consider greater alignment with the GD sector?</p>

Energy efficiency

- 7.31 Future electricity demand will depend critically on changes in the way that we heat our homes, as well as on other future electricity use in commercial and industrial premises. In particular, there is a widely acknowledged need to scale up the uptake of thermal energy efficiency of the housing stock. DNOs have not historically been responsible for the delivery of energy efficiency services within consumers' homes. In the past our view has been that redistributing substantial costs for such activities through energy bills, when the economic, comfort and health benefits accrue only to those consumers whose properties have benefited from such measures, is an area for government.

⁴⁵ Guaranteed Standard 3 (GS3) states that if you are registered on your supplier's PSR and your gas supply is interrupted, you will be provided with alternative heating and cooking facilities within 4 hours, or if more than 250 customers are affected, within 8 hours. (8pm to 8am excluded).

- 7.32 However, it is also the case that energy efficiency will tend to have a beneficial, economic impact on the wider electricity distribution network itself, reducing demand on networks under some circumstances, particularly through activities that reduce heat loss. Measures such as the addition of smart heating controls or smart EV charging also create opportunities for consumers to participate in flexibility markets, which can benefit the wider system. Alongside these benefits, the local footprint of DNOs, their management of the PSR, as well as their continuous service of properties (unlike energy suppliers) may mean that DNOs could have a role to play.
- 7.33 We are therefore interested in stakeholder views on whether this is an area where the DNOs should have greater responsibilities, what role might be appropriate and whether funding to deliver such services to consumers should be provided through the price control, or whether some alternative mechanism would deliver a fairer outcome for all consumers.

Q33. Should DNOs have a role in delivering energy efficiency measures to homes and businesses? What might the scope of these services be and how should they be funded?

Providing a quality service to consumers seeking a connection

- 7.34 As noted elsewhere, under all net zero pathways, the transition to net zero will require a significant increase in the number of connections to LCTs such as EV chargers, heat pumps, battery storage and distributed generation, at pace. This means that the regulatory framework governing the service elements of the connections process, which includes obligations and incentives, will likely play a more significant role in ED3 and we need to ensure it remains fit for purpose with appropriate obligations and incentives in ED3.
- 7.35 Service provision to connections customers is split into two broad categories. These are:
- minor connections: these are connections at the lower voltages that generally cover domestic customers. The connections process is generally considered to be straightforward, and we incentivise DNOs service provision through the CSS element of the BMCS as well as through the Time to Connect (TTC) metric;⁴⁶ and

⁴⁶ See paragraph 7.17 for more detail on BMCS

- major connections: these are connections at higher voltages such as generation customers. Whilst there are fewer connecting customers overall, the connections process is more complex and bespoke, and we incentivise DNOs through the Major Connections Incentive (MCI).

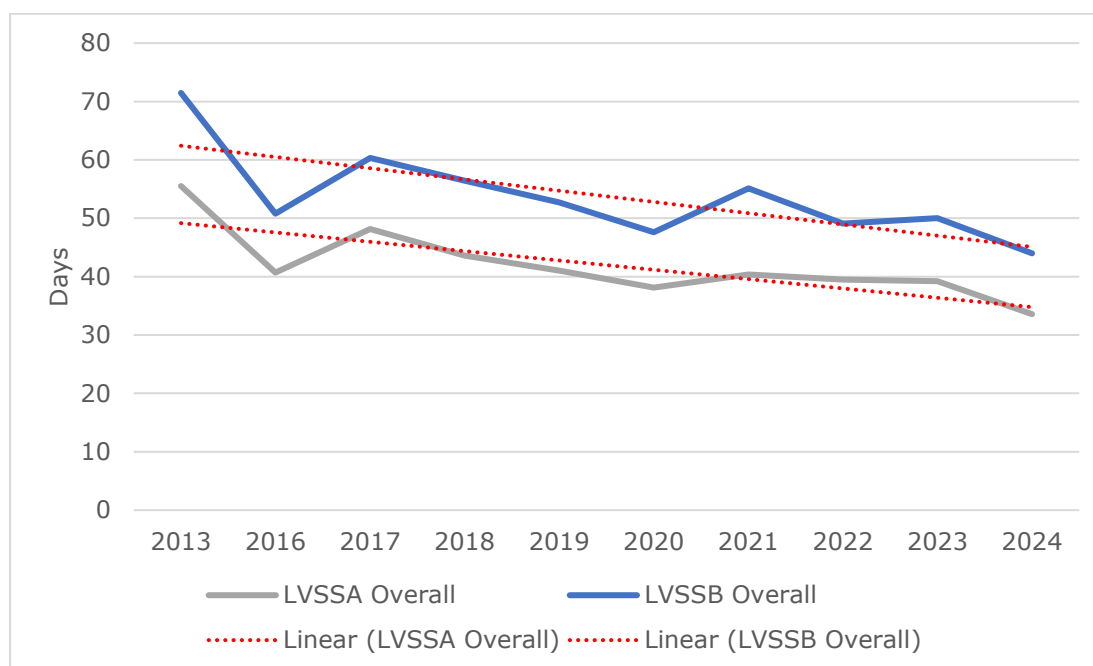
7.36 We set out our thinking on the evolution of these specific incentives below, however, as noted in Chapter 6, we will shortly also consult on broader connection reforms through our end to end connections review. Whilst this does not focus specifically on distribution customers it does discuss key elements of the connections process and how each could be optimised to improve connections service provision.

Time to Connect incentive

- 7.37 The Time to Connect (TTC) incentive was introduced in RIIO-ED1 to incentivise DNOs to increase the timeliness of quoting and connecting minor connections customers in the LVSSA and LVSSB market segments.⁴⁷ It includes a Time to Quote (TTQ) metric that measures the time taken from the DNO receiving the initial application to issuing a quotation and a TTC metric that measures the time taken from the customer accepting the quotation to the connection being completed.
- 7.38 Data from 2013 to 2024 demonstrated that the incentive has been successful in driving performance improvements to the timeliness and efficiency of DNOs connecting minor connections customers. From the start of RIIO-ED1 to the first year of RIIO-ED2, there has been an approximately 15.4% decrease in connection times for minor connections customers (Figure 14).

⁴⁷ LVSSA means a small low voltage demand connection to single premises, involving a single-phase connection and no significant other work. LVSSB means a low voltage demand connection, where the scheme requires i) more than one but less than five single-phase connections at domestic premises ii) fewer than five single-phase connections at domestic premises and an extension of the existing network, or iii) single premises requiring a two-phase or three-phase connection.

Figure 14: DNOs TTC performance



7.39 For RIIO-ED2, we decided to strengthen the incentive from a reward-only incentive to a reward-and-penalty incentive. This decision was made to further incentivise DNOs to improve performance and to protect consumers from the risk of declining performance, especially as RIIO-ED1 consumers paid for these improvements. Performance in Year 1 of RIIO-ED2 has continued the improved performance trend, though it is important to note that there is a natural floor on how short the TTC timeframes can be, due to the nature of the connections process.

7.40 Overall, we believe that the TTC incentive is effective in driving high quality service provision for new connections and will monitor RIIO-ED2 performance closely as the price control progresses. However, we are also interested in hearing stakeholders’ views on whether it would be appropriate to bring some connection activities into the scope of the TTC incentive that are currently excluded eg the upgrading of domestic services, cutouts and fuses and unlooping activities, in light of the predicted increase in LCTs.

- Q34.** How can we drive further service improvements under the TTC incentive?
- Q35.** Should the TTC also apply to domestic connection upgrades ie fuse/cutout/service cable upgrades, including unlooping?

Major Connections Incentive

- 7.41 For RIIO-ED2 we introduced the Major Connections Incentive (MCI). The MCI replaced the Incentive on Connections Engagement (ICE). The MCI includes the:
- major Connections Customer Satisfaction Survey (MCCSS); and
 - major Connections Annual Report: which is an annual report published by DNOs covering its performance against the MCCSS as well as performance against two reputational timeliness metrics (Major Connections Time To Quote and Major Connections Time to Connect).
- 7.42 The MCI introduced a different approach to measuring performance against major connections, as it replaced the qualitative Incentive on Connections Engagement (ICE) with the quantitative, metrics-based MCI.
- 7.43 Given the small sample sizes of major connections customers, data from Year 1 of RIIO-ED2 is not robust enough for us to comment on. Therefore, it is difficult to understand meaningful trends or performance patterns at this stage. These concerns around the small number of major connections impacting sample size and producing statistically insignificant results have been raised to us. This is in part due to the fragmented nature of the major connections marketplace with its Relevant Market Segments.⁴⁸
- 7.44 We have received feedback stating that the connections incentives are too punitive, penalty-only, and there should be more chances for network companies to earn rewards on their performance.
- 7.45 For RIIO-ED2 we required DNOs to produce a Major Connections Strategy (MCS) as part of their Business Plan submissions. DNOs designed their strategies around the major connections baseline expectations and had to set out how they planned to meet and exceed what we defined as the baseline level of service DNOs should be providing to their major connections customers.⁴⁹
- 7.46 The MCI was created by incorporating the baseline expectations into its design. Given the development and establishment of the MCI that embody these baseline principles, we are keen on understanding whether the baseline

⁴⁸ The connections market consists of various segments which reflect the different types of customers and types of work. For market segments where we consider competition is viable are referred to as Relevant Market Segments.

⁴⁹ See Appendix 2 of [the RIIO-ED2 Methodology Decision: Annex 1 – Delivering value for money services for consumers](#) for more detail on the Major Connections Principles and Baseline Expectations.

expectations will be necessary for ED3 and if so, whether they need to be updated or altered.

- 7.47 Additionally, we are keen to understand whether the MCI could be sharpened and how we can maximise the effectiveness of the different elements of the MCI. Given the importance of ensuring timely connection of renewable generation, new housing and large demand customers to enable the net zero transition and support sustainable economic growth, we are also open to more fundamental reforms to the MCI, although this isn't something we're actively developing currently. For example, for RIIO-ET3 we are exploring a shift away from incentives focused on the connections process to incentives that drive behaviours that would deliver faster connections, such as supergrid transformer capacity additions.

<p>Q36. What is the best approach towards incentivising services to major connections customers and how should the MCI be adapted for ED3?</p>

Reform of connections incentives

- 7.48 We are aware that some areas of friction have emerged for connecting customers in recent years as a result of the unprecedented number of new connection applications being made to both the transmission and distribution networks.
- 7.49 For RIIO-ED2, we introduced new connections incentives including the Major Connections Incentive and the DSO incentive. We also retained incentives that had a strong track record of delivering high-quality service, like Time to Connect and the Broad Measure of Customer Satisfaction.
- 7.50 While we believe that these incentives can and have contributed to positive consumer outcomes, we believe they can benefit from further improvement as we are concerned about the efficacy of the current incentive framework in light of the historically high level of the connections queue.
- 7.51 Last year, jointly with DESNZ, we published our CAP.⁵⁰ This included a commitment from us to undertake an end to end review of the incentives, obligations and standards relating to electricity connections.
- 7.52 We will publish our initial end to end connections review consultation / call for input shortly. The review identifies several key areas where there is the scope to

⁵⁰ [Connections Action Plan: Speeding up connections to the electricity network across Great Britain \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)

improve services for customers connecting to the distribution network. These include improving the visibility and accuracy of capacity and connections data, improving standards of service, ensuring networks meet contracted connection dates and improving the quality and ambition of connection offers. The end to end review also looks specifically at the services being provided to smaller (minor) connections, responding to the imperative to enable the timely connection of and EV and heat pump technologies.

- 7.53 The end to end review takes a holistic view of the connections process and attempts to identify the connections problems that are not necessarily captured through the existing connections incentive regime. Moreover, it discusses some issues that sit outside the price control framework, but together contribute towards a better service provision for connecting customers.
- 7.54 The end to end review assesses each of these key themes by stating the outcome that we want to achieve and summarises the feedback we have received from stakeholders. In some cases, it also proposes potential solutions to address these issues, including both new and adapted regulatory mechanisms. We encourage stakeholders to respond to the end to end connections review and provide examples and feedback to better inform our understanding of their connections concerns and to support the development of potential solutions.
- 7.55 Beyond asking questions about the existing RIIO-ED2 connection incentives described in this chapter, we are not requesting detailed stakeholder feedback views through this consultation, on the specific areas being explored through the end to end connections review. This is to avoid duplication with that process, and we encourage stakeholders to respond to that consultation separately. However, we do include a consultation question below, that provides an opportunity for stakeholders to give us their thoughts on any matters relating to connections that they believe are relevant to the ED3 framework.
- 7.56 In developing our ED3 methodology, we will carefully consider the feedback provided to the end to end review, alongside stakeholder responses to this framework consultation and, where changes to the regulatory framework are necessary to drive the connections behaviours and outcomes that we need to see, we will develop solutions through the ED3 methodology phase to supplement the ED3 framework, for the benefit of distribution connection customers.

Q37. How should the ED3 framework adapt to ensure that customers connecting to the distribution network are provided with the service that they need from the DNOs?

Interruptions Incentive Scheme (IIS)

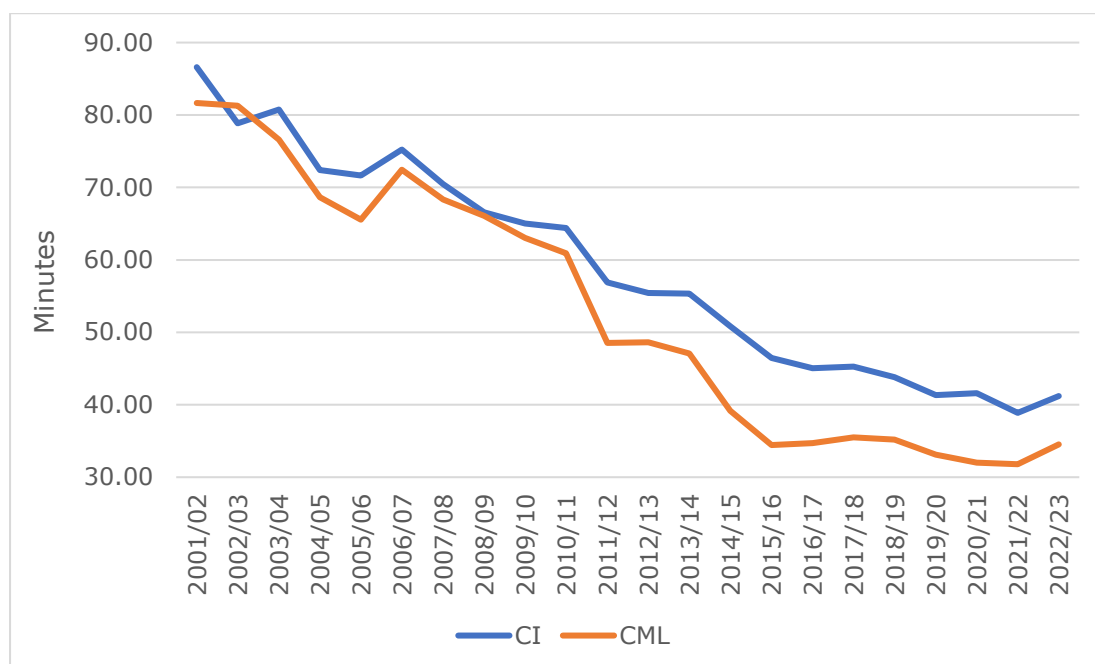
- 7.57 It is crucial that both domestic and industrial consumers receive an uninterrupted supply of electricity from DNOs, especially as reliance on electricity grows in order to meet net zero and for certain growth industries, such as data centres.
- 7.58 Over RIIO-ED1 and RIIO-ED2, DNOs have made significant progress, driven by a package of measures including the Interruptions Incentive Scheme (IIS), GSOPs and improvements in services to their "worst served customers".
- 7.59 Following our 'Review of Severe Weather Arrangements for Electricity Customers',⁵¹ we decided to implement the immediate recommendations by amending the Reliability GSOPs. These amendments will strengthen our reliability regulations package and came into effect in September 2023.
- 7.60 The IIS is an incentive on DNOs to improve the overall reliability of their networks by reducing the number and duration of interruptions. Value of Lost Load (VoLL); a representation of the view that domestic and Small and Medium-sized Enterprises (SMEs) customers place on the security of supply, is used in setting the incentives rates for the IIS in ED.⁵²
- 7.61 Since its introduction in 2001/02, the IIS has been very effective in reducing the frequency (measured by customer interruptions (CIs)) and duration (measured by customer minutes lost (CML)) of interruptions experienced by average customers.
- 7.62 Over RIIO-ED1, electricity supply interruptions fell by 23% whilst the average duration of interruptions saw an 18% reduction overall with DNOs generally meeting or exceeding their targets, as evidence by Figure 15 below. This resulted in DNOs earning close to £1bn in incentive rewards under the IIS for RIIO-ED1.
- 7.63 In response to RIIO-ED1 performance, we sharpened the IIS by increasing the targets to incentivise additional improvements in this area. We changed the

⁵¹ [Review of Severe Weather Compensation Arrangements for Electricity Customers | Ofgem](#)

⁵² VoLL is also used in other parts of the price control namely in calibrating Cost Benefit Analysis (CBA) models and the network performance factor in the NARM for all RIIO sectors and in the Energy Not Supplied (ENS) incentive in ET.

balance of the incentive from symmetrical rewards and penalties in RIIO-ED1 to asymmetric in RIIO-ED2, with stronger penalties and stronger improvement factors for poorer performing companies. Moreover, we introduced a single figure for VoLL, updating the RIIO-ED1 figure in line with inflation. While overall DNO performance was judged to be good, DNOs will receive a penalty of approximately £30m on reliability for 2023-24, due to the substantially more challenging targets.

Figure 15: GB CI and CML weighted average performance from 2001/02 to 2022/23



- 7.64 Data from the first year of RIIO-ED2 indicates that the IIS is targeted and challenging, however the pace of improvement is slowing in recent years.
- 7.65 The IIS has continued to evolve since its introduction. Further modernisation of the IIS would be materialised through the strengthening of the IIS with changes to the incentive parameters, such as VoLL. In our RIIO-ED2 Final Determinations, we stated that we would undertake a review of VoLL in advance of ED3 so that it more accurately reflects the value that consumers place on avoiding outages electricity usage.
- 7.66 We are currently engaging with industry stakeholders and wider government to finalise the scope of an updated study on VoLL. This will include:
- identifying how the value of VoLL may have changed in light of COVID, the gas market crisis, hybrid working, and increasing renewable power generation;

- looking into the differences between a uniform VoLL and regional VoLLs, and how they may differ across outage type, duration and location; and
- how VoLL could be kept up to date on a more regular basis. Once the scope is finalised, we expect to ask the DNOs to lead this work, collaborating closely with us and wider stakeholders in the process. We expect the VoLL study to be completed in time to inform the ED3 process.

7.67 For ED3 we want to ensure that we are driving stronger reliability levels, whether this is through incentivisation or not, as the anticipated increased electrification necessitates this. Therefore, we are seeking stakeholder views on whether our current approach towards reliability remains fit for purpose. We are keen to understand different views on how we should ensure that all networks continue to improve the reliability of their networks.

<p>Q38. In the context of greater electrification, is our current approach towards regulating reliability appropriate for ED3?</p>

Bespoke outputs and Consumer Value Propositions

- 7.68 A bespoke output refers to an output that is only relevant to a single DNO, usually implemented due to circumstances that are specific to individual licensee regions.
- 7.69 A Consumer Value Proposition (CVP) was part of the Business Plan Incentive (BPI), where a DNO could receive a reward if it demonstrates the additional value its Business Plan would generate for consumers.
- 7.70 For RIIO-ED2, we set nine bespoke outputs, including Output delivery incentives - Reputational (ODI-R), Output delivery incentives - Financial (ODI-F) and PCDs, across four DNOs. Additionally, we received 24 CVP proposals with a total proposed value in excess of £800m and accepted 12, giving rewards to 3.
- 7.71 We accept that bespoke outputs and CVPs can be useful mechanisms for DNOs to demonstrate additional value, accounting for regional differences and to enable DNOs to solve problems specific to its region.
- 7.72 However, by their nature, bespoke outputs and CVPs also create regional variations in services and a potential 'postcode lottery' of benefits, where only consumers from the region that the output applies to benefit from it. Additionally, in RIIO-ED2, our reflection is that some proposals resulted in a disproportionate amount of regulatory burden relative to the proposed benefits that would be delivered.
- 7.73 In our FSNR decision, we stated that for future price controls, we would narrow the eligibility criteria for bespoke outputs in order to raise the bar and limit the number of bespoke proposals from companies. This resulted in our general principle to minimise the number of bespoke outputs incorporated into the RIIO-3 price control for ET, GT and GD, while still providing network companies with the opportunity to submit bespoke outputs where network companies have unique requirements and have particular circumstances based on its local geography.
- 7.74 For ED3, we seek views from stakeholders on the role for bespoke outputs and CVPs, particularly around how the postcode lottery issues can be mitigated to ensure that regulatory resources are being optimised to deliver benefits to consumers across GB.

Q39. What role should bespoke outputs and CVPs have in ED3?
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Competition

- 7.75 For RIIO-ED2 we stated that we wanted to extend the use of early and late competition. Our approach to competition is largely informed by the approach we have taken in ET.
- 7.76 Early competition refers to competition to determine a solution to a need on the network that is run before detailed design of the preferred solution has been carried out. Late competition refers to a competition for delivery of a project, once a solution for meeting a system need is specified and sufficiently developed.
- 7.77 The benefits to these models are that it encourages innovation in the design, delivery and operation of infrastructure as well reducing the costs of project construction and operation.
- 7.78 For RIIO-ED2, we decided not to apply early competition to any projects on the basis that key aspects of the policy were still being developed for the ED sector and that we would consider it further once the early competition model had been sufficiently developed in the ET sector. We also decided not to apply late competition because there were no stand-alone projects funded in ex-ante allowances that satisfied the criteria of being new, separable and of a value exceeding £100m (the threshold for late competition in ET).
- 7.79 We are aware that early and late competition models are more relevant to ET given the greater size and scale of network build. For the RIIO-3 price control for ET, GT and GD, we provided detailed guidance on how companies should be considering late and early competition in their Business Plans.
- 7.80 As we increase the pace of network build to meet net zero, we believe that the benefits of early and late competition can help deliver innovative solutions and we remain open to exploring whether there should be a role for early and late competition in ED3.

<p>Q40. How can we optimise late and early competition models for application in electricity distribution?</p>

Cost assessment approach

- 7.81 In RIIO-ED2, as part of the price control setting process, DNOs provided Business Plans which included historical and forecast cost information, on which we based our cost assessment process and set baseline allowances.
- 7.82 We used a range of assessment tools, including quantitative methods such as regression analysis, unit cost and ratio benchmarking and historical trend

- analysis, as well as qualitative methods such as project and scheme level needs-based engineering reviews. The majority of costs were quantitatively assessed.
- 7.83 Ultimately, we used a combination of disaggregated and totex benchmarking to determine baseline allowances, with 50% weighting to each. We set a catch-up efficiency challenge for all DNOs based on a glide path to the 85th percentile of efficient costs, as well as an ongoing efficiency challenge (1% per annum) to account for productivity improvements that even the most efficient DNOs could achieve. Overall, this resulted in ex ante totex allowances of £22.2bn for the sector, representing an overall reduction of £2.9bn or 11.7% compared to DNOs' submitted totex.
- 7.84 When setting RIIO-ED2 allowances, we explicitly adapted our approach to address anticipated strategic concerns in relation to the funding of load related expenditure (LRE) given the uncertain nature of the pace of evolution of the energy system to prepare for net zero.
- 7.85 We introduced a range of uncertainty mechanisms including PCDs, volume drivers and re-openers, and retained the TIM, to deal with uncertain costs or workloads for the RIIO-ED2 period.
- 7.86 For ED3 we think it likely that further adaptations will need to be made to the cost assessment approach that was used at RIIO-ED2. As we noted in our FSNR decision, we need to ensure that network regulation delivers value for consumers by considering the whole energy system, not only the efficient delivery of networks and their operations. This means that the ED3 framework needs to balance:
- ensuring consumers get a fair deal now and in the future (by incentivising efficient, well-justified expenditure in running and growing the network); and
 - enabling the rapid pace and extent of change and investment needed to deliver net zero (by setting a funding framework that provides sufficient certainty and adaptability and does not disincentivise the investments that are supported by our load investment policy).
- 7.87 We are keen to explore whether further changes are needed to adapt the RIIO-ED2 cost assessment approach to enable us to better manage these trade-offs and welcome stakeholder views on this. This could include simplifying the RIIO-ED2 approach, increasing the role of technical or bespoke cost assessment and potentially looking at expanding the application of ex post assessment.
- 7.88 Whilst we consider that econometric approaches, and other quantitative assessment tools, will continue to have a central role to play in our cost

assessment approach as we need to continue to incentivise operating efficiency and frontier shift, we also think it likely that a greater proportion of costs will need to be technically assessed, especially where costs relate to projects that are more strategic in nature, for example with less asset utilisation certainty. DNOs will play a key role in data transparency and accuracy to ensure we can clearly categorise each type of cost so that the appropriate cost assessment technique is applied.

- 7.89 The outputs of the RESPs may also have an impact on the scope of cost assessment in ED3, depending on the extent to which RESPs start to define certain network needs. The RESP methodology decision will provide further clarity on the nature of such outputs and the extent to which the scope of cost assessment might be impacted. This matter will be considered further in the ED3 Sector Specific Methodology.

- Q41.** How should our approach to cost assessment evolve, to enable us to better manage increasingly pronounced trade-offs between consumer protection, efficiency and investment in the distribution network?
- Q42.** How should our guidance for cost benefit analysis evolve to better enable optioneering between different interventions, taking relevant long-term risks and benefits into consideration?

Real Price Effects (RPEs) and ongoing efficiency

- 7.90 We set price control allowances that are indexed to a general inflation measure (ie the Consumer Price Index including owner occupiers' housing costs (CPIH)). To the extent that CPIH does not adequately capture external changes to prices that network companies face, we may make further adjustments to allowances. We refer to these adjustments as RPEs. These adjustments are based on forecasts for the indices which make up the overall RPE index and have been 'trued up' annually based on outturn differences between CPIH and input price indices. We propose to retain the same approach to RPEs in ED3. We welcome stakeholders' views on whether the approach is suitable for ED3 or whether there are specific methodological aspects that could be improved or simplified.
- 7.91 Moreover, we welcome views on whether RPEs are a sufficient mechanism to tackle market volatility and consequent supply chain challenges experienced by network companies in recent years.
- 7.92 To help inform our view of the efficient level of costs for each DNO, we also account for the productivity improvements we expect them to make over the price control period. We refer to ongoing efficiency assumptions as the reduction

in the volume of inputs required to produce a given volume of output, ie the productivity improvements that we consider even the most efficient company is capable of achieving.

7.93 Setting an appropriate ongoing efficiency challenge is vital to ensuring DNOs continually strive to identify and exploit opportunities to optimise their processes and operations. By doing so, they are able to remain resilient in the face of change and ensure value for money for consumers. In RIIO-ED2, we set the ongoing efficiency challenge at 1% per annum at a totex level based on EU KLEMS data and other sources. We consider this approach to be broadly suitable for ED3. Nonetheless, we welcome stakeholders' views on:

- whether the approach is suitable for ED3;
- whether there are specific methodological aspects that could be improved and/or simplified; and
- additional data sources or evidence that could be used.

7.94 For both RPEs and ongoing efficiency, our approach will also be informed by the ongoing work within the RIIO-T3/GD3 price controls.

Q43. Do you agree that the current Real Price Effect (RPE) methodology should form the basis for adjusting allowances in ED3?

Q44. Do you agree that the current approach to setting the ongoing efficiency challenge is a suitable starting point for ED3?

Responsible financing

7.95 We set a financial framework, and associated policies and methodologies, for price controls that are broadly stable and predictable over time. This broad regulatory stability gives investors the confidence to continue to invest in the sector. It also helps us to achieve a low cost of capital without constraining our ability to act in the interests of consumers by adapting to changing circumstances and through adopting best practice.

Allowed returns and financeability

7.96 We expect that our overall financial framework, the approach to setting the allowed return on capital and the assessment of financeability in this price control will be substantially in line with the approach taken in RIIO-ED2 as a starting point. However, in our recent methodology decision in relation to the RIIO-3 price controls for ET, GT and GD, we made a range of methodological improvements that we anticipate are likely to be relevant to the ED sector. These methodological improvements include:

- updates to best practice when calculating the cost of capital using the Capital Asset Pricing Model (CAPM), building on the 2023 UKRN Guidance;⁵³
- the payment of an element of the debt allowance in nominal terms to address the inflation leverage effect;
- implementing a RAV-weighted approach to setting the cost of debt allowance for the ED sector;
- the consideration of 'investability' to better understand whether the allowed return on equity from our methodologies continues to meet the needs of the energy network sectors; and
- investigating broadening the toolkit used when assessing financeability.

7.97 Full details of the improved methodologies can be found in the RIIO-3 Sector Specific Methodology Decision – Finance Annex.⁵⁴ We are keen to hear from stakeholders to understand whether these updates will be suitable for the ED sector and/or what additional updates to our methodologies might be appropriate.

Financial resilience

7.98 Our assessment of allowed returns and financeability are conducted in line with a notional capital structure. This helps to insulate consumers from the decisions that companies make about their actual financing and capital structures. We expect companies to manage their own financial risks and for shareholders, not consumers, to directly gain or lose as a consequence of their choices.

7.99 The financial resilience measures within the financial framework are designed to protect consumers from the adverse consequences of financial distress or failure, which could include higher costs of capital and the potential impact on quality of service. Network companies experiencing financial distress may also potentially be at risk of licence breaches, default and/or administration.

7.100 There are several important financial controls currently applicable to DNOs which underpin consumer protection in the RIIO-ED2 period. These measures include external credit rating requirements, availability of resources assurance, and restrictions on the ability to dispose networks assets or pledge these as security.

7.101 As the regulator, we consider it vital to continually review whether our existing financial resilience controls provide sufficient protection for consumers in context

⁵³ UKRN (2023), [Guidance for regulators on the methodology for setting the cost of capital](#).

⁵⁴ [RIIO-3 Sector Specific Methodology Decision – Finance Annex \(ofgem.gov.uk\)](#)

of the evolving external environment and changing financial structures. For ED3, we intend to evaluate whether new measures should be introduced to enhance consumer protection without creating a disproportionate economic cost.

7.102 New measures could include mirroring the proposals we outlined at the RIIO-3 SSMD for ET, GT and GD. We would also implement any changes that may come from the proposed review of the network ring fence.⁵⁵ The measures we are taking for ET, GT and GD are:

- to amend the licensee external credit rating license condition from:
 - taking “all appropriate steps” to ensure the licensee maintains one investment grade rating;
 - to “require” or “must ensure” the licensee maintain two investment grade credit ratings;
- to amend the requirements prior to making a payment to a related party, such as a dividend, to include a minimum issuer credit rating of BBB- (which is not subject to a negative outlook/ watch or equivalent) and regulatory gearing of less than 75%; and
- to amend the Availability of Resources requirement for board certification to require that the licensee states that, based on agreed assumptions (which may include capital market access), it has sufficient financial resources to cover the entire price control period or a minimum of three years ahead.

7.103 We invite stakeholders to consider whether these proposals should also be implemented as part of ED3 or whether other measures should be considered. This matter will be considered further in the ED3 SSMC and as part of any network ring fence review.

Regulatory depreciation

7.104 Regulatory depreciation is a charge in network bills and is the mechanism by which consumers repay the costs of building long-life assets. This approach helps to support ‘intergenerational fairness’ so that the costs of building and maintaining the energy networks are spread over the life of the assets and across the generations of consumers who use them.

7.105 In RIIO-ED1, we decided that the regulatory depreciation methodology for the ED sector should transition from a 20-year straight-line asset life (as of 31 March 2015) to a 45-year straight line asset life (by 31 March 2023), as 45

⁵⁵ [Energy Networks ring fence review \(ofgem.gov.uk\)](https://www.ofgem.gov.uk/energy-networks/ring-fence-review)

years better reflected our assessment of the economic lives of the assets.

Straight line depreciation is a methodology that splits the depreciation payments equally over the asset life period.

- 7.106 In RIIO-ED2, we noted concerns raised by network companies in relation to this transition to a 45-year asset life assumption, particularly in relation to long-term financeability, but ultimately decided to retain the 45-year straight line asset life depreciation policy. However, we stated that we would further consider the appropriate depreciation lifetime at the next price control, consistent with regulatory best practice. As a result, we will review the regulatory depreciation policy for ED3 and beyond and will seek stakeholder evidence on this issue as part of the ED3 Sector Specific Methodology Consultation. We invite stakeholder views on the key factors that Ofgem should take into account when conducting this methodology review, as well as the benefits of any changes to RIIO-ED2 policy to consumers.

- Q45.** Do you see any reason why we should not implement the proposed changes to the calculation allowed returns, consideration of investability and assessment of financeability that we set out in RIIO-3 Sector Specific Methodology Decision – Finance Annex for ET, GT and GD?
- Q46.** Do you see any reason why we should not implement the proposed updates to financial resilience requirements that we set out in RIIO-3 Sector Specific Methodology Decision – Finance Annex for ET, GT and GD?
- Q47.** What are the key factors (including benefits and costs to consumers) that Ofgem should take into consideration when conducting its review of the appropriate approach to regulatory depreciation in ED3 and beyond?

Bill impact

- 7.107 Distribution charges represent around 40% of the total network charges on a typical domestic consumer bill, circa £140 per year.
- 7.108 Building more network capacity, to enable the net zero transition and deliver wider sustainable economic growth is likely to increase the overall distribution network charge element of consumer bills, as a result of deploying higher levels of capex and growing the RAV than has been the case historically.
- 7.109 We will look to mitigate cost increases over the ED3 period whilst delivering against the objective and consumer outcomes described in Chapter 4. We will do this by:

- ensuring the cost of capital associated with investments is no higher than it needs to be;
- driving frontier efficiency in all cost areas and the innovation and digitalisation agenda to help with frontier shift;
- providing greater certainty of future system needs and strategic priorities through the RESPs, and developing a regulatory framework that supports long-term planning and investment, leading to greater competition and supporting investment in UK supply chain and manufacturing; and
- taking a whole system and long-term view on costs and benefits, ensuring that new infrastructure supports wider system and all-in bill benefits, for example by reducing network losses and increasing wider system access to DSR.

8. Smarter networks

Introduction

- 8.1 A smarter, more flexible, digitally enabled energy system will allow more active management of the flows of energy across the networks and is a necessity for reaching net zero. Smart optimisation will be delivered by investment in network monitoring, leveraging data and digitalisation and DSO functions. All of this will require better and more easily accessible data for stakeholders than is currently available, while also ensuring that the networks are protected against cyber threats.
- 8.2 This chapter discusses how we are using the existing RIIO-ED2 framework to address these challenges and our developing views on how it should be adapted for ED3.

Development of DSO capabilities in RIIO-ED2

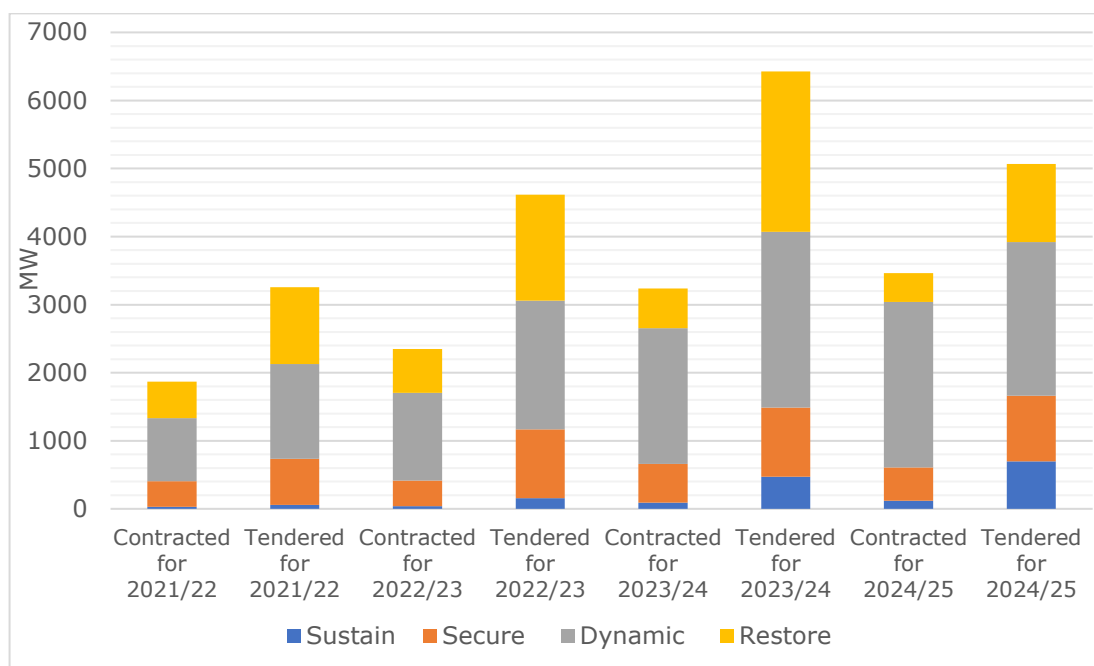
- 8.3 DSOs take a proactive role in optimising the existing network, for example by utilising an ANM scheme and/or DER to make the most of the capacity available for customer connections.⁵⁶ DSO activities, such as procuring flexible services, can help to manage local constraints, lower costs for local network users (by deferring network investment), and can also help reduce the wider system costs of achieving net zero.
- 8.4 In RIIO-ED2, we introduced a new financial incentive to promote and regulate DSO functions within the DNOs.⁵⁷ The purpose of the DSO incentive is to drive licensees to develop and use their network efficiently, taking into account flexible alternatives to network reinforcement.
- 8.5 It was intended that this incentive is calculated on the following evaluation criteria:
- a DSO stakeholder satisfaction survey;
 - the DSO performance panel assessment; and
 - three outturn performance metrics: 1) reinforcement deferral by deploying flexible solutions, 2) low voltage network visibility/forecasting, and 3) curtailment efficiency.

⁵⁶ An ANM is an automated control system used to manage generation and demand dynamically so that the distribution network system parameters stay within predetermined limits. The system allocates capacity to customers on an agreed basis, such as a last in, first out hierarchy.

⁵⁷ With a financial reward/penalty of +0.4%/-0.2% of return on regulatory equity.

- 8.6 Earlier this year we decided not to turn on any of the outturn performance metrics due to concerns about reliability and accuracy.⁵⁸ As a result, the DSO incentive consists of the first two evaluation criteria, with equal weighting.
- 8.7 Early indications from the first year of the DSO incentive in RIIO-ED2 are that the DNOs' development of DSO functions are progressing in the right direction with all DNOs receiving an overall reward.
- 8.8 The first DSO performance panel assessment found that the DNOs have either met or exceeded baseline expectations for increasing network visibility, improving data accessibility and facilitating distributed flexibility markets in their regions.⁵⁹ The panel also found areas where the DNOs could improve in future. This includes the depth of evidence to substantiate claims, and demonstrating more rigorously the consumer benefits delivered from activities over the year.

Figure 16: DNOs' procurement of distributed flexibility services⁶⁰



- 8.9 The overall the volume of tendered and contracted distributed flexibility has increased since 2021/22. Although DNOs generally contract less than they tender for, the overall use of flexibility as a tool is increasing, with a total of 3.3GW in 2023/24.

⁵⁸ [RIIO-ED2 DSO incentive - decision on outturn performance metrics | Ofgem](#)

⁵⁹ [Distribution System Operation Incentive annual report - 2023 to 2024 | Ofgem](#)

⁶⁰ Data sourced from: [Open Networks - 2024 Flexibility Figures – Energy Networks Association \(ENA\)](#)

8.10 In terms of the types of flexibility services DNOs have procured, Dynamic (generator changes output in the event of a fault) tends to dominate, with Restore (generators supporting restoration following a loss of supply) and Secure (securing the network to carry out planned maintenance) making up the rest. The use of these flexibility products has meant that networks can carry out maintenance and have mitigations to faults in place at a lower cost to the consumer than would otherwise be the case. DSOs have used Sustain (providers change their supply/demand up or down to help manage network constraints) to defer investment to a lesser extent.

DSO role in ED3

- 8.11 We consider there is a strong ongoing need for robust DSO functionality within the DNOs in ED3. As highlighted in Chapter 6, it is important that DNOs deliver efficient network capacity and optimise the balance between reinforcement and flexibility for the benefit of existing and future consumers based on whole system value.
- 8.12 As the UK transitions to a clean power system by 2030, it is critical that the power system has sufficient flexibility to balance intermittent energy sources and minimise costly curtailment of generation when there is a high influx of wind and solar.
- 8.13 In ED3, we consider that DSOs should continue to focus on improving network visibility and digitalisation to support the development of smart grids. The latter is key to enabling demand-side response, storage, and distributed generation to respond to market signals or direct load control.
- 8.14 In RIIO-ED2, the focus was on how DNOs can use flexibility to manage localised network constraints and defer the need for costly infrastructure upgrades. However, studies into the role and value of flexibility within a net zero electricity system in GB have found that system-wide benefits (and consumer value) of distribution-based flexibility are larger than the savings from deferring distribution investment if the flex is coupled with sufficient network reinforcement to allow it to be used for system-wide needs.⁶¹
- 8.15 This suggests that a narrow focus on distribution-based flexibility to defer network investment is potentially not the best use case in the long term. In addition, the distribution network could be a source of inflexibility if the wider

⁶¹ [Flexibility in GB final report.pdf \(ctprodstorageaccountp.blob.core.windows.net\)](#) and [COMMANDER – Coordinated Operational Methodology for Managing and Accessing Network Distributed Energy Resources | ENA Innovation Portal \(energynetworks.org\)](#)

system cannot access distribution-based flexibility because of network constraints. Unlocking the full consumer value from distributed flexibility requires appropriate investment in distribution networks to ensure it can be accessed by the wider system.

- 8.16 This highlights the importance of looking at the wider-system value of investing in distribution reinforcement as the sources of energy system flexibility become more localised. It also prompts a rethinking of whether the RIIO-ED2 “flex first” approach, for the purpose of deferring network investment, is a false economy if it overlooks the wider-system value of network investment and flexibility (alongside the other potential implications for deliverability challenges and higher costs in future discussed in Chapter 6).
- 8.17 For the avoidance of doubt, we consider that DSOs will continue to have a really important role in discovering and activating distribution-based flexibility over ED3. However, we think it is important that the DSOs reorientate the focus of their evaluation frameworks for network investment and flexibility to ensure that the wider-system benefits are recognised.

Q48. How should the price control encourage ongoing development of the DSO role and activities to optimise whole system benefits for existing and future consumers?

Q49. What should the role of the DSOs be in identifying and delivering whole system benefits?

Data and digitalisation

- 8.18 Our energy system is becoming more complex as we progress towards net zero. To overcome this complexity, sector participants will require higher quality data and more easily accessible data than is available today to fulfil their roles. This is because 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.
- 8.19 Data and digitalisation can help meet key challenges and enable transformational system-wide benefits by supporting network companies to address demand growth, decarbonise and improve resilience. Digitalisation will be fundamental in enabling different energy systems to be connected together,

increasing overall efficiency.⁶² Digitalisation in this sense is about making better use of energy system data and digital technologies to generate value for all stakeholders.⁶³

- 8.20 For RIIO-ED2 we implemented greater digitalisation to modernise the energy system for electricity distribution. We introduced the Digitalisation license condition which required DNOs to:
- publish regular updates to its Digitalisation Strategy & Action Plan (DSAP): The DSAP should set out the network companies digitisation strategy against a list of DSAP principles around working towards a defined vision, ensuring visibility of on the progress of delivery and prioritise providing benefits that are in the public interest. Regular updates to its strategy being published would give us clarity about digitalisation intentions and progress made; and
 - meet the expectations of Data Best Practice (DBP) guidance.⁶⁴ It states that network companies should treat data as “presumed open” and carry out a data triage process to identify and manage sensitivities associated with the data. It aims to ensure decision-making processes relating to data are transparent and that data exchanges between market actors are “friction free”.
- 8.21 We also approved significant investment into the direct monitoring of the low voltage networks which, when used in combination with aggregated smart meter data, will give DNOs a greater understanding of the state and behaviour of their most granular networks. We are seeing positive rollout of this investment, publication of the data collected, and use of the data to generate planning and operational insights within the DNOs.
- 8.22 We continue to work with the DNOs on reforms to the Long-Term Development Statement, where we introduced the Common Information Model during the price control setting process for RIIO-ED2.
- 8.23 DNO investment in this area increased substantially in RIIO-ED2, increasing to nearly £300m across the price control. We felt it necessary to allow this significant increase in investment by DNOs to allow them to rapidly improve their digital capabilities given the positive downstream impacts of digitalisation

⁶² [POST-PN-0655.pdf \(parliament.uk\)](#)

⁶³ [Digitalising our energy system for net zero: strategy and action plan 2021 \(publishing.service.gov.uk\)](#)

⁶⁴ [Decision on updates to Data Best Practice Guidance and Digitalisation Strategy and Action Plan Guidance | Ofgem](#)

- on LRE, System Planning, and Flexibility. For ED3, we expect to continue to see significant investment into digitalisation to allow the DNOs to become more digitally enabled organisations and solve some of their biggest challenges using digital tools.
- 8.24 It is important to note that the DNOs are at different stages on their digitalisation journey, and so will need to make different investments relating to their digital maturity. We were accommodating of this divergence in investment for RIIO-ED2, however, we will be exploring the need for greater alignment between DNO investments in ED3. We consider there to be greater risks in siloed development of digital products and services in the ED3 period.
- 8.25 Some of these siloed risks are already manifesting in RIIO-ED2, with some duplication of innovation projects and limited progress on ensuring interoperability of DNO data. We need to see greater progress on interoperability in ED3. Whilst much of this progress will stem from greater collaboration, that we can stimulate outside of the price control setting process, it may be necessary to drive specific investments across the DNOs relating to interoperability.
- 8.26 For ED3, we need to consider how we can enable greater data sharing across network companies. We consider this can be achieved through the adoption and utilisation of the Data Sharing Infrastructure (DSI), currently under development. The DSI can help to break down data sharing barriers by facilitating secure and efficient exchanges of data.
- 8.27 We expect the DNOs will participate in the development of the DSI during RIIO-ED2 as the priority use cases are related to strategic planning and connections. By 2028, the DSI will be fully operational, and we expect to see potential use cases for the DSI being put forward by DNOs in their Business Plans.
- 8.28 We know there are opportunities and challenges from AI and these benefits include transforming planning, management and real-time operation of the distribution networks leading to faster and more effective decision-making and better resource allocation and optimisation.
- 8.29 However, we are also aware of the risks of AI as systems containing them become increasingly autonomous, complex and adaptive, which includes the increased susceptibility to cyber-attacks. Additionally, the increased strain that AI data centres may place on the network as the use of AI becomes widespread across the economy, contributing to network constraints. ED3 may not be the price control where AI plays a transformative role, but its proliferation could

have implications for networks and data centres in the future and we will need to consider whether specific mitigations or preparations should be made now.

- 8.30 We view digitalisation as an important strategy around improving and developing the digital infrastructure of network companies that should be embedded in the network companies' organisational culture. To ensure that this is realised, we are interested in understanding whether there should be incentives for interoperability and data sharing around strategic priorities such as network planning, flexibility and connections.

Digitalising DNO reporting

- 8.31 We believe that modernising the regulatory reporting process can contribute to streamlining price control operations, improve accessibility to network company performance information and leverage the power of reputational and behavioural incentives.
- 8.32 During RIIO-ED2, DNOs will be developing digital tools and capabilities that will allow information sharing with us in a more suitable format. We encourage DNOs to develop new digital capabilities and build its internal digital expertise.
- 8.33 At RIIO-ED2 Final Determinations, we stated our intention to run a project to determine the scope of a modern regulatory reporting process during RIIO-ED2. We are currently assessing the internal resources required to undertake this review and will provide further updates on this in future publications.

Smart Optimisation Output (SOO) licence condition

- 8.34 Smart optimisation is utilising network data to improve decision-making on all aspects of network functions, particularly with respect to LRE, DSO, and collaboration with local stakeholders.
- 8.35 The Smart Optimisation Output (SOO) licence obligation was introduced at RIIO-ED2 with the purpose of facilitating more meaningful partnerships between DNOs and their local stakeholders by packaging network and strategic development data to make them more accessible, transparent and interoperable.
- 8.36 The two key elements of the SOO are:
- the Collaboration Plan: which is a document describing how the DNO will collaborate with stakeholders through a more transparent and user-centric approach to sharing data. It should also state how the DNO will work with stakeholders to support the development of local and regional net zero strategies; and

- the System Visualisation Interface: which is a section of the DNOs website or open data portal that provides access to forward-looking, open and accessible, digital network tools.
- 8.37 Since the SOO licence obligation was implemented for RIIO-ED2, significant progress has been made on RESPs that will be a function of the National Energy System Operator (NESO).⁶⁵ Elements of the Collaboration Plan may need to be revised to reflect changes in expectations and responsibilities following further decisions on RESP.
- 8.38 In relation to the System Visualisation Interface, we have set out guidance around the data sets, digital tools, strategies and reports that DNOs are required to share on their website or open data portal. We are seeing positive developments on the publication of data sets and digital tools during RIIO-ED2, but there may need to be greater interoperability between DNOs System Visualisation Interfaces. This will ensure data users have a consistent and low-friction journey when trying to access similar datasets across the DNOs.
- 8.39 We believe that the System Visualisation Interface element of the SOO will constantly evolve, as data is used more, and innovative data tools are developed. The end to end connections review explores how the SOO LO may need to be amended to incorporate the proposed 'single digital view' of connections.
- 8.40 For ED3, we are keen on consolidating the key elements of the System Visualisation Interface from RIIO-ED2, while making necessary additions where innovative solutions are developed. An example of this was the new direction we published, changing the form of statement on the Long Term Development Statement (LTDS), which is one of requirements of the System Visualisation Interface. We believe that the DNOs took good steps towards the LTDS and we are keen on understanding how any of the other existing requirements can be further developed for ED3.

Q50. Our historic approach to publishing and sharing datasets has been stakeholder-led and focused on establishing good digital foundations in the DNOs. With the rapid pace needed for enhanced data and digitalisation, should we instead be considering incentives around strategic priorities, such as network planning, flexibility, and connections?

⁶⁵ [Decision on future of local energy institutions and governance | Ofgem](#)

- Q51.** How can we enable greater development of internal digital expertise in its licensees?
- Q52.** How should network companies use AI to improve network insight and decision-making (both operating expenditure (opex) and capital expenditure (capex)) and how should we be encouraging this through the ED3 framework?

Innovation

Overall RIIO-3 approach

- 8.41 The scale and pace of change needed across the energy system to achieve net zero requires networks to tackle substantive challenges related to how they develop and operate their assets, engage their customers, and plan for the future. Innovation is an essential part of how we expect energy networks to operate in ED-3. The innovation framework for RIIO-ED2 has delivered significant benefits to consumers. Our most recent SIF Beta Round of projects is projected by networks to deliver up to £6.8bn of benefits from £54.51m of funding if projects are successful and deployed on the network. These projects range from affordable heating projects to network resilience solutions and digital tools for whole systems.
- 8.42 The existing innovation framework consists of:
- the Strategic Innovation Fund (SIF): a £450m fund that supports R&D of green energy projects that will accelerate the energy system's transition the network to net zero; and
 - the Network Innovation Allowance (NIA): a UIOLI mechanism to support smaller scale innovation projects focused on either enabling the energy system transition, or delivering innovations to support vulnerable customers.
- 8.43 We believe that both the NIA and SIF are appropriate mechanisms in supporting the development of disruptive technologies and innovative business models that may not be explored within ED3 in the more efficiency focused innovation delivered with BAU or other funding. We are keen on retaining these mechanisms but will need to further consider whether they need to be evolved to meet the challenges of ED3.
- 8.44 For the RIIO-3 ET, GT and GD price controls we stated that the current innovation package requires reform to deliver both incremental and transformation innovation.

- 8.45 Key pieces of feedback we received were that we should work to streamline the SIF and the NIA, so that they are as simple to operate as possible, and that we should explore the barriers to innovations being deployed, as well as potential support to enable this deployment.
- 8.46 For RIIO-3 ED3 we are keen to ensure that innovation is shared and deployed across different networks, and that it is transformative, and we therefore need to consider the framework and rules that govern network activities and ensure they remain appropriate for incentivising transformative innovations.
- 8.47 We believe this can be done by mirroring the proposals we outlined at the RIIO-3 price control for ET, GT and GD, where we stated our intention to introduce more monitoring for NIA-funded projects, to explore making SIF Challenges longer term, and to explore mechanisms that better incentivise and enable deployment of innovation.
- 8.48 However, we are aware of the differences in operations for electricity distribution and are keen on understanding from stakeholders whether the structural differences prevent any of these solutions being considered for ED3.

- Q53.** Our aim is for the ED3 framework to be structured to deliver high impact, transformative innovation – do you think that further changes, alongside those proposed for the other sectors in our RIIO-3 SSMD, are required to deliver this?
- Q54.** Are there any factors particular to DNOs that facilitate or challenge deployment of innovation on their own and across networks?

9. Resilient and sustainable networks

Introduction

- 9.1 Good asset stewardship is essential for consumers in the face of growing risks, particularly from climate change. Alongside investment in new and upgraded infrastructure to meet higher consumer demands, strong asset management practices are essential for the net zero transition. All network companies must deliver a safe, secure and resilient network that is efficient and responsive to change, but the amount of above ground network owned and operated by the DNOs means they face particularly acute challenges from the risks of extreme weather. In the period of September 2023 to August 2024 alone there were 12 named storms.
- 9.2 The transition to greater electrification sharply raises the importance of network resilience as interruptions will have consequential impacts not only on GB's wider critical infrastructure, including digital, telecoms, transport and water systems, but also for individual consumers' heating and transport services. Consumers, both now and in the future, will therefore be increasingly alive to the resilience of electricity networks from physical, financial, climate and cyber stresses and shocks.
- 9.3 As both the climate and energy market change, and where we decide that more anticipatory investment is in the interests of consumers, so too should the regulatory approach to resilience and asset health adapt to these new conditions. In the future, good asset stewardship will need to involve the timely delivery of asset replacements and upgrades that align with future needs and strategic priorities, as defined through RESPs, as well as being designed to withstand more frequent extreme weather and malicious attacks, in a market context increasingly constrained by international competition for skills and supply chains.

Network Asset Risk Metric (NARM)

- 9.4 Network and asset resilience is a key component of network regulation. In an integrated and dynamic energy system, effective decision-making is complex as it involves consideration of how numerous factors interact and change over time.
- 9.5 During RIIO-ED1, Network Asset Secondary Deliverables (NASD) were introduced to simplify some of the complexity associated with asset management decision-making by quantifying the risk of network asset failures

- and the benefits to consumers of asset interventions, such as replacement and refurbishment, in terms of the risk reduction they deliver.
- 9.6 It established a regulatory output that measured the effectiveness of a licensee's asset replacement and refurbishment expenditure. We set target deltas for the middle and end of RIIO-ED1, with under or over delivery potentially leading to allowance adjustments. Within RIIO-ED1, DNOs further established the Common Network Asset Indices Methodology (CNAIM), a common framework of definitions, principles and calculations which apply to DNOs for assessing, forecasting and reporting asset risk.
- 9.7 In RIIO-ED2 we introduced the NARM, an evolution of RIIO-ED1's NASD enabling a long-term view of network assets and their functions within the context of the whole energy system.
- 9.8 NARM is derived from the probabilities and expected consequences of asset failure and DNOs use the metric to ensure that network risk is maintained within reasonable bounds (+/-5% of target).⁶⁶ The consequences of network asset risk degradation may only become apparent over much longer timeframes through interruptions to service, therefore the impact of any shortfall in asset management activities may not be directly observable during a price control.
- 9.9 This is an important part of the price control, not only because asset replacement and refurbishment are significant areas of expenditure, but also because we use network asset risk as the output to hold companies accountable for their investment decisions and to ensure they are effectively managing their assets.
- 9.10 In RIIO-ED2, we made further improvements to the framework to remove potential gaming risks, increase assets covered, standardise asset health reporting by DNOs, and improve robustness of the network risk measure. Separately, we are looking at increasing the role of audits and inspections to increase our assurances in the asset data as part of our wider improvements to the framework to better hold companies to account for delivery.

⁶⁶ Within the Network Outputs Measures (NOMs) Incentive Methodology in RIIO-1 we specified that upper and lower materiality thresholds should be used when assessing compliance with the overall network target, also known as a deadband. Within DPCR5 and for RIIO-ED2 we set a deadband of +/-5% of the target. We did not set a deadband within RIIO-ED1 but proposed to use +/-5%, maintaining consistency with other price control periods within ED but also other sectors. It was our view that the robustness of the data justified this threshold. Our assessment of the evidence provided by licensees suggested that discrepancies between the target and delivery sat within the expected deadband and we established that all licensees have delivered their NARM (then called NASD) target in RIIO-ED1. [RIIO-ED1 Closeout: Consultation on proposed adjustments \(ofgem.gov.uk\)](https://www.ofgem.gov.uk), p 43-44.

- 9.11 DNOs' NARM performance in RIIO-ED1 was strong, with all licensees landing within or above the delivery deadband (+/- 5%). Based on the Year 1 RRP submissions for RIIO-ED2, DNOs have delivered on average 14.70% of their Baseline Network Risk Outputs established for RIIO-ED2, the non-load related funding package was circa £3.9bn (18% of ex ante allowances).⁶⁷
- 9.12 As noted in Chapter 3, we are interested in exploring the link between those parts of the framework that drive network investment for load growth and those that ensure the system is resilient and reliable, including NARM.
- 9.13 Firstly, as noted in Chapters 5 and 6, we think that there may be a case for the framework to be more prescriptive and input based in terms of load related network reinforcement, to ensure the timely delivery of additional network capacity at least cost to consumers in the long term and to increase certainty for the supply chain.
- 9.14 We welcome stakeholder views on whether a more prescriptive and programmatic approach might also be helpful with respect to asset health investments. We think there may be similar benefits to those described for load related investments and in holding companies to account in the delivery of their non-load plans. We would like to explore with stakeholders what the benefits and trade-offs might be of this more input-based approach to managing asset health. We are interested to understand to what extent a planned programmatic approach can be taken with asset health investments.
- 9.15 Secondly, we think it will be necessary that where decisions are taken to replace assets to manage monetised risk through the NARM framework, network companies will need to demonstrate that decisions about the future replacement of assets have taken into consideration expected demand and generation requirements, as defined by the RESP pathways.
- 9.16 Given the potential for overlap and duplication we are interested to explore whether asset health capital investments should be considered together with the planned load-driven expenditure on a consistent basis, across all DNOs, and the risks and opportunities of doing this.
- 9.17 We welcome stakeholder views on how we might accommodate this approach, particularly where more prescription on asset replacement may be in the consumer interest, and the role of NARM in this. We are also interested in

⁶⁷ RIIO-ED2 Cost Volumes Reporting Pack, in 2020/21 prices.

understanding whether there might be a risk of two different approaches resulting in gaps or duplication between the load and non-load mechanisms.

- 9.18 We think it is appropriate to retain NARM as a measure of overall asset health and explore opportunities for further enhancements, such as identifying additional asset categories that can be incorporated into the NARM framework, network innovation and improvements in our understanding of network risk, increasing digitalisation and enhancing reporting and assurance processes.

Q55. Do you agree that we should retain the Network Asset Risk Metric (NARM)? How should it further evolve in ED3?

Q56. Do you agree that we should consider a more integrated approach to managing asset health, together with load-driven expenditure, given the need to future proof for resilience (climate, cyber and physical security) and future demand? What might the risks and benefits of this approach be?

Climate resilience

- 9.19 UK Climate Projections (UKCP) indicate that we are likely to face warmer, wetter winters and hotter, drier summers, alongside more frequent and intense storm events.⁶⁸ The electricity distribution network is increasingly at risk from these climate threats. We must ensure consumers can safely rely on networks for their energy needs, both now and in the future. The CCC⁶⁹ and the NIC⁷⁰ have recommended urgent action to improve the resilience of the energy system to climate change.
- 9.20 Taking action on climate resilience within a 5-year price control is challenging for many reasons. These include the complexity of integrating climate impacts into network planning, balancing operational responses with infrastructure hardening, and the difficulty of measuring meaningful in-period outputs for an uncertain future.
- 9.21 Decision-making around climate resilience is further complicated by radical uncertainty, particularly for hazards with less high-quality data. For example, we have detailed information on precipitation and flooding to justify future decisions, however for hazards like extreme heat, the modelled data is less robust. While the long-run trend is clear, uncertainties regarding the timing of extreme events remain. We recognise the important role of climate projections

⁶⁸ [Met Office - UK Climate Projections, August 2022](#)

⁶⁹ [Climate Change Committee - Delivering a reliable decarbonised power system, March 2023](#)

⁷⁰ [National Infrastructure Commission - Developing resilience standards in UK infrastructure, September 2024](#)

- like the UKCP18, which are based on rigorous science. However, elements of the modelling process introduce unavoidable uncertainty, as climate models rely on assumptions about future societal developments to project emissions, which cannot be predicted with certainty.
- 9.22 For the first time, in RIIO-ED2 we required network companies to submit a Climate Resilience Strategy (CRS). We asked DNOs to use their CRS to outline how they plan to adapt their networks to increasing climate threats, over the 5-year price control period and beyond, including actions on flood mitigation and vegetation management. Further work is required to develop CRS to ensure they effectively identify climate-specific needs and embed them into the investment decision process.
- 9.23 RIIO-ED2 also established the Climate Change Resilience Working Group, providing a forum for network operators to discuss climate resilience planning, investments, monitoring and adaptation reports. The group is working with us to develop climate resilience metrics and indicators for implementation in ED3. We support the work to date which highlights challenges related to the use of these metrics.
- 9.24 These strategies, planning efforts and the working group have helped develop a collective understanding of the need for and challenges of climate resilience. We will build on these efforts with Government and NESO to embed climate resilience into the next price control. This is especially important given discussions earlier in this consultation about the potential for more input-based, anticipatory investments to minimise expensive retrofits to network infrastructure at a later date.
- 9.25 A strategically planned approach to new network investments, supported by a regulatory regime designed to ensure their delivery, opens a window of opportunity for DNOs to deliver climate resilient investments. These approaches should include asset hardening to resist impacts and strategies to absorb the effects of and recovery from incidents. We welcome views as to how such future-proofed investments can be specified and any challenges associated with a unified approach to such investments (see also question 24).
- 9.26 We will need to further ensure that CBAs take account of the value of climate resilience to assess investment options consistently. Traditional CBA methods rely on future certainties to weigh costs and benefits of different courses of action and will therefore need to be developed further. We recognise that CBAs may not provide all the answers, and additional tools like minimum standards

and stress-testing regimes may also be necessary. Adaptation pathways will help establish the range of uncertainty and identify thresholds and trigger points for future investment decisions.

9.27 We have already begun to experience the impacts of climate change and it will be crucial that networks continue to ensure a reliable service to consumers in the face of these ongoing challenges throughout the ED3 period. As discussed in Chapter 7, we think that the current broad incentive approach is appropriate, but welcome reflections on any additional challenges or changes to the relevant mechanisms that might be necessary.

- Q57.** In the context of making anticipatory investment decisions, what do network companies and other stakeholders need to enable the planning and delivery of cost-effective network resilience measures against our changing climate? What risks and opportunities do you see linked to an input-based approach to these investment plans?
- Q58.** How should we monitor progress on the delivery of climate change resilience? Do you have any specific learnings which can help shape this?
- Q59.** Do you have any comments on the suitability of current incentives to ensure that consumers continue to receive a reliable service in the face of climate hazards?

Environmentally sustainable networks

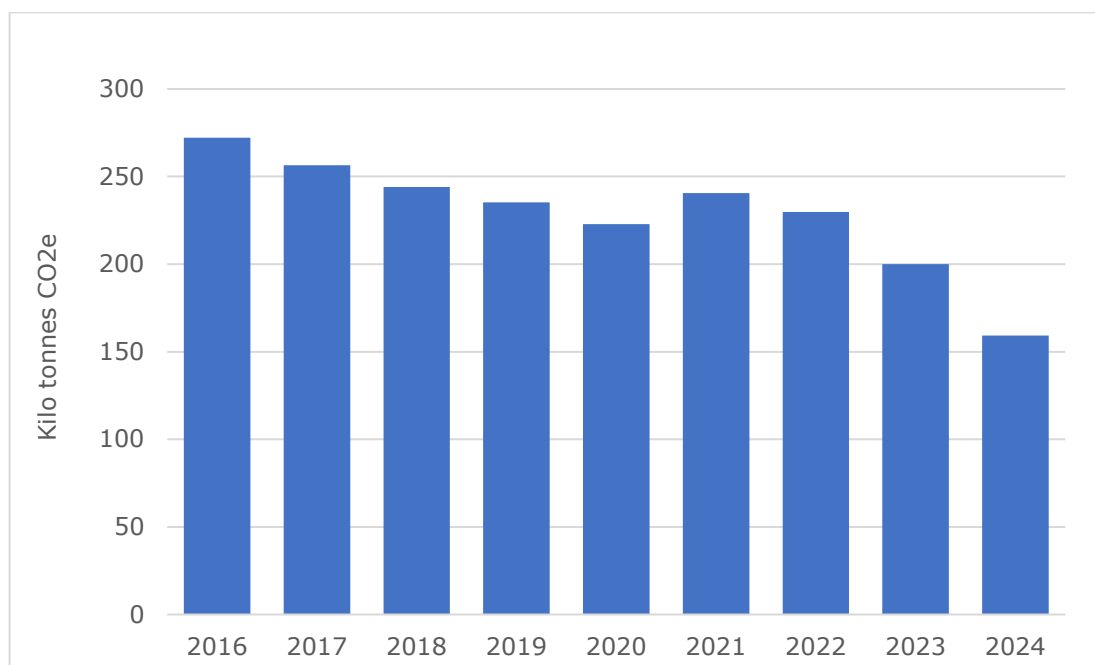
9.28 In addition to adapting to the effects of climate change, it is important to consumers that the ED networks also take action to mitigate the impact of network operations on the environment including reducing GHG emissions that contribute to climate change.

- 9.29 In RIIO-ED2 we required the DNOs to:
- adopt a science-based target to reduce their business carbon footprint (BCF);
 - develop an environmental action plan (EAP) to mitigate the impact of network operations across a range of environmental areas; and
 - to publish an annual environmental report (AER) and key performance indicators on progress implementing the EAP.⁷¹

⁷¹ The DNOs will publish their AERs for the first year of RIIO-ED2 at the end of October 2024.

9.30 As shown in Figure 17, the combined business carbon footprint (BCF) of all DNOs excluding network losses⁷² has decreased 42% since 2016. The sum of all DNOs' BCF excluding network losses was 159 ktCO₂e in Year 1 of RIIO-ED2, less than the combined target of 169 ktCO₂e.⁷³

Figure 17: DNOs' annual GHG emissions excluding network losses

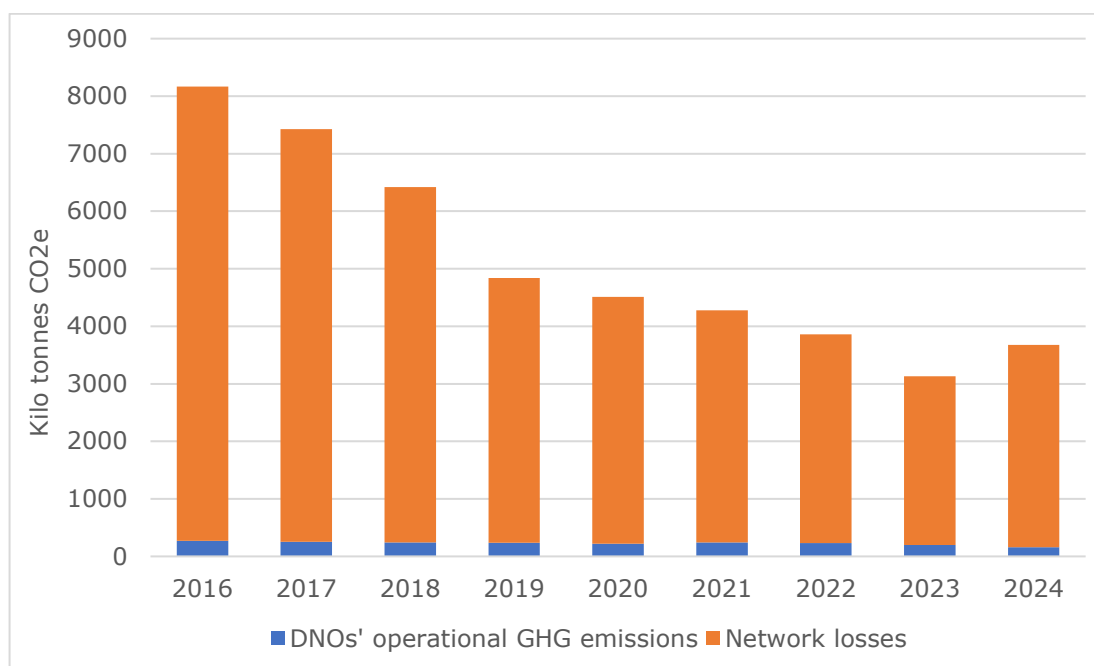


9.31 Figure 18 shows the contribution of network losses to DNOs' total business carbon footprint over RIIO-ED1 and the first year of RIIO-ED2.

⁷² Network losses are the difference between the energy entering a network and the energy received by customers. Losses predominantly occur for technical reasons but some also arise due to non-technical issues such as measurement errors or theft. Technical losses usually occur in the form of heat when electricity is transported to meet consumer demand due to the electrical resistance of network lines and equipment.

⁷³ The combined target was calculated by adding together each DNO's individual emission target for 2023/24.

Figure 18: DNOs’ annual GHG emission including network losses



9.32 Emissions associated with network losses fell significantly over RIIO-ED1. This was mostly due to a significant reduction in the carbon intensity of electricity generation as the share of renewable generation in the energy mix increased. However, more recently emissions from network losses increased in the first year of RIIO-ED2, due to an increase in the carbon intensity of electricity generation in 2023/24 as well as an increase in the amount of network losses.

ED3 approach

9.33 For ED3, we propose to retain the main components of the environmental framework from RIIO-ED2, including the ODI-R on the AER.

9.34 However, we consider there are opportunities to strengthen the overall effectiveness of the framework by:

- increasing the rigour required to meet the baseline expectations for the EAP;
- driving more standardisation in metrics and consistency in annual reporting; and
- monitoring and challenging company performance over the price control period.

9.35 It is important that we also consider how the DNOs balance the need to increase network capacity significantly in ED3 against other important priorities for reducing whole system costs including the environment. It would be regrettable if delivering networks for net zero over ED3 also led to an increase in the direct

adverse impacts of local networks on climate change and the environment. There are a couple of areas in particular that we intend to look at how best to manage the potential trade-offs.

Network losses

- 9.36 As highlighted above, network losses comprise the vast majority of DNOs' total emissions contributing to climate change. The extra generation needed to cover the electricity lost also represents a significant system cost to consumers.⁷⁴
- 9.37 Network losses have a proportional relationship to the square of the current. This means that if the network utilisation is high or running harder the percentage of electricity generated that is wasted as electricity losses will also increase. It also means that losses are higher on the lower voltage networks where the current is higher. Therefore, as heating and transport is electrified and the electrical load on the distribution networks increases, so too will network losses.
- 9.38 The DNOs have an existing licence obligation to ensure distribution losses are as low as practicably possible.⁷⁵ All DNOs are also required to report annually on the impact of activities they have undertaken to improve network efficiency and reduce non-technical losses.
- 9.39 Although network losses will inevitably increase over time along with overall demand, we consider it important that the DNOs continue to work on reducing the rate of network losses. We think there will be greater scope for the DNOs to increase the efficiency of the distribution networks over ED3 through the adoption of more efficient equipment, asset sizing and using real-time monitoring and smart grid technologies to manage the network and DER to optimise current loading and reduce losses.
- 9.40 We also think it is important that the DNOs include losses and wider system costs into the evaluation of investment options to meet network needs. It is not clear whether these factors are included consistently in the DNOs' current approach. The omission may mean that the consumer benefit (eg lower direct costs) of an option is overestimated compared to alternatives that contribute fewer network losses. For example, as flex solutions typically increase network utilisation rates and losses more than traditional network reinforcement, flex might be attributed undue consumer value compared to a traditional

⁷⁴ Electricity losses have averaged around 27TWh per year over the last 10 years.

⁷⁵ See standard licence condition 49. Electricity Distribution Losses Management Obligation and Distribution Losses Strategy. [Electricity Distribution Consolidated Standard Licence Conditions](#)

reinforcement if the system costs and greenhouse emissions from losses are overlooked. The omission of network losses from the evaluation also undervalues the consumer benefits of designing a traditional reinforcement with spare capacity to achieve the economically efficient maximum network loading.⁷⁶

- 9.41 We will further consider whether the existing regulatory arrangements for DNOs to manage network losses are still suitable or if these need to be modified to ensure network losses are at an acceptable level in the net zero transition. We welcome stakeholders' views on this point.

Interruption and Insulating Gases

- 9.42 Interruption and insulation gases (IIG) are used as both an insulating and arc extinguishing medium in electrical plant such as circuit breakers and switchgear. While the equipment is designed to be as secure as possible, they can leak some gas into the atmosphere.
- 9.43 Sulphur hexafluoride (SF6) is a type of fluorinated gas (known as an F gas) and is the predominant IIG used in electrical plant. SF6 leakage contributes to the DNOs' business carbon footprint as it is a potent GHG.^{77 78}
- 9.44 In 2022/23, the existing SF6 inventory on distribution networks had an average leakage rate of 0.4% - contributing 27,089 tonnes of carbon dioxide equivalent emissions.⁷⁹
- 9.45 In early 2024, the European Union finalised new F-gas regulations with a timetable for banning the installation of new SF6 electrical switchgear at different voltages. The regulations also include derogations linked to the availability of suitable alternatives.⁸⁰

⁷⁶ [IC Report exec summary.pdf](#)

⁷⁷ SF6 has a global warming potential (GWP) 25,200 times that of carbon dioxide. Source: Intergovernmental Panel on Climate Change's Sixth Assessment Report, 2023.

⁷⁸ In 2023/24, SF6 emissions averaged 0.7% of DNOs' total GHG emissions including network losses (and averaged 15.3% of DNOs' BCF excluding network losses). Source: DNO Annual Regulatory Report data.

⁷⁹ In 2022/23, the existing SF6 inventory comprised more than 200,000 items of equipment that contained approximately 350,000 kilos of SF6 in total.

⁸⁰ [Regulation - EU - 2024/573 - EN - EUR-Lex \(europa.eu\)](#). New installations will be prohibited as follows:

1 January 2026: full ban of F-gases in switchgear for primary and secondary distribution up to and including 24 kV;

1 January 2028, full ban of F-gases with GWP equal or greater than 1 in electrical switchgear from 52 kV up to and including 145 kV; and

1 January 2030, full ban of F-gases with GWP equal or greater than 1 electrical switchgear for primary and secondary distribution from more than 24 kV up to and including 52 kV.

- 9.46 Although the new European regulations do not apply in the UK, they will have implications for electricity networks in the UK through the supply chain and manufacturers supplying the EU market.
- 9.47 The UK, Scottish and Welsh governments plan to publish a joint consultation in 2025 on potential revisions to the UK F-gas regulations. It is expected the joint consultation will propose to revise the current UK regulations to secure a more ambitious abatement of F-gases similar to the EU.
- 9.48 For RIIO-ED2, each DNO set a target to reduce SF6 leakage and an obligation to publish the volume of SF6 in use on their network and the leakage rate in their Annual Environmental Reports.
- 9.49 Although SF6-free alternatives are available for distribution voltages ⁸¹, it is generally not cost-effective for DNOs to replace the existing inventory with SF6-free alternatives given the volume and low-leaking nature of the installed units.
- 9.50 A more pressing issue is whether the availability of SF6-free and environmentally sustainable alternatives is at scale sufficient to meet significant network growth needed to facilitate net zero.
- 9.51 In light of the above, we consider that DNOs' SF6 leakage reduction strategies for ED3 should focus on:
- further improvements in asset management practices; and
 - working with other industry parties to jointly collaborate with the supply chain on expanding the availability of SF6 free and environmentally sustainable alternatives.
- 9.52 For ED3, it is important that the DNOs ambitiously target the reductions necessary to achieve a near-negligible leakage rate for the SF6 inventory that will continue to operate on their distribution network in the foreseeable future. The range in the leakage rate across individual DNOs suggests that there is scope for DNOs with higher leakage rates to learn from better performing peers on leakage reduction best practices, including data analytics and leak modelling, leak prevention, leak detection and repair.
- 9.53 In addition, we think the DNOs, in conjunction with other networks and industry parties, should engage and collaborate with manufacturers on the availability of

⁸¹ These include clear air technologies that utilise dry air (mix of oxygen and nitrogen) and vacuum for insulation and have a zero greenhouse warming potential.

SF6-free and environmentally friendly alternatives needed for significant network growth to meet net zero.

- 9.54 We welcome stakeholders' views on the priorities for the sector in relation to SF6 leakage in the context of the huge increase in network capacity to facilitate net zero.

<p>Q60. Do stakeholders agree with retaining and strengthening the main components of the environmental framework from RIIO-ED2?</p>

Cyber resilience

- 9.55 As networks become smarter and more automated, network companies will become more reliant on interconnected technologies and systems to deliver services to customers. This means that the risk of cyber-attacks rises as well, threatening to hinder the full benefits consumers could experience from a more digitised, interconnected network. Cyber-attacks can also impact the integrity and availability of operational technology and information technology.
- 9.56 Historically, our cyber resilience framework has included requiring DNOs to publish cyber resilience Information Technology (IT) and Operational Technology (OT) plans. Baseline allowances and a UIOLI allowance have been provided to fund the delivery of these plans, including two separate re-openers to fund any additional activities. This approach has been used alongside PCDs to track delivery of all the activities set out in the plan.
- 9.57 We have learnt that while this approach has enabled us to monitor delivery, allowance spend and progress in complying with existing cyber regulations, it has also resulted in significant regulatory burden for both us and the network companies. Additionally, differences in interpretation of the cyber re-opener guidance have led to a variation in the quality of submissions resulting in an increased administrative burden.
- 9.58 These issues mean that for the RIIO-3 price control for ET, GT and GD, we have proposed to streamline the cyber resilience framework and consider that the approach could be replicated for ED3.
- 9.59 This would broadly mean that a principles-led approach would be taken, thereby reducing the number of PCDs and by extension, the administrative burden on both us and the network companies. Aligning our principles to the NIS Regulations strengthens and simplifies the cyber framework. We will provide consolidated guidance to navigate this new framework.

9.60 For RIIO-3 for ET, GT and GD, we have also proposed changing the funding structure from predominantly UIOLI and re-opener funding to predominantly setting baseline allowances for network companies to deliver the proposals that will be set out in their Business Plans. This is driven by the fact that this area will have matured to a greater extent and transitions these activities to business-as-usual activities. Additionally, the data we have gathered over the previous price controls should help us to effectively benchmark DNO plans.

Q61. Do stakeholders agree with building on the approach taken to cyber resilience in RIIO-3 for ED3?

Supply chain and workforce resilience

9.61 As set out earlier in Chapters 2, 3 and 6, rapid electrification during and beyond the ED3 period will require distribution network companies to deliver new and upgraded assets at unprecedented scale and pace. Companies must have adequate supply chain and workforce resilience plans to minimise the delivery risk.

9.62 We recognise that in recent years companies are confronting a challenging market context that risks slowing down the timely delivery of network asset capacity required for net zero. As many countries step up their investment in clean energy at the same time, reliance on a limited number of distribution network asset suppliers, intense competition for skilled technicians, increased external disruptions like geopolitics and natural disasters, and input cost inflation for manufacturers are putting significant pressure on supply chains and workforce. We are alive to these pressures and want to play our part in helping to alleviate them by designing a regulatory framework that stimulates confidence and growth of energy sector supply chain and workforce capacity. This is consistent with our Growth Duty.

9.63 As an example of the challenges, some network companies report that equipment manufacturing output is largely at capacity, leading to increased price volatility and longer procurement lead times. Companies are being quoted 15-18 month delivery lead times and 2-3x pre-COVID prices for critical high voltage equipment.

9.64 Companies are also experiencing high staff turnover due to a competitive labour market. There are an estimated 47,000 people currently employed in the distribution of electricity. Between 2024 and 2030, an average 2,200 new people per year will need to enter the electricity distribution workforce to meet

the drive to net zero.⁸² By the beginning of ED3, it is possible that between a quarter to a third of the skilled and specialist workforce required may be unavailable. This is particularly pronounced for engineering specialists, electricians, excavation teams, jointers, and overhead line persons. These shortages are reported to be already impacting the ability of companies to deliver network upgrades, with several DNOs citing them as the reason for load and non-load related underspend in Year 1 of RIIO-ED2.

- 9.65 The rate of workforce retirement is currently outpacing the rate at which network companies are training apprentices, leading to more vacancies, higher wages, and increased 'poaching' of skilled employees by companies.⁸³ This is especially a challenge in the lower voltage network where upgrades to the network are reliant on greater number of people. Over-emphasis on planning and engineering, fast pace of delivery, and attitudes to risk within the utilities sector are cited as major barriers in attracting young people and diverse talent when compared to tech or services sectors.⁸⁴
- 9.66 Separately, supplier representatives have noted that the capacity to respond to increased demand is currently good and lead times have improved for low and medium-voltage switchgears and transformers.
- 9.67 The main challenge suppliers continue to face appears to be the lack of a high-level order book with no minimum volumes, making the GB market less attractive to international manufacturers.
- 9.68 RIIO-ED2 allowed £360.4m for operational training⁸⁵ and introduced the requirement of workforce resilience strategies where companies set out their approach to tackling workforce challenges. RIIO-ED2 Business Plans further required that if a network company projects significant increase (compared to RIIO-ED1) in either an activity or a level of performance, the forecast must be accompanied by a description of the arrangements that will need to be put in place to support the increase, together with supporting evidence. This included evidence that the company has considered the implications an increase may have on its workforce or supply chain.

⁸² [Power-Workforce-Demand-Estimates-2024-30-v5.pdf \(euskills.co.uk\)](#)

⁸³ Trainees account for just 3.4% of the current electricity transmission and distribution workforce. Workforce requirements of the UK's electricity transmission and distribution industry (2024 – 2038), Energy & Utility Skills | UK Membership - Energy & Utility Group (euskills.co.uk), 13 November 2023.

⁸⁴ [Gearing up for net zero - Utility Week](#), 1 Mar 2024.

⁸⁵ Operational training includes only the costs of training employees, related parties and agency staff. These staff are referred to as Craftspersons, Engineers and Other Operational Employees. It does not include costs incurred for assessing or training contractors.

9.69 Beyond these measures, we do not currently regulate or monitor the supply chains or workforce of network companies. However, we welcome views on whether these measures are sufficient to tackle market volatility and consequent challenges in the ED3 period. For example, adopting the advanced procurement mechanism we are currently developing for the ET sector could provide both long-term visibility to equipment manufacturers and reduce lead times for companies. Promoting collaboration among network companies on traineeship programmes and standardisation of industry-wide qualifications and of workforce metrics could relieve labour market pressures and reduce the need to poach from a limited pool of experienced employees.

- Q62.** What specific issues are network companies facing in relation to the skills and capacity of their workforce and what measures should we take through the regulatory framework to mitigate these issues?
- Q63.** What specific issues are supply chains facing and what measures should we take through the regulatory framework to mitigate these issues?
- Q64.** Given our comments in Chapter 6 around taking a more proactive approach, are there any specific features of a more anticipatory or strategic investment approach that might create risks or opportunities for supply chain and workforce constraints?
- Q65.** What would the benefits be of a geographical approach to delivering new and upgraded assets in terms of supply chain and workforce constraints?

10. Your response, data and confidentiality

Consultation stages

- 10.1 The consultation will be open until 15 January 2025. Responses will be reviewed, and the consultation decision will be published in Q1 2025.

How to respond

- 10.2 We want to hear from anyone interested in this consultation. Please send your response to RIIO3@ofgem.gov.uk.
- 10.3 We've asked for your feedback in each of the questions throughout. Please respond to each one as fully as you can.
- 10.4 We will publish non-confidential responses on our website at www.ofgem.gov.uk/consultations.

Your response, your data and confidentiality

- 10.5 You can ask us to keep your response, or parts of your response, confidential. We'll respect this, subject to obligations to disclose information, for example, under the Freedom of Information Act 2000, the Environmental Information Regulations 2004, statutory directions, court orders, government regulations or where you give us explicit permission to disclose. If you do want us to keep your response confidential, please clearly mark this on your response and explain why.
- 10.6 If you wish us to keep part of your response confidential, please clearly mark those parts of your response that you *do* wish to be kept confidential and those that you *do not* wish to be kept confidential. Please put the confidential material in a separate appendix to your response. If necessary, we'll get in touch with you to discuss which parts of the information in your response should be kept confidential, and which can be published. We might ask for reasons why.
- 10.7 If the information you give in your response contains personal data under the General Data Protection Regulation (Regulation (EU) 2016/679) as retained in domestic law following the UK's withdrawal from the European Union ("UK GDPR"), the Gas and Electricity Markets Authority will be the data controller for the purposes of GDPR. Ofgem uses the information in responses in performing its statutory functions and in accordance with section 105 of the Utilities Act 2000. Please refer to our Privacy Notice on consultations, see Appendix 4.
- 10.8 If you wish to respond confidentially, we'll keep your response itself confidential, but we will publish the number (but not the names) of confidential responses we

receive. We won't link responses to respondents if we publish a summary of responses, and we will evaluate each response on its own merits without undermining your right to confidentiality.

General feedback

10.9 We believe that consultation is at the heart of good policy development. We welcome any comments about how we've run this consultation. We'd also like to get your answers to these questions:

1. Do you have any comments about the overall process of this consultation?
2. Do you have any comments about its tone and content?
3. Was it easy to read and understand? Or could it have been better written?
4. Were its conclusions balanced?
5. Did it make reasoned recommendations for improvement?
6. Any further comments?

Please send any general feedback comments to stakeholders@ofgem.gov.uk

How to track the progress of the consultation

You can track the progress of a consultation from upcoming to decision status using the 'notify me' function on a consultation page when published on our website. Choose the notify me button and enter your email address into the pop-up window and submit.

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Upcoming > **Open** > **Closed** (awaiting decision) > **Closed** (with decision)

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Appendix 1 – Consultation questions

Drivers for change

Q1. Do you agree with our characterisation of the wider context for ED3? Are there any other areas of context that you consider material for ED3?

ED3 objective and consumer outcomes

Q2. What are your views on our overarching objective and proposed consumer outcomes?

Regulatory framework

Q3. Do you agree that the network investment elements of the framework should be more input based?

Q4. Do you agree that we should consider introducing additional controls around network investments and what features should these controls contain?

Q5. Do you agree that the incentives on DNOs will need to adapt from RIIO-ED2 and if so, how?

Q6. Do you agree that there is still a role for re-openers in ED3, particularly given the timing of the future full RESP output and how should these be triggered?

Q7. Using RIIO-ED2 as the counterfactual, what alternative regulatory models or characteristics are needed in ED3 to ensure the DNOs deliver the above consumer outcomes? What are the trade-offs we should consider?

Q8. Do you agree that the regulatory framework for ED3 should have features of the Plan and Deliver model for network investment and Incentive Regulation model for other elements?

Q9. Do you think that there is a greater role for elements of ex post regulation or of cost pass through in ED3, either specifically in assessing cost changes resulting from changes to investment requirements during the period, or more broadly to reflect the changing context?

Networks for net zero

Q10. What is the potential availability of network flex across GB for DNOs in the short term and on the journey to net zero during ED3?

Q11. To what extent are global supply chain and workforce pressures contributing to longer lead times for delivery network reinforcement?

Q12. Do you agree that the risk and downside for consumers of network underinvestment in network reinforcement would be greater than the downside of overinvestment?

- Q13.** What are the benefits and risks to deliverability if network reinforcement is deferred to future periods?
- Q14.** What do you see as the role of distributed flexibility, both in the short and longer term, to manage distribution network constraints?
- Q15.** How do we ensure that network flexibility is used only when it is in consumers' long-term interests in ED3?
- Q16.** How are unexpected constraints dealt with currently? How quickly can these be eased, and what is the impact of these unexpected constraints (eg on LCT uptake)?
- Q17.** Do you agree that the tRESP output outlined for early 2026 will help create a level playing field for DNOs' business planning and support the ED3 objective and consumer outcomes?
- Q18.** Can anticipatory network reinforcement be used to smooth the long-term build profile to avoid creating pinch points for the supply chain and workforce? What are the risks and trade-offs?
- Q19.** Do you agree that investment optioneering should aim to reduce the lifetime costs by sizing elements of works for long-term need, including considering the impact of thermal losses?
- Q20.** Is a 5-year price control (2028-33) the right duration to achieve the objective of securing timely network capacity for the net zero transition at least cost to consumers over the long run?
- Q21.** To what extent should the price control be more directive on specific anticipatory and strategic investments to achieve the 'networks for net zero' consumer outcome?
- Q22.** Do you agree with our characterisation of strategic and anticipatory investment and our expectation that these activities would have different regulatory drivers and controls?
- Q23.** Should the price control provide more guidance or guardrails around the use of particular network solutions to achieve the 'networks for net zero' consumer outcome?
- Q24.** Should we consider how we might bring all network capex investment together within the framework, irrespective of driver (eg load, asset health, resilience), to ensure a common approach to future proofing and delivery?

Responsible business

- Q25.** How can we better strengthen accountability for consumer outcomes?
- Q26.** What are your views on ED company reporting and the overall transparency of performance and compliance?

- Q27.** Do you consider that ISGs alone are sufficient to ensure high quality and effective consumer and stakeholder engagement throughout the ED3 price control? What alternative or complementary approaches should we consider?
- Q28.** Do you agree that Ofgem should adopt research approaches, such as deliberative techniques to ensure that the consumer voice is heard and considered throughout the ED3 and company Business Plan process?
- Q29.** How should our approach to enhanced stakeholder engagement be adapted to better include the perspectives of all vulnerable customers, including those that are seldom heard, digitally disengaged/excluded and those that are worst served?
- Q30.** What alternative or additional approaches might we use to ensure that the consumer voice remains central to our policy setting process?
- Q31.** Has the BMCS incentive served its purpose in driving performance improvements and how can we adapt the metrics to better incentivise performance across a wider range of interactions between DNOs and their customers, particularly relating to connections?
- Q32.** How should the CVI be adapted for ED3 and should we consider greater alignment with the GD sector?
- Q33.** Should DNOs have a role in delivering energy efficiency measures to homes and businesses? What might the scope of these services be and how should they be funded?
- Q34.** How can we drive further service improvements under the TTC incentive?
- Q35.** Should the TTC also apply to domestic connection upgrades ie fuse/cutout/service cable upgrades, including unlooping?
- Q36.** What is the best approach towards incentivising services to major connections customers and how should the MCI be adapted for ED3?
- Q37.** How should the ED3 framework adapt to ensure that customers connecting to the distribution network are provided with the service that they need from the DNOs?
- Q38.** In the context of greater electrification, is our current approach towards regulating reliability appropriate for ED3?
- Q39.** What role should bespoke outputs and CVPs have in ED3?
- Q40.** How can we optimise late and early competition models for application in electricity distribution?
- Q41.** How should our approach to cost assessment evolve, to enable us to better manage increasingly pronounced trade-offs between consumer protection, efficiency and investment in the distribution network?

- Q42.** How should our guidance for cost benefit analysis evolve to better enable optioneering between different interventions, taking relevant long-term risks and benefits into consideration?
- Q43.** Do you agree that the current Real Price Effect (RPE) methodology should form the basis for adjusting allowances in ED3?
- Q44.** Do you agree that the current approach to setting the ongoing efficiency challenge is a suitable starting point for ED3?
- Q45.** Do you see any reason why we should not implement the proposed changes to the calculation allowed returns, consideration of investability and assessment of financeability that we set out in RIIO-3 Sector Specific Methodology Decision – Finance Annex for ET, GT and GD?
- Q46.** Do you see any reason why we should not implement the proposed updates to financial resilience requirements that we set out in RIIO-3 Sector Specific Methodology Decision – Finance Annex for ET, GT and GD?
- Q47.** What are the key factors (including benefits and costs to consumers) that Ofgem should take into consideration when conducting its review of the appropriate approach to regulatory depreciation in ED3 and beyond?

Smarter networks

- Q48.** How should the price control encourage ongoing development of the DSO role and activities to optimise whole system benefits for existing and future consumers?
- Q49.** What should the role of the DSOs be in identifying and delivering whole system benefits?
- Q50.** Our historic approach to publishing and sharing datasets has been stakeholder-led and focused on establishing good digital foundations in the DNOs. With the rapid pace needed for enhanced data and digitalisation, should we instead be considering incentives around strategic priorities, such as network planning, flexibility, and connections?
- Q51.** How can we enable greater development of internal digital expertise in its licensees?
- Q52.** How should network companies use AI to improve network insight and decision-making (both operating expenditure (opex) and capital expenditure (capex)) and how should we be encouraging this through the ED3 framework?
- Q53.** Our aim is for the ED3 framework to be structured to deliver high impact, transformative innovation – do you think that further changes, alongside those proposed for the other sectors in our RIIO-3 SSMD, are required to deliver this?

Q54. Are there any factors particular to DNOs that facilitate or challenge deployment of innovation on their own and across networks?

Resilient and sustainable networks

Q55. Do you agree that we should retain the Network Asset Risk Metric (NARM)? How should it further evolve in ED3?

Q56. Do you agree that we should consider a more integrated approach to managing asset health, together with load-driven expenditure, given the need to future proof for resilience (climate, cyber and physical security) and future demand? What might the risks and benefits of this approach be?

Q57. In the context of making anticipatory investment decisions, what do network companies and other stakeholders need to enable the planning and delivery of cost-effective network resilience measures against our changing climate? What risks and opportunities do you see linked to an input-based approach to these investment plans?

Q58. How should we monitor progress on the delivery of climate change resilience? Do you have any specific learnings which can help shape this?

Q59. Do you have any comments on the suitability of current incentives to ensure that consumers continue to receive a reliable service in the face of climate hazards?

Q60. Do stakeholders agree with retaining and strengthening the main components of the environmental framework from RIIO-ED2?

Q61. Do stakeholders agree with building on the approach taken to cyber resilience in RIIO-3 for ED3?

Q62. What specific issues are network companies facing in relation to the skills and capacity of their workforce and what measures should we take through the regulatory framework to mitigate these issues?

Q63. What specific issues are supply chains facing and what measures should we take through the regulatory framework to mitigate these issues?

Q64. Given our comments in Chapter 6 around taking a more proactive approach, are there any specific features of a more anticipatory or strategic investment approach that might create risks or opportunities for supply chain and workforce constraints?

Q65. What would the benefits be of a geographical approach to delivering new and upgraded assets in terms of supply chain and workforce constraints?

Appendix 2 – Summary of RIIO-ED2 outputs

Output name	Output type
Annual Environmental Report	ODI-R
DSO	ODI-F
Digitalisation Licence Obligation	LO
Technology Business Management (TBM) taxonomy for classifying digital/IT spend	ODI-R
Collaborative project with networks to develop a new regulatory reporting methodology	ODI-R
Smart Optimisation Output	LO
Customer Satisfaction Survey	ODI-F
Complaints Metric	ODI-F
Time to Connect	ODI-F
Guaranteed standards of performance - Connections	Statutory instrument
Major Connections Incentive	ODI-F
Treating domestic customers fairly	LO
Consumer Vulnerability Incentive	ODI-F
Annual Vulnerability Report	ODI-R
Interruptions Incentive Scheme	ODI-F
Guaranteed standards of performance - Reliability	Statutory Instrument
Network Asset Risk Metric	PCD, ODI-F
Cyber Resilience Information Technology	PCD
Cyber Resilience Operational Technology	PCD

Appendix 3 – RIIO-ED2 Year 1 performance

- A3.1 We hold DNOs accountable through annual reporting, ensuring performance meets expectations, outputs are delivered, and spending aligns with forecasts. A detailed performance assessment will be provided in the RIIO-ED2 Year 1 Performance Report in due course.
- A3.2 In the meantime, key findings from our initial review of the DNO Regulatory Reporting Packs (RRPs) are summarised below for the first year of RIIO-ED2 (1 April 2023 – 31 March 2024). This information is subject to further QA but provides an initial, high level summary of RIIO-ED2 Year 1 performance, indicating how DNOs are meeting quality of service targets and spending expectations, as well as highlighting common sector challenges.
- A3.3 DNOs reported an aggregate 13% underspend in year 1 due to mobilisation issues, rephasing of works, increased use of flexibility, supply chain constraints, and lower than expected connection volumes despite inflationary pressures. Most DNOs forecast to exceed their ex-ante allowances, with a sector-wide forecast overspend of 6% by the end of RIIO-ED2. We will continue to monitor spend and delivery against allowances and plans over the remainder of the price control.
- A3.4 Quality of service performance was broadly neutral in financial terms across all ODI measures, with significant variation: while IIS performance was challenging, customer service levels remained high, averaging 9.1 out of ten.

Figure 19: All DNO - totex by category (actual vs allowance) 2024

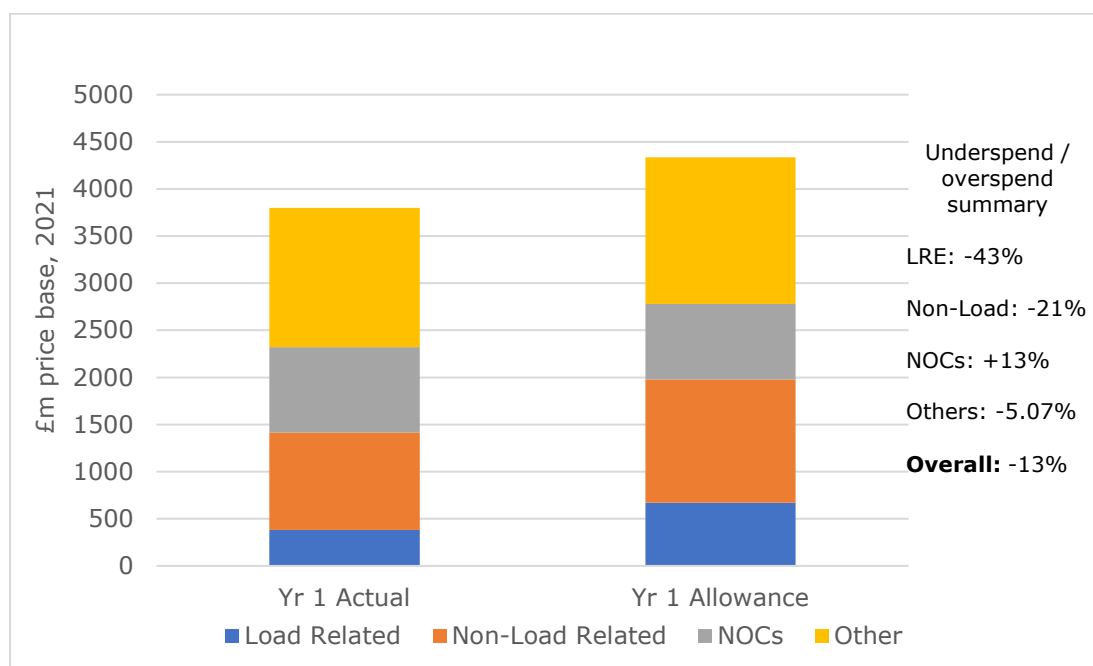
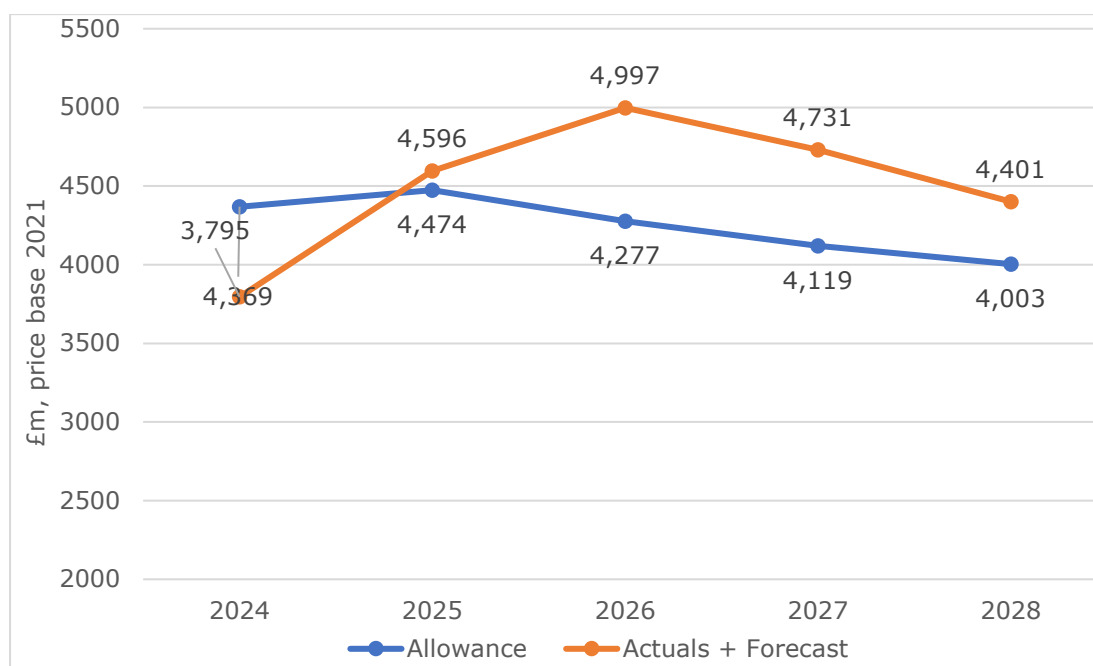


Figure 20: All DNO - totex annual profile



A3.5 Load Related Expenditure (LRE)⁸⁶ saw the most significant underspend. This was, in part, due to lower demand than expected for new connections in 2024. The changes to connection boundaries from the Access Significant Code Review (Access SCR) have not resulted in the increase in distribution connections

⁸⁶ Investment in network capacity, for example to meet demand from low carbon technologies or to connect new generation, is called load-related expenditure in the price control.

expected, potentially also due to challenges being experienced at transmission that are impacting distribution connections. DNOs expect demand to increase later in 2024 and beyond, based on DFES forecasts.

Figure 21: LRE - actual vs allowances and forecast vs allowances 2024

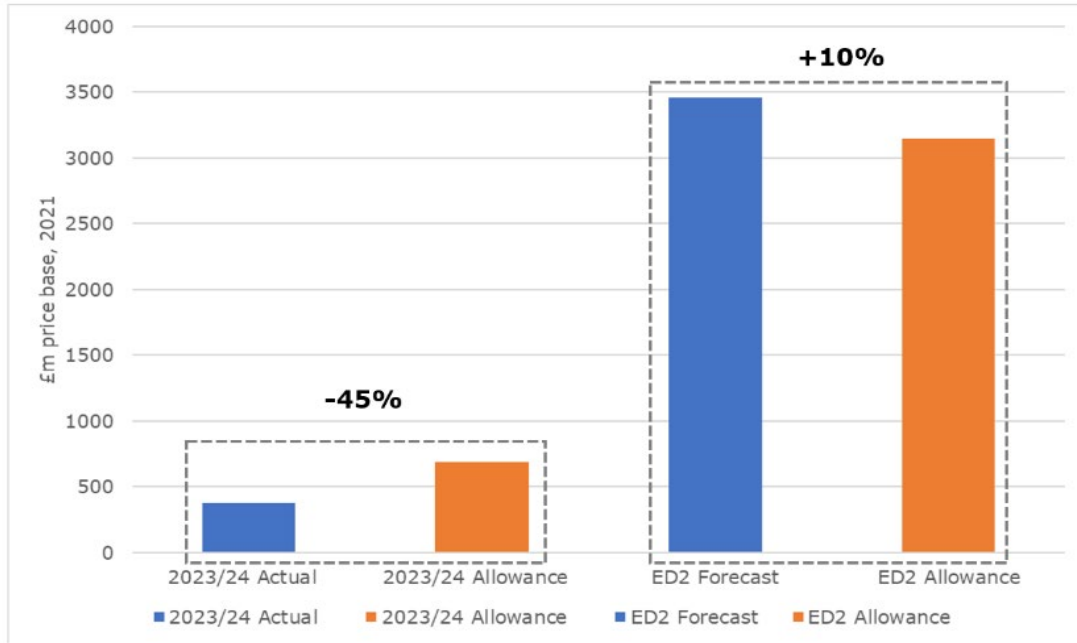


Figure 22: Volume driver - actuals vs allowances vs forecast 2024

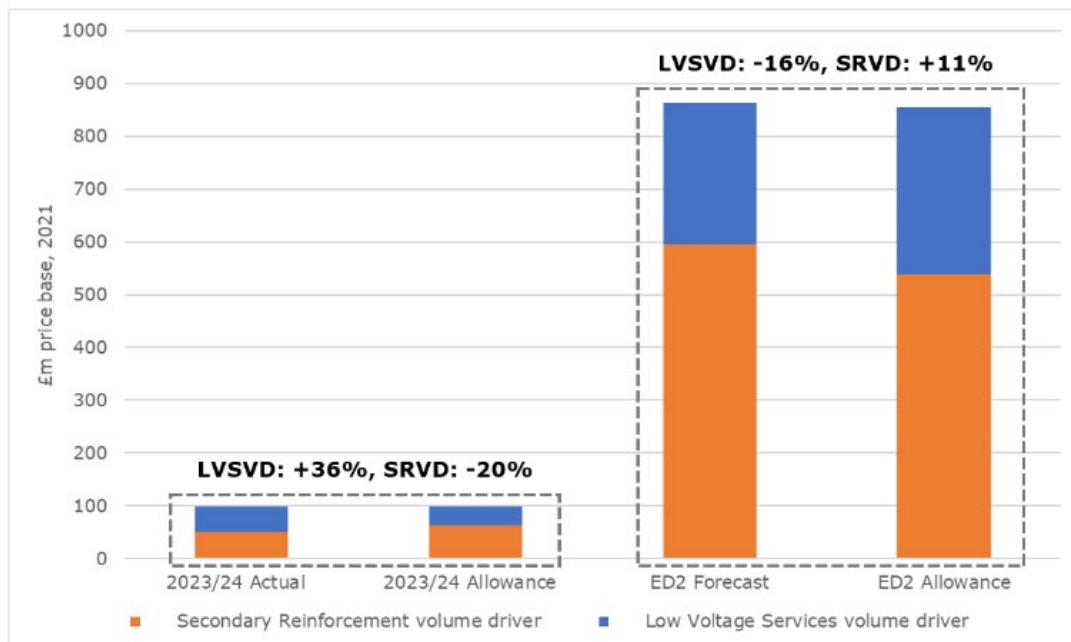
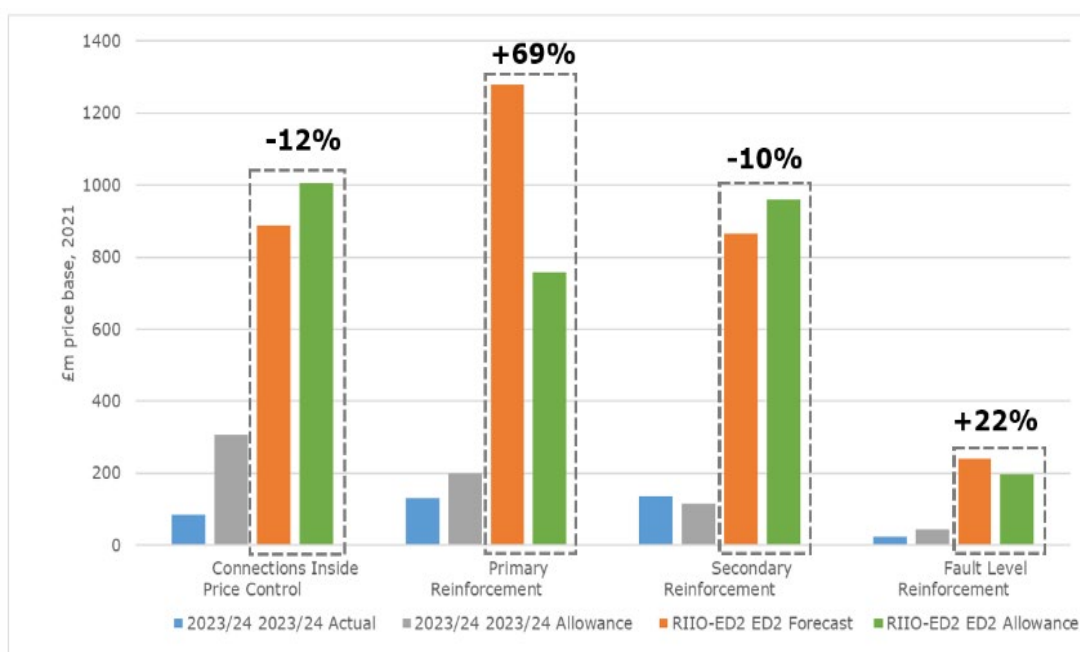


Figure 23: Load disaggregated actuals vs allowances vs forecast 2024



A3.6 Non-LRE also experienced an underspend due to slow asset replacement and NARM progress, hindered by mobilisation and supply chain issues. Network Operating Costs exceeded allowances for most DNOs due to higher fault costs from unusually wet weather and increased storm events, highlighting emerging climate resilience risks.

A3.7 The non-operational capex underspend was due to mobilisation delays, slow EV procurement, and recruitment challenges for cyber/IT programs. DNOs forecast these underspends will be offset by higher delivery in the remaining years, but we will monitor and act if performance falls short.

A3.8 Long-term forecasts for RIIO-ED2 vary, with some DNOs projecting to underspend their ex-ante allowances due to efficiency while others projecting to overspend. DNOs noted rising supply chain, contractor, and labour costs as some of the reasons for this forecast overspend.

A3.9 DNOs received a net penalty of -£2.47m across the sector, mainly due to tougher interruptions incentive targets. However, there are positive signs in other areas. Time To Connect scores have generally improved, with 13 out of 14 licensees surpassing the new Major Connections incentive benchmark. Customer service levels remained high, averaging 9.1 out of ten. Further details are in Chapter 7.

Appendix 4 – Privacy notice on consultations

Personal data

The following explains your rights and gives you the information you are entitled to under the General Data Protection Regulation (GDPR).

Note that this section only refers to your personal data (your name address and anything that could be used to identify you personally) not the content of your response to the consultation.

1. The identity of the controller and contact details of our Data Protection Officer

The Gas and Electricity Markets Authority is the controller, (for ease of reference, “Ofgem”). The Data Protection Officer can be contacted at dpo@ofgem.gov.uk

2. Why we are collecting your personal data

Your personal data is being collected as an essential part of the consultation process, so that we can contact you regarding your response and for statistical purposes. We may also use it to contact you about related matters.

3. Our legal basis for processing your personal data

As a public authority, the GDPR makes provision for Ofgem to process personal data as necessary for the effective performance of a task carried out in the public interest. i.e. a consultation.

4. With whom we will be sharing your personal data

We will not share your personal data with any other person or organisation.

5. For how long we will keep your personal data, or criteria used to determine the retention period.

Your personal data will be held for 12 months after the project has closed.

6. Your rights

The data we are collecting is your personal data, and you have considerable say over what happens to it. You have the right to:

- know how we use your personal data
- access your personal data
- have personal data corrected if it is inaccurate or incomplete
- ask us to delete personal data when we no longer need it

- ask us to restrict how we process your data
- get your data from us and re-use it across other services
- object to certain ways we use your data
- be safeguarded against risks where decisions based on your data are taken entirely automatically
- tell us if we can share your information with 3rd parties
- tell us your preferred frequency, content and format of our communications with you
- to lodge a complaint with the independent Information Commissioner (ICO) if you think we are not handling your data fairly or in accordance with the law. You can contact the ICO at <https://ico.org.uk/>, or telephone 0303 123 1113.

7. Your personal data will not be sent overseas

8. Your personal data will not be used for any automated decision making.

9. Your personal data will be stored in a secure government IT system.

10. More information For more information on how Ofgem processes your data, click on the link to our "[ofgem privacy promise](#)".