Consultation

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Consultation on frameworks for future systems and network regulation: enabling an energy system for the future

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The existing RIIO-2 price controls for electricity and gas transmission and gas distribution networks will run until March 2026, with the new price control for electricity distribution running for 5 years until March 2028. We are now consulting on the process for deciding the overarching framework design for the network price controls that will replace these. This consultation is the follow up publication from our September 2022 Open Letter which set out the initial options for a proposed package of reform.

We welcome views from all stakeholders with an interest in the regulation of energy networks. 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. 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

If there is one lesson to be taken from the energy crisis following Russia's invasion of Ukraine in 2022, it is the need to accelerate the shift away from fossil fuels to clean energy. This will help to reduce costs to consumers by breaking the link between electricity bills and gas prices; it will improve the security of supplies of energy; and it will help to protect consumers from the dangers of unmitigated climate change.

Without reform, the electricity grid at both the transmission and distribution levels, will become an obstacle to net zero. It is now imperative that generation and network investment are closely planned and co-ordinated; and that the electricity network is upgraded in anticipation of the significant numbers of low carbon assets needed to meet net zero targets for 2035 (a net zero clean power system) and 2050 (a net zero economy).

The paper we are publishing today consults on the overarching framework design for the price controls that will follow RIIO-2. System planning should allow us to move away from the approach followed under the "Connect and Manage" regime where market-led increments to transmission grid capacity perpetually lagged accelerating renewable generation. This approach has led to high constraint costs for consumers and lengthening delays in connecting new generation. We propose that the future of the grid should be based on a modern version of "Invest and Connect", where programmatic grid expansion occurs in line with top-down system plans prepared by the Future System Operator (FSO), *in anticipation* of generation and demand.

These system plans will specify the network infrastructure needed to meet long-range net zero targets at the least overall cost to consumers, while meeting security of supply standards, and minimising grid congestion. They will identify the system-wide generation assets that are likely to be needed at the transmission and distribution levels; but also how best to anticipate new sources of demand at the distribution level (such as electric vehicle charging and heat pumps). The task of the regulatory regime will then be to get this infrastructure built as rapidly and efficiently as possible, so that when the wind farms or nuclear power stations or electric vehicles are ready to connect, the grid capacity is already in place.

It is appropriate therefore to consider how such a foundational shift might impact various aspects of network regulation. This includes the way we set network price controls; the way we allocate system costs through network charges; the policies that govern how users connect to the grid; and the way system planning interacts with energy markets to produce the best outcomes for consumers.

Work is already underway to establish the FSO in 2024. Last year, we published a decision on accelerating strategic transmission investment in line with the first holistic network design published by the Electricity System Operator (ESO) to meet 2030 offshore wind targets. We followed this with a decision that the ESO would prepare a central strategic network plan by 2025 that covers the grid upgrades needed for the entire electricity system to meet 2035 and 2050 net zero targets. We propose to consult on an expansion of the Strategic Network Plan to cover gas and hydrogen as well, with a view to achieving a truly whole-system plan.

The consultation being launched today puts another essential building block in place – the design of future price controls in the context of long-range system plans. Consultation on other areas of network regulation, such as connections policy and network charging, will follow later in the year, but always with the same objective in mind: acceleration of the shift to a net zero energy system at the least overall cost to consumers, in line with long-range whole system plans. This task is now vital and urgent. There is not a moment to lose.

Akshay Kaul

Interim Executive Director, of Infrastructure and Security of Supply, Ofgem

Executive Summary

The renewed urgency in the UK's decarbonisation goals underlines the need for our energy networks to be ready for new patterns of energy supply and energy use. As we embark on a deeper and faster transformation of our energy system, we need to ensure that networks play a full role in that. We need to regulate networks to ensure that consumers are benefitting from their contribution to a low-cost energy system as a whole – not only from efficiently run networks.

The transformation means investing, upgrading and relocating capacity, and reconsidering use of the existing network based on predictions of where the system will be in 5, 10 or 25 years' time. The investments in pipes and wires that will be needed in the future requires a whole energy system view across all energy sources, the location and nature of future supply and demand, and opportunities and need for flexible responses and energy storage in a coherent package. Without such a strategic plan, investment would occur without coordination; it would be expensive and wasteful; and investors, mindful of statutory requirements to invest only where it is "economic and efficient", would ask for a higher cost of capital.[1] Such a plan will need to be rich in information about existing networks and informed by customer and stakeholder intelligence to deliver maximum consumer benefits and optimal, least cost solutions. It, and the associated regulatory regime, will need to manage the uncertainties and be able to adapt to evolving futures.

We are already developing strategic network planning roles for the Future System Operator (FSO) for the Electricity Transmission sector;[2] and we anticipate similar roles in Gas Transmission. We are consulting on giving the FSO an active role in the Electricity Distribution sector and will consider the potential role in Gas Distribution considering this and Government's overall hydrogen strategy.

As the economic regulator of the energy sector, standing in the place of consumers and representing their long-term interests, this is a big change to the environment in which we operate. We need to ensure that the infrastructure that will be needed is there *before* the need materialises *and* that it has been built efficiently and without waste. Our aim, therefore, is to make effective whole-system plans the *foundation* of future price controls in gas and electricity.

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[1] These changes and their dependencies are discussed in Section 2.
[2] Decision on the initial findings of our Electricity Transmission Network Planning Review | Ofgem and Future System Operator: government and Ofgem response to consultation (publishing.service.gov.uk)

The traditional outcomes for consumers that we have always sought to ensure from the networks will continue to be important: very high levels of service and everyday operations and maintenance delivered at efficient costs. That requires that our regulation provides investors with all the fairness and certainty that they need to keep the cost of capital very low.[3]

The requirement for large amounts of new infrastructure are to be delivered at pace and the attendant development of whole system planning, and indeed increased digitalisation, could change how we perform many aspects of our regulatory work. Network price controls could be transformed; so could the way we charge for network services; the way we manage connection requests; and how we interact with the family of institutions - GB-wide, national, devolved, and local - with their various and differing responsibilities for energy and the net zero transition.

This document focuses specifically on the possible implications of these changes for network price controls. We will consult separately on the other areas of our activity that are affected by these transformations. We are concurrently publishing a consultation on local energy institutions and governance.[4]

At this stage in our review, we have not ruled out that incremental modifications of the RIIO framework might deliver all that is needed. RIIO has evolved into a very flexible collection of mechanisms. We tell some of the story of that evolution in Section 2. Changing the mix of mechanisms and inventing new incentives might deliver anticipatory investment in a strategically planned system. Incremental change would have the advantage of familiarity and of delivering the security that investors want in exchange for a low cost of capital.

On the other hand, whole system planning may change the fundamental justification for RIIO-style ex ante regulation sufficiently to tip the choice away from it. Traditionally, ex ante incentive regulation arose from the fact that licensees possessed the detailed expert system knowledge of assets and demand conditions, while the regulator did not. Whole system planning requires a substantial reduction in that information asymmetry, and anticipatory investment places ultimate responsibility for upgrades and new project needs with the strategic planners rather than the licensees.

Reduced information asymmetry allows us to consider alternatives that were previously off the table. In Section 3, we describe three "archetypes" of regulation that expand on

[3] See Section 4 for a full discussion of the imperative to maintain a stable environment for investment.
[4] Consultation: Future of local energy institutions and governance | Ofgem

the options described in the September open letter which launched this review process. The first, "Plan and Deliver", involves granular planning by the new planning institutions and direct procurement, through competitive tendering. The second, "Ex ante Incentive Regulation" considers possible simplifications and evolutions of RIIO-style regulation. The third, "Freedom and accountability", describes ex post regulation that could be made possible by enhanced monitoring.

Then, in Section 4, we mix and match these ideal types in specific example models for discussion for each of the networks. We ask open questions about their feasibility and desirability. The move to system-level strategic planning may have implications for the timing and synchronisation of price controls, since the capacity for developing whole-system strategic plans may start at transmission levels and only later become detailed at lower levels. Section 4 therefore also presents a set of options and questions about timing, including the question of whether we should roll over the 2026 price controls in gas.

We aim to have come to a decision on a framework, procedure, and timing for the next price controls in the autumn of this year, and to start consultation on detailed methodologies soon after that. To achieve this, we propose an active period of stakeholder engagement which we intend to be primarily between March and May 2023. This process is described in more detail in Section 5 and Appendices 2-6.

1. Introduction

This Section sets out the focus of the review and the context of the changes we are exploring.

What are we consulting on?

1.1. We announced in September 2022 that we would be undertaking a review of the existing network regulation regime.[5] In the open letter, we outlined that future network price controls cannot be considered in isolation from other policies across the Ofgem portfolio, and a co-ordinated approach will be needed to ensure that the whole energy system is optimised to deliver low cost and reliable energy.

1.2. The energy system is in transformation, and we must consider how we regulate networks alongside the other institutional, policy and regulatory changes that are enabling this transformation. Ensuring that we can deliver the right infrastructure, at the right place, at the right time, at lowest cost, depends on the totality of these arrangements. This consultation is therefore closely related to other areas that have been the subject of recent publications, including:

- **Local energy institutions and governance**[6]
- **Centralised Strategic Network Planning**[7] and its future evolution
- **Role of flexibility and options for market reform**[8]
- **Future System Operator role**[9]
- **Review of electricity market arrangements**[10]
- **Competition policy**[11]

[5] Open Letter: Future Systems and Network Regulation | Ofgem Open Letter: Future Systems and Network Regulation | Ofgem
[6] Consultation: Future of local energy institutions and governance | Ofgem
[7] Decision on the initial findings of our Electricity Transmission Network Planning Review | Ofgem
[8] Call for Input: The Future of Distributed Flexibility | Ofgem
[9] Future System Operator: government and Ofgem response to consultation (publishing.service.gov.uk)
[10] Review of electricity market arrangements - GOV.UK (www.gov.uk)
[11] Competition in Onshore Electricity Networks

1.3. This consultation does not pre-empt or reconsult on the outcome of consultations on these topics. Rather, the intention here is to look specifically at the way in which all these changes might influence network price controls.

1.4. This consultation assumes the following conditions to be in place:[12]

- There will be national and regional holistic cross-vector energy system planning. The level of detail at which this is done might be informed by the results of this review;
- There will be substantial deployment of smart devices and appliances, network digitalisation for monitoring and control that enables smart networks. The rules governing who has access to what data might be informed by the outcomes of this review.

1.5. There is a combination of changes which together may require and/or enable changes to how price controls are undertaken:

- **Need:** the step change in amount, location, timeliness, and type of investment needed.
- **System-level plan:** the prospect of holistic and strategic network planning capabilities in the FSO and in regional strategic planning bodies.
- **Digitalisation:** the new information-gathering and processing capabilities associated with network digitalisation.
- **Wider systemic complexity and uncertainties:** the fact that price controls and the underpinning networks interact with broader systems with their own complexities, from the impact of climate change itself, system operation and consumer behaviour, and uncertainties in future technological and political developments.

1.6. We are consulting on whether these factors merit large-scale change in our price control frameworks, methods, and processes, or whether we should rely on evolutionary change. Our objective is to do so while preserving the stability in the overall approach to economic regulation that allows us to attract investment at a low cost of capital across all networks.

[12] Whether they are or not will be subject always to the outcome of related consultations and to future decision-making.

1.7. Section 2 presents the strategic case for change and reviews what we have learned to date from RIIO-2.

1.8. Section 3 builds on the options in our open letter and describes three regulatory archetypes. It asks specific questions about how these could work in practice.

1.9. Section 4 sets out an example regulatory model for each sector, bringing archetypes together. The details of how we propose to arrive at a decision on the regulatory framework for networks through a process of stakeholder engagement is presented in Appendices 2-6.

1.10. Section 5 presents the analytical framework through which we plan to evaluate the pros and cons of each combination of options, as well as next steps and an overview of the stakeholder engagement and analytical plan.

1.11. We intend to decide on the overarching framework approach for gas transmission (GT), gas distribution (GD) and electricity transmission (ET) in early autumn 2023, taking into consideration the outcome of this consultation and of related stakeholder engagement and wider Ofgem consultations noted above. We will implement the framework from 1 April 2026. For electricity distribution (ED), the new RIIO-ED2 price control starts on 1 April 2023. The next ED price control will start from 1 April 2028. We will not come to a final decision on the RIIO-ED2 framework in early autumn 2023 but aim to provide a broad direction of travel and timetable for a decision on a future framework.

Responses to our open letter

1.12. We received 42 formal responses to our open letter and have met with stakeholders who requested further engagement to share their views. The overall feedback collected since the publication of the open letter has informed our views on refining the illustrative options presented in this paper. Appendix 1 summarises stakeholders views on the key challenges, sector specific feedback and wider views in relation to the future of network regulation. We continue to seek views and would be particularly grateful for responses to the questions highlighted throughout this document.

Common themes

1.13. The majority of respondents recognised the strategic challenges and agreed that embracing whole system planning could deliver benefits for consumers, and that the establishment of the FSO should represent a critical change. Respondents also recognised the opportunities from digitalisation. Some suggested that

Ofgem's legal remit should be expanded to include net zero and identified that strategic challenges of the future should include climate resilience.

1.14. Most network respondents recognised that there is merit in considering different regulatory approaches for different cost types (eg 'Business-as-usual' versus 'Enhancement' activities) and called for more detailed engagement on a methodology for splitting them out.

1.15. Overall, there was a broad support for an adapted RIIO framework rather than more radical change. However, stakeholders outlined that they needed more detail on the practicalities of the non-RIIO options to engage and present evidence for designing alternative solutions.

1.16. A common theme in all stakeholders' feedback was that to achieve whole system outcomes in a cost-efficient manner, new governance structures and capabilities would be required across the energy sector. This included within Ofgem, but also in the FSO and other public sector and stakeholder bodies. Under these new regimes, responsibilities need to be clear, coordinated and understood by all.

2. Strategic case for this review

This Section sets out the background to this review and provides the case for change to our approach to network regulation.

Preparing for future needs

2.1. The UK's legislative targets[13] of net zero by 2050 and 78% reductions in emissions by 2035 have accelerated the decarbonisation of the energy sector. The transition is well underway and is being driven by the UK, Scottish and Welsh Governments' legislative commitments to net zero and underpinning policies, with regional and local authorities across the country also setting their own decarbonisation ambitions. The Welsh Government has committed to achieving net zero emissions by 2050[14] while the Scottish Government has set a net zero trajectory to 2045. Scotland has also set interim targets set for 2030 and 2040.[15]

2.2. The UK government has committed to decarbonising electricity generation by 2035. A large increase in offshore wind across GB by 2030 will see new generation continue to significantly change our supply mix and the geography of generation.

2.3. In parallel, decarbonisation of the economy is likely to require a significant reduction in use of fossil fuels and a consequent doubling or trebling of electricity peak demand by 2050.[16,17] We expect a large-scale change and investment in electricity networks combined with potential decommissioning, and partially repurposing, of the gas networks. This requires a change in networks of a scale not seen since privatisation.

2.4. We reaffirm the challenges noted in our open letter: changes to the location of electricity generation, increase electricity demand, decline of natural gas demand, the importance of demand side flexibility and energy storage, as well as uncertainties in the depth and speed of elements of the transition, and geopolitical considerations.

[13] Reductions compared to 1990 levels. UK enshrines new target in law to slash emissions by 78% by 2035 - GOV.UK (www.gov.uk)
[14] Wales commits to net zero by 2050, but sets out ambitions to get there sooner | GOV.WALES
[15] Reducing greenhouse gas emissions - Climate change - gov.scot (www.gov.scot)
[16] Delivering-a-reliable-decarbonised-power-system.pdf
[17] Electricity networks strategic framework Appendix I: Electricity Networks Modelling (publishing.service.gov.uk)

2.5. In addition, we also recognise the need to develop an appropriately climate resilient energy system. Climate change itself will exacerbate extreme weather events and its impacts on consumers.[18,19] Storms, rainfall and heatwaves are likely to become more frequent and more severe.[20] Future energy systems will also need to account for expected and potential effects of climate change. We will need to prepare for, build and operate a system that has acceptable levels of resilience against extreme weather events, as well as other climate induced stress.

The future of electricity, and network needs

2.6. Electricity demand is expected to rise, and significantly. Figure 1 illustrates recent modelling that suggests that electricity demand in 2050 could be two to three times today's level of peak demand. It also shows extent to which the effect on the peak demand on the system could be mitigated by flexibility in the form of Demand-Side Response (DSR).

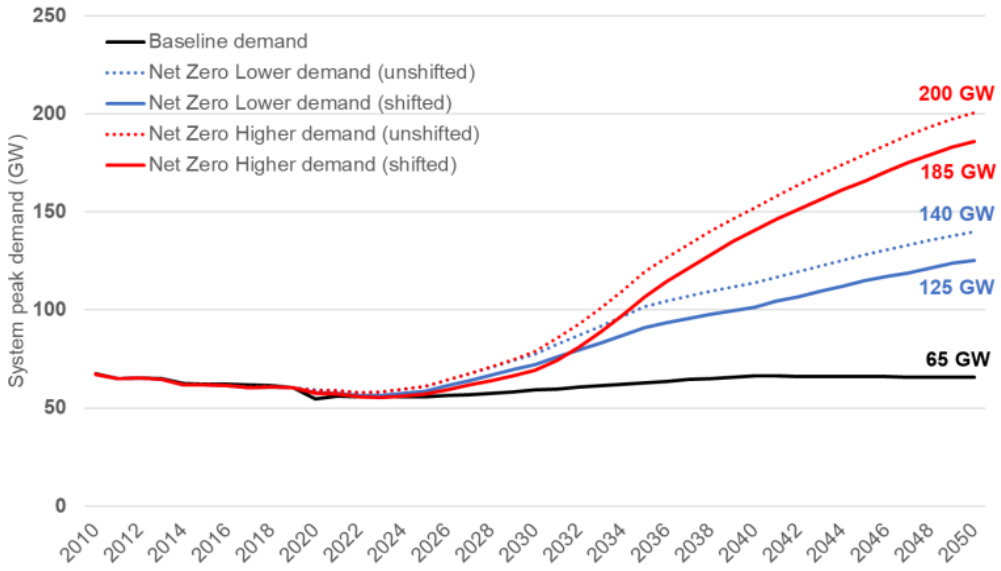

Figure 1. System peak demand and the impact of DSR[21]

[18] Storm Arwen review: final report (publishing.service.gov.uk) Storm Arwen review: final report (publishing.service.gov.uk)
[19] Ofgem publishes full report following six-month review into networks' response to Storm Arwen | Ofgem
[20] ukcp18_headline_findings_v4_aug22.pdf (metoffice.gov.uk)
[21] Electricity networks strategic framework Appendix I: Electricity Networks Modelling (publishing.service.gov.uk)

2.7. This significant increase in electricity demand and changing location and nature of generation will require large investments in networks - £20-27bn of investment in the 2030s alone. Delivering new and upgraded networks in the right place at the right time, at low cost, will be the key challenge for the economic regulation of electricity networks. Failure to do so will result in high costs for making the electricity system balance, degrading security of supply, and will result delay in the transition. We need to minimise these to protect the interests of current and future consumers.

2.8. Such demand growth has happened before. The UK experienced massive-scale electrification between 1950 and 1970, as generation quadrupled. A sizeable proportion of our network assets originate from that period, and as illustrated in Figure 2, this included building in anticipation of demand. The topology of our transmission network, linking power stations near coal mines or at remote seaside nuclear sites to centres of demand, also dates from that period.

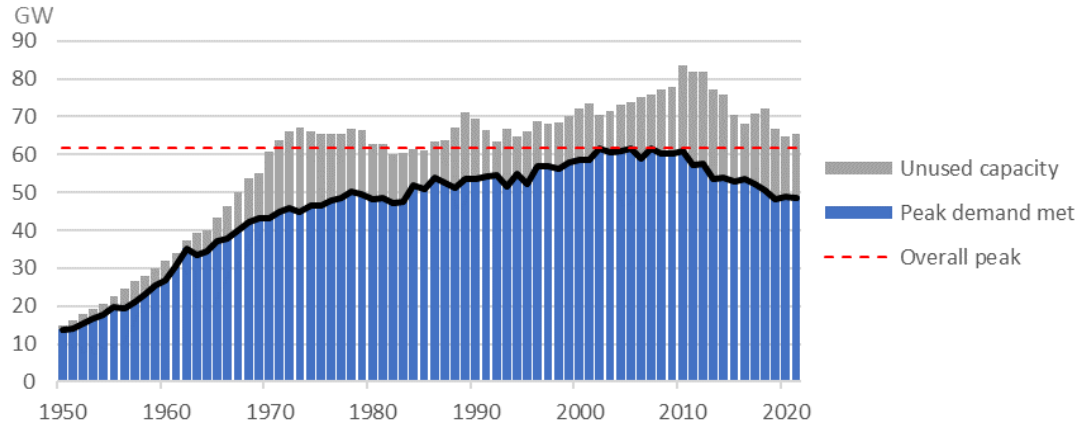

Figure 2. Difference between peak demand met and generation capacity in the UK between 1950 and 2021.[22]

2.9. The decisions we implement in the next price controls will fundamentally define the network that GB residents will inherit into the 2050s and beyond. We need the right balance between building new assets, maintaining asset health and deploying smart flexible solutions.[23] The future electrification of our economy involves a new geography of supply, significant non-dispatchable generation,[24]

[22] Historical electricity data - GOV.UK (www.gov.uk)
[23] Transitioning to a net zero energy system: smart systems and flexibility plan 2021 - GOV.UK (www.gov.uk)
[24] Dispatchable electricity generation can be dispatched upon request and adjusted up or down in order to meet fluctuating energy demands. Natural gas generation provides the majority of 'dispatchable' supply at present. In 2021, 38% of GB generation capacity was non-dispatchable. FES 2022 estimates that this will rise to around 60-65% by 2035.

complex and dynamic two-way flows of energy between transmission and distribution systems, and new challenges around the timing and the regional coordination of investment.[25]

2.10. Many of the emerging challenges are result from bottom-up change – consumer adoption of batteries, heat pumps and EV adoption, as well as the location of new commercial loads like data centres, new decarbonised industrial clusters and new local heat networks.[26] This means that residents, businesses, local communities, and regional councils will all play a part in shaping where demand increase will materialise first, and at what pace.[27] It will require that there is a far greater, and more sophisticated, understanding shared across many institutions of the likely future needs of network connected consumers than has been required to date.

2.11. Delivering a low-cost transition will require strategically planned upgrades, anticipatory investment and reform to the way assets connect to the network. The change will also require strategic planning of the forward work programme to ensure the availability of skilled people and account for the impact of the forward work programme on existing networks, and the need to maintain these. Given adequate strategic and holistic planning, and the anticipated growth in the electricity network, we consider it unlikely that asset stranding will be a significant risk.

The future of natural gas network needs

2.12. In gas, we face the opposite challenge of managing declining use. Climate Change Committee (CCC) projections suggest that natural gas usage is likely to decrease by 40-60% by 2035 across a range of modelling scenarios.[28] This is due to dramatic reduction in use of gas for power generation, as well as the electrification of some current gas demand. Figure 3 summarises the changes presented by the CCC in the Sixth Carbon Budget (CB6).

[25] net-zero-north-east-final-report.pdf (publishing.service.gov.uk)
[26] Heat Networks Zoning Pilot - GOV.UK (www.gov.uk) Heat Networks Zoning Pilot - GOV.UK (www.gov.uk)
[27] Public awareness of and attitudes to low-carbon heating technologies: (climatexchange.org.uk)
[28] Sixth Carbon Budget - Climate Change Committee (theccc.org.uk)

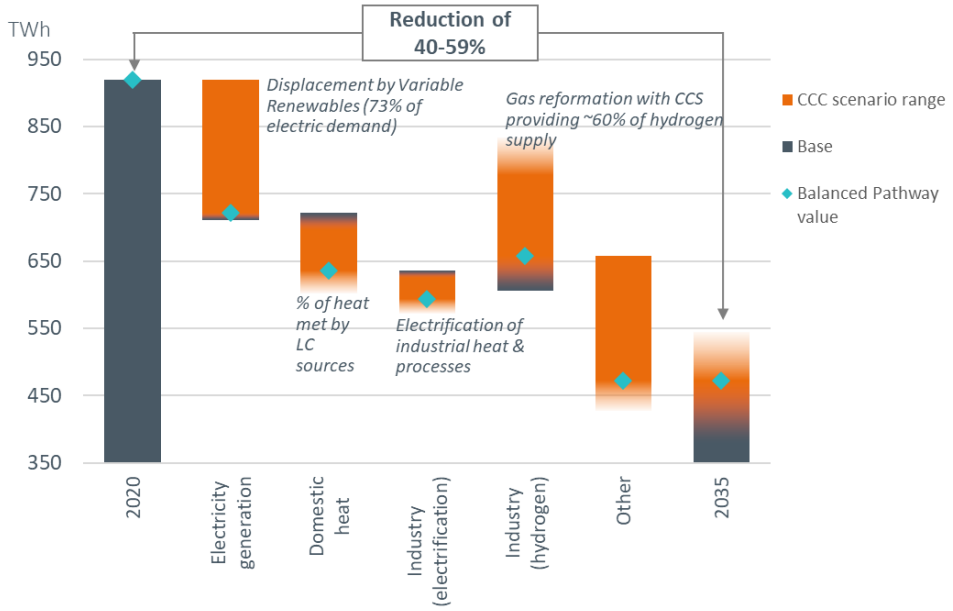

Figure 3. Natural gas demand reductions in electricity generation, domestic heat, and industry, showing a 40-59% reduction between 2020 and 2035. Analysis of Committee of Climate Change Carbon Budget 6 data[29]

2.13. The speed and location of the transition are uncertain. The cost of existing assets will need to be shared in a fair manner, and decommissioning and/or repurposing of the gas network should be carried out efficiently. We may need to consider changes to the way in which gas networks recover their costs in the face of declining future gas demand (and thus fewer customers and lower volumes for these costs to be spread across).

2.14. Hydrogen will play an important role in decarbonising the economy. The government has recently set out ambitions to develop the hydrogen economy to facilitate net zero, including a target of 10GW of low carbon hydrogen production capacity by 2030. This will be supported by a business model for hydrogen producers; for hydrogen transport and storage networks; and by taking a strategic decision on hydrogen for domestic heating by 2026.[30,31,32]

2.15. The role of hydrogen within the next price control period is especially uncertain, and the regulatory framework for hydrogen infrastructure is not yet established.

[29] The-Sixth-Carbon-Budget-Charts-and-data-in-the-report.xlsb (live.com)
[30] Design of a business model for low carbon hydrogen - GOV.UK (www.gov.uk)
[31] Hydrogen production business model - GOV.UK (www.gov.uk)
[32] Hydrogen Strategy update to the market: December 2022 (publishing.service.gov.uk)

The UK government considers "that a regulated asset base (RAB) will likely be the most suitable regulatory model for a hydrogen network in the long-term".[33] If this option goes ahead, a RAB will therefore include new assets as well as potentially repurposed methane networks. Further policy and regulatory development will be needed to establish the RAB as part of government's overall strategic policy package,[34] and to develop clear methodologies for any connections between the hydrogen and methane RABs. Hydrogen networks and their regulation therefore sit outside the scope of this particular review, but these changes will form an important context to the decisions on the gas network beyond RIIO-2. We discuss options for regulation of the gas network in Section 4.

Whole system planning and benefits

2.16. Energy networks are central to enabling the transformation in many parts of society and the economy. Overall system design, and the optimisation of this design, will play an important role in ensuring this transformation is low-cost. This means coordination between gas and electricity, between transmission and distribution, and between energy networks and other parts of the national infrastructure.

2.17. The future energy system will be dominated by renewables, with very different characteristics to the centralised thermal power system of the past. An optimised system will need to reflect how supply changes with time and weather, and hence the opportunities for shifting of demand and energy storage – both large scale and in millions of distribution-connected assets such as vehicles. These considerations will impact network needs. We recognise that an optimised system is not necessarily the one with the least network. The reward for integrated and strategic thinking will be a cheaper, more secure, and more resilient route to net zero. Ofgem's duty to protect the interests of current and future consumers requires a system of economic regulation consistent with this whole-system thinking.

2.18. Finally, the timing of all these transformations will need to be coordinated. For example, it will not be possible to install heat pumps, switch off/convert gas

[33] Hydrogen transport and storage infrastructure: consultation on business model designs, regulatory arrangements, strategic planning and the role of blending (publishing.service.gov.uk)
[34] MISSION ZERO - Independent Review of Net Zero (publishing.service.gov.uk)

networks and switch at scale to electric vehicles if the electricity networks cannot cope with the implied new pattern of energy flows.

2.19. The outline of institutional mechanisms which aim to deliver strategic energy system plans of sufficient granularity are becoming clearer, but those mechanisms are not yet decided. A parallel consultation on the future of local energy institutions and governance asks for opinions on regional planning.[35] The FSO could play a critical role in developing integrated strategic plans to align public and private actors so that everyone is working to a common roadmap towards net zero. How democratically derived priorities at a national and regional level influence these plans will need to be accounted for. Network price controls could use these capabilities and contribute to keeping strategic plans and digital network models updated as funds are spent, and business plans delivered. This may result in a benefit from aligning the timing and structure of price controls more closely to the needs identified by the whole-system plans. We discuss options for the use of system plans in economic regulation in Section 3 below and will be seeking detailed views about the role in strategic planning through the working group described in Appendix 2.

Digitalisation

2.20. Increasing digitalisation is expected to allow technical and economic information to be captured and shared between relevant parties. This common digital system, or systems, could eventually become a full-blown 'digital twin'. There are a variety of interlinked and distinct needs for representation of the networks and its state, both on a longer term and real time basis. This capability would be a forceful enabler of benefits such as:

- Opportunities to gain new information and integrating this with digital representations of network assets to develop insights. This can directly enable:
- Optimised system planning which accounts for operational and temporal aspects of the networks and their current state;

[35] Consultation: Future of local energy institutions and governance | Ofgem

- Innovation and better solutions to identified needs[36,37] by sharing of data within appropriate regulatory parameters;
- Smarter regulation, such as more risk-based regulatory approaches, and a reduction of the administrative reporting burden on network companies, can be enabled by greater transparency between the regulator, system planner, system operator and networks.

2.21. We will explore the opportunities for regulation from current and potential programmes of digitalisation, including through the engagement group described in Appendix 6.

The background to RIIO-2 and the case for change

2.22. GB energy network regulation is now over 30 years old. Until 2013, we regulated networks using the 'RPI-X' form of regulation, which was designed to provide incentives to reduce the cost of operating and maintaining the networks that existed at privatisation. The overall evidence was that these incentives worked. Companies reduced costs of operating the networks. The periodic price controls then passed the lower costs operating the networks through to consumers in future periods. This incentive regulation model continues to thrive internationally and has been adopted by independent regulators across much of the world.

2.23. However, over time, there was a growing concern that the simple incentives in RPI-X were coming at a cost. In 2010, we launched a major review of regulation, RPI-X@20, and many responses to our open letter pointed to that review as a comparator for our current review. The result of the RPI-X@20 review was the RIIO (Return = Incentives + Innovation + Outputs) framework: which built on RPI-X with an expansion of the objectives that companies were expected to deliver.

2.24. Our use of incentive regulation has been successful in attracting low-cost investment into energy network companies. The cost of capital has fallen, and these lower costs have been passed through to consumers. We discuss how we intend to maintain the stable and low-cost investment environment in Section 4 below and Appendix 4. In recent times, this investor appetite has been

[36] Artificial intelligence in sustainable energy industry: Status Quo, challenges and opportunities - ScienceDirect
[37] The Emerging Interdependence of the Electric Power Grid & Information and Communication Technology (pnnl.gov)

demonstrated through companies signing up to growth mandates such as within the RIIO-ED2 price control and the Accelerated Strategic Transmission Investment (ASTI[38]) programme.

2.25. The most recent price control, RIIO-2, has recently concluded, and will be well known to stakeholders. RIIO-2 has adapted Ofgem's approach in several ways to address some of the strategic concerns highlighted above, including the evolution of the energy system to prepare for net zero. For example, it allows Ofgem more flexibility to re-open the price control to reflect new developments. It also requires companies to monitor a wider range of outputs and outcomes, and holds companies to account for their delivery.

2.26. One option for future price controls would be to continue to use a similar framework to RIIO-2. In considering the alternative options outlined in Section 3, we will need to assess whether they deliver additional benefits over and above an evolution of RIIO-2. RIIO-2 already represents a combination of different approaches, but within a single 'package' of licence modifications based on a single business plan for a fixed period, and some of the challenges above suggest that there is a case for change away from this model.

2.27. There is a case that the benefits of using fixed periods may be declining. Both customer and companies have benefitted from fixed periods to date. Longer fixed periods provide certainty and stability to the companies, in assessing and raising finance for alternative operational and investment strategies. We could then use the information learned during a price control period to reset baselines, reset incentives, and so reduce costs for consumers.

2.28. However, the pace of network change beyond RIIO-2 may mean that, as already evidenced by ASTI, companies may not be able to have stability during a fixed period. In addition, the information gathered in one period around the effective operation of the network will become less relevant to the next period. The benefits to both investors and consumers of fixed periods may therefore fall over time.

2.29. Another attraction of periodic reviews is that they allow a single settlement covering all the regulated activities of a licensee. This allows for linkages between activities to be taken into account, and for a balanced approach: where one mechanism might be harsh, another might be generous. However, there is a good

[38] Decision on accelerating onshore electricity transmission investment | Ofgem

case that the more in-depth approach to regulation over time mitigates against this, with price controls representing a series of decisions, with evidence for each required on its own merits.[39] As discussed in Appendix 5 we will seek views as part of our stakeholder engagement on whether the portfolio nature of a periodic review remains important.

2.30. RIIO-2 addresses the pace of network change through an increase in the use of uncertainty mechanisms that change the regulatory contract during the period, both administrative (for example, reopeners) and automatic (for example, volume drivers). These mechanisms can help to address the pace and scale of the transition, and the difficulty of presenting full business plans for the period of the price control. They reduce the risk that regulation becomes ineffective during the period, and support more timely reviews of new investments. However, they also directly impact on the degree to which companies are given periodic certainty.

2.31. Some uncertainty mechanisms, such as the Volume Drivers in RIIO-ED2, allow the network companies to manage uncertainty during a period, through allowing investment to flex automatically according to demand. These mechanisms are well suited in responding to lower value, higher volume spend, for example on much of the distribution networks over the next few years. They are less suited to bringing forward higher value, lower volume strategically planned transformation in response to anticipated needs. Accordingly, more dynamic approaches may be required beyond RIIO-2, and such approaches could be complex to implement effectively and are harder to reconcile with the "one-shot" nature of a periodic review.

2.32. RIIO-2 price controls, and those in other sectors, such as Ofwat's PR19[40], are time-consuming exercises that produce complex settlements. These have clear benefits: the depth of uncertainty mechanisms and output requirements in RIIO-2 will provide a step change in protecting both consumers and companies from adverse effects of unmitigated change during the period. In some cases, a detailed and complex approach to regulation may be the only way to ensure that consumers are protected, where effective outcomes are hard to measure and there is evidence that simpler incentives do not work.

[39] This is consistent with the appeals regime, which was moved in 2012 from a 'reference' of the whole licence modification, to a case-by-case appeal of individual decisions.
[40] 2019 price review - Ofwat

2.33. However, further increases in complexity to adapt the RIIO-2 approach to the challenges of transition may not be practicable:

- It is hard to translate desired outcomes into clearly measured outputs. If measurement is imperfect, we may create incentives to optimise the wrong behaviour.
- Where there are many incentives all simultaneously in play, it is possible for unwelcome, unforeseen, and unintended interactions between them to lead to the wrong outcomes.
- Each new output incentive may require a corresponding ex post monitoring mechanism to determine whether the outcome has been achieved, which imposes further in-period cost for regulator and company.

2.34. More fundamentally, for the transformation ahead, we need network companies and their leaders to focus on the big tasks at hand that will deliver consumer benefits. There is a risk that increasing regulatory complexity may detract from this. In Section 3 we consider some of the potential alternative options for incentive regulation, that could reduce some of this complexity. As part of this review we will assess whether there are ways to address the concerns that led to an increase in complexity by other means, and if so whether they might deliver similar benefits at lower cost.

2.35. As described in Appendix 5, we are seeking views from stakeholders on the effectiveness of the key elements of the process of RIIO-2 to assess the degree to which an evolution of the RIIO-2 process could meet these challenges beyond the existing controls due to end in 2026 and 2028. This process will inform our assessment of the benefits and costs of moving away from the fixed period approach followed in RIIO.

2.36. In parallel to this consultation, we will also be continuing to work towards a more effective approach to connection to the network. Although that process is not part of this review, our approach of moving towards a system that is built around anticipatory investment, which is a prerequisite for rapid connections in a growing electricity system, should be consistent between this review and our approach to the connections regime.

2.37. In the next section we identify some framework models (archetypes) for network regulation. All these archetypes have some precedents in existing regulation and could therefore be implemented in combination as part of a self-contained periodic review. Alternatively, where a range of regulatory models are applied to

separable activities of a single network company, it may be more appropriate to also disaggregate the approach to regulation and make targeted decisions by activity.

Common themes

2.38. We have set out the strategic drivers of change in the transition to net zero, as well as the new institutional structure of the FSO and opportunities for digitalisation. We need to ensure that the network regulation of the **future delivers value for consumers by considering the whole energy system**, not only in efficient delivery of networks and their operations. This means an ever-greater focus on delivering changes to network infrastructure at pace; and effectively managing uncertainty about the future – considering the impacts and risks of not taking action, as well as risks when we do.

2.39. A good price control framework is one that is smart and adaptable, that protects consumers whilst delivering appropriate returns for investors, all of which while being proportionate and avoiding unnecessary regulatory complexity. We will reach evidence-based conclusions on framework design based on consultation outcomes including the outcome of our consultation on our consumer interest assessment methodology.[41]

2.40. At a very high level, this requires a framework model that delivers benefits to consumers by:

- Ensuring consumers get a fair deal now and in the future.
- Accounting for networks' critical role in delivering an efficient, resilient, and interconnected energy system.
- Enabling the rapid pace and extent of change and investment needed to deliver net zero.
- Ensuring digitalisation delivers all its potential for wider system benefits.
- Ensuring continued investor confidence through focus on the financeability of networks, which is a key enabler of a low-cost transition.

[41] Our consumer interest framework is presented on Page 8 of Consultation on Ofgem's draft Forward Work Programme for 2023/24 | Ofgem

3. Archetypes for future network regulation

This Section describes three distinct models or archetypes for how network regulation could apply to the activities of energy network companies as part of future price control decisions.

3.1. Our open letter proposed four generic models for regulation. Several stakeholders asked for more precision in the description of these generic models to provide constructive comment. In this section we provide greater detail on three archetypes that we intend to assess in more detail as part of the next stage of this review. In Section 4 we consider how they might be brought together in each of the four energy network sectors.

Negotiated Settlement

3.2. The open letter also set out negotiated settlement as a standalone model. Upon further reflection, we think that this is best described as a governance and information-gathering feature, consistent with any of the options described in this consultation document. The particular use and form of negotiated settlement warrants attention in the context of each of the following models, rather than as a generic regulatory model.

3.3. As part of our review of the effectiveness of the RIIO-2 process (Appendix 5), we set out our plans to discuss the role of the consumer voice at different stages of the price review process, and the implications for future network regulation. We welcome views from companies, customer representatives and other stakeholders on the appropriate role for stakeholder engagement in future price controls.

Q.1. What should the role of the 'consumer voice' be and through what institutions and processes should it be channelled?

Why have we chosen these three archetypes?

3.4. In general, a system of economic regulation needs to provide answers to three questions:

- What needs to be done (how is investment **specified**)?
- What will ensure that it is delivered at efficient cost (how is responsibility for **delivery** delegated)?
- How will consumers be assured it has in fact been delivered (how are results **monitored**)?

How do regulators solve the problem of information asymmetry?

Modern theories of economic natural monopoly regulation, dating from the 1980s onwards, have emphasised the problem of asymmetric information as being at the heart of designing mechanisms to answer these three questions. In the pure form of ex ante regulation, it is assumed that it is very expensive for the regulator to specify needs in detail. This should therefore be left to companies who are assumed to acquire the information in the normal course of business. Moreover, it is hard for regulators to identify the right technical solutions for delivery, so these should as far as possible be left to the companies, either through competition for the market (competitive tendering), or through benefit sharing (ex ante incentive regulation). Finally, it is often assumed that monitoring of outcomes and outputs is a relatively low-cost ex post activity. The regulatory "game", then, has been expressed as the problem of defining an incentive contract that on its own makes the parties to it deliver good outcomes for the economy. What all the effective options for economic regulation have in common is to address this problem of asymmetric information, either upfront, or via incentives that lead the firm to reveal information on actual costs.

3.5. We have identified three archetypes, which can be seen as points on a what is a complex continuum, but which serve to provide a simplified framework for discussion. **Plan and Deliver** (Archetype 1) relies on information asymmetries being reduced by the needs being defined by the new strategic planning processes, with economic regulation taking advantage of this to make intelligent use of competitive tendering or other forms of efficient procurement to ensure that customers benefit from low costs. **Ex ante Incentive Regulation** (Archetype 2) allows for some incremental evolutions from RIIO-style regulation and will feel the most familiar. **Freedom and Accountability** (Archetype 3) relies on increased ease of monitoring to allow companies bounded freedom in their choices: network companies pass costs through where they can demonstrate ex post that their expenditure forms part of an agreed plan to achieve net zero objectives at low cost. These alternatives may be more relevant beyond RIIO-2, because of the changed landscape presented both by institutional changes (namely the FSO), and opportunities from digitalisation.

3.6. RIIO-2 already includes some targeted use of all these archetypes. Our expectation is that effective future network regulation will increasingly need to consider a combination of these archetypes, and that different combinations may be suitable in different sectors.

Archetype 1: 'Plan and Deliver'

In this section we discuss the 'Plan and Deliver' approach to the regulation of network companies. Under this model, the need for investment and the outcomes from that investment are not identified by the network companies. Instead, the process by which investment is procured in a way that both meets customer needs and reflects efficient delivery is as follows:

- The external system planner determines a **need** for specific activities on the network (new investments, upgrades, etc);
- The planner then identifies the most efficient **delivery** model for that activity and defines outputs or outcomes that represent successful delivery; and
- Ofgem's role will include the decision on process to ensure delivery at efficient cost, using commercial market mechanisms (where appropriate), rather than upfront cost assessment, and **monitoring** of effective delivery against outputs.

3.7. This model relies on the existence of national and regional strategic plans which are turned into clear and detailed descriptions of network needs. This requires government and devolved administrations, independent system planners and Ofgem to work collectively, with some data, expertise and information provided by the network companies. These plans could include the long-term anticipatory investment that is likely to be needed across the sectors as part of system transformation.

3.8. In ET, the process has started with the ESO's Holistic Network Design, that informed our decisions to accelerate the reviews of £20 billion of investment under the ASTI programme.[42] We are progressing with our programme for the FSO to deliver a new ET network planning called a Centralised Strategic Network Plan (CSNP), which is a first step in the direction of the strategic planning envisaged under this model.[43] We have found evidence of international examples of this broad archetype working in practice in the Ontario strategic planning regime[44] and the Australian strategic planning regime.[45]

[42] Decision on accelerating onshore electricity transmission investment (ofgem.gov.uk)
[43] Decision on the initial findings of our Electricity Transmission Network Planning Review | Ofgem
[44] Annual Planning Outlook (ieso.ca)
[45] AEMO | Integrated System Plan (ISP)

3.9. As outlined in Section 1, a lot of the key drivers during the transition on the demand side will increasingly be determined locally. Whilst modelling capacity has changed in the last 10 years across institutions [46,47] – including FES,[48] CCC[49] and BEIS[50] projections – there is still a need for more sophisticated location-specific, temporally-sensitive, and cross-vector modelling. This modelling would inform strategic planning that strikes the right balance between investment, managing constraint costs, optimising flexibility, and ensuring resilience.

3.10. For this archetype to work in practice, governance issues and appropriate alignment between Ofgem and other bodies will be critical. The FSO would need to be demonstrably capable of producing coherent whole-system cost-optimised plans that, for example, integrate the cost reducing opportunities of a more flexible electricity system. Appendix 2 outlines the process by which we will answer the question of the technical and institutional capabilities required.

3.11. Once a sufficiently detailed specification of needs and plans has been agreed, this model proposes that cost control be achieved by ensuring that good procurement practices are in place.

3.12. One model would be competitive tendering of the detailed plan and build of the investment identified by the independent system planner. Professor Dieter Helm in his 2018 Cost of Energy Review,[51] argues for much increased use of open competitive tendering, with the economic regulator and the independent system planner together assessing bids to deliver the specified needs. Professor Helm proposes a high level of flexibility in who tenders for what, arguing that this will deliver both low costs and innovative solutions.

3.13. Fully effective competitive tendering may be the most powerful mechanism for cost control, could bring significant benefits, and is one potential implementation mechanism for Archetype 1. However, there might also be valid reasons for why the strongest form of competition to plan, build and operate the assets, might have costs that could outweigh the benefits. We are considering – and would

[46] A review of energy systems models in the UK: Prevalent usage and categorisation - ScienceDirect
[47] Next frontiers in energy system modelling: A review on challenges and the state of the art - ScienceDirect
[48] Future Energy Scenarios 2022 | National Grid ESO
[49] Sixth Carbon Budget - Climate Change Committee (theccc.org.uk)
[50] Electricity networks strategic framework Appendix I: Electricity Networks Modelling (publishing.service.gov.uk)
[51] Cost of Energy Review by Dieter Helm (parliament.uk)

welcome views on – the validity of the following reasons when determining the appropriate scope of this model of competition:

- The "winner's curse" in which the bidders who make the largest forecasting mistakes tend to win auctions. This can be very hard to overcome in formal tendering processes. It has been suggested that this may have played some role in the difficulties experienced in Private Finance Initiative projects.[52] There is some evidence that the North Sea oil industry in the 1990s resolved similar problems through open-book contracting and developing long term relationships based on high degrees of trust, long term relationships and transparency.[53]
- Many of the benefits of competitive tendering in terms of cost discovery could be achieved by its targeted use, producing data that is then used to inform future cost assessment. There are fixed overhead costs and delays brought about by tendering that could be avoided partially by sometimes making awards benchmarked against recently tendered equivalent contracts.[54]

3.14. There are other models of competition that could be applied to ensure cost efficiency, involving tendering by the licensee of elements of the build of the project, with other activities remaining with the licensee. An option that is being implemented by Ofwat is direct procurement by the licensee.[55] Alternatively, depending on the nature of the investment, we or the FSO could require the use of other public procurement models such as a combination of tendering and open book contracting.[56] Where the need is clearly defined, these procurement models could have advantages over ex ante incentive regulation, given the challenges for

[52] See, for example, Private Financing of Transport Infrastructure (researchgate.net) and Private Opportunity, Public Benefit? on JSTOR
[53] See, for example, Origins of alliancing | Contract Alliancing in Construction | CMS and Five years of collaboration in the UK upstream oil and gas industry (alliancecontractingelectroniclawjournal.com)
[54] Our decision on ASTI was to proceed with incentive regulation and tendering by the licensee, reflecting these additional costs, including the costs associated with a longer implementation timetable. ASTI has some elements of "plan and deliver", in that strategic transmission network needs have been identified by NGET and, effectively, single-sourced from NGET. ASTI projects have been exempted from competitive tendering to enable earlier delivery to address system constraints – the benefit of earlier delivery has been estimated to outweigh the potential savings from running competitive tenders. Decision on accelerating onshore electricity transmission investment (ofgem.gov.uk). The difference between ASTI and Archetype 1 thus resides in *who* specifies the need, and *how* is cost-control achieved.
[55] Direct Procurement for Customers - Ofwat
[56] Under the open book contracting widely used in other parts of the public sector, cost control is not through identifying a fixed price, but through frequent and transparent reporting of costs, to ensure that actual costs are in line with projections.

us in accurately projecting the costs of such 'one-off' projects. Operation & maintenance would be more likely to remain with the licensee.

3.15. In practice, the most efficient overall outcome would be likely to be a combination of approaches. The Offshore Transmission Owner (OFTO) regime includes competition, normally taking place during the build phase, followed by an ex post review of the final costs incurred, which include the option of reviewing on a full 'open book' basis. We regulate cap and floor charges for the use of interconnectors using a similar process, with the addition of ongoing annual reviews that look at cost movements on actual spend, up to the ex post construction review. Independent Distribution Network Operators (IDNOs) compete to build, develop, operate, and maintain local ED networks, with charges set by reference to the relevant regional Distribution Network Operator (DNO) charging levels. Ofwat in its regulation and procurement of the Thames Tideway used a combination of competition, open book, and cost incentives.[57] Under this archetype, our role would be to ensure that the right mechanism for cost control is adopted in each case. The distinction with Archetype 2 below is that cost control would be through an appropriate form of competitive tendering, rather than through ex ante targets determined by the regulator.

3.16. With needs specified through strategic planning and efficient procurement delivered through the economic regulator, the third element of any model, monitoring of adequate delivery, could be satisfied in several ways. In the water sector, large and specific projects may be reviewed on behalf of the Environment Agency, the Drinking Water Inspectorate and Ofwat by independent technical advisors who have full project access and share information with licensees and their contractors. Similar provisions were typically made in large Private Finance Initiative projects, by which the purchasing department or agency would appoint contract managers who would have full project access and information by right.

3.17. Under Archetype 1, we think that stakeholder involvement in specifying needs, as envisaged by negotiated settlement, might best be integrated into the institutional responsibilities of the bodies involved in developing strategic plans. This might allow not only for customer representation, but also for proper political representation into strategic decision-making at all appropriate levels of

[57] There are many aspects of open book contracting that have been adopted for cost control and quality assurance by Ofwat in its regulation and procurement of the Thames Tideway. Thames Tideway - Ofwat

government. It would allow for earlier participation on the expected pattern of future changes in demand and connections to the network.

3.18. Within this context, we invite views on lessons learned from the offshore transmission owner (OFTO) regime, IDNOs and other public sector planning and purchasing experiences. We recognise that depending on the exact models taken forward the boundaries and the roles of Ofgem and the FSO may be slightly different, and seek views on how our role should most effectively work alongside the FSO's planning role. We will be seeking views on the circumstances in which this model could be effectively implemented, and how to assess the benefits to consumers of alternative procurement models, as compared to the evolution of RIIO-2 incentive-based approaches.

Q.2. How detailed could an independent, cross vector view become to determine future plans for periods beyond RIIO-2 and support effective use of the 'Plan and Deliver' model?

Q.3. Under what circumstances would competition, or other procurement models such as open book contracting, have benefits over ex ante incentives as a cost control mechanism?

Archetype 2: 'Ex ante Incentive Regulation'

In this section we discuss the potential evolution of incentive regulation. This model is used in RIIO-2, is familiar in GB regulation, and is based on the **need** being proposed by the network company and approved by the regulator, with cost incentives for efficient **delivery**, and output incentives to ensure that customers get what they pay for.

We outline below some potential approaches to incentive regulation beyond RIIO-2:

- An evolution of RIIO-2, with mechanisms updated to reflect the challenges in section 2;
- Simplified cost incentives for ongoing 'business-as-usual' costs: a targeted return to a simplified cost efficiency incentive for more repeatable activity, or an ex post review;
- Simplified output incentives if digitalisation allows more frequent and accurate monitoring of network company performance; and
- Simplified assessment of costs for 'one-off' investment projects through a combination of lighter-touch approaches to assessment and incentives

3.19. Energy network revenues have been regulated through an ex ante incentive regime for over 30 years both in the GB and in many other countries.[58] It is therefore the regulatory archetype that GB stakeholders know best. Many of the responses to the open letter (Appendix 1) favoured incremental change options of the sort under consideration here.[59]

3.20. RIIO-2 includes a range of incentives that we do not cover here in detail. They include incentives to reduce costs, to improve outputs, to improve customer service, and to support system transformation. Some are relatively simple, others are complex. In the cost assessment that was used to derive total cost allowances, RIIO-2 used benchmarking techniques where feasible to define efficient cost projections. These were used as the basis for cost incentives that were combined with extensive monitoring requirements to assess whether customers getting what they paid for. RIIO-2 also included incentives to provide good information to the regulator (the Business Plan Incentive).

[58] CEER Regulatory Frameworks Report
[59] This greater attention to detail, however, should not be considered an indication, at this stage of the review, that we are more inclined towards these solutions than to those that come under the other two archetypes.

3.21. Under the incremental change option, this package of outputs and incentives would be updated where appropriate to reflect the strategic challenges in Section 1 above.

3.22. In this section, we present some alternative options which could maintain desirable features of ex ante incentive regulation while reducing complexity. As with all our proposals, we will consider whether these would deliver additional benefits by comparison to an evolution of the approaches taken in RIIO-2.

3.23. One option is to consider a simpler regulatory framework like RPI-X, at least for some areas of 'business-as-usual' activities that are repeated over time. This might mean a simpler annual incentive where efficiency incentives are based on reducing costs relative to an adjusted baseline. Some regulators – for example in Australia[60] – continue to use such simpler forms of incentive regulation, and it could bring benefits to the regulation of activities where the primary objective is improved cost efficiency.

3.24. We have moved away over time from the simplest form of RPI-X. For example, to deal with uncertainties, reduce bias in favour of capital as opposed to operating expenditure, promote innovation and to use outputs to drive performance improvements. However, if we can apply different controls to different areas of business, is there a separable and well-defined business area where the relative simplicity of RPI-X might be an attractive choice? We are interested in views on business areas to which a simple annual efficiency incentive might be applied.

3.25. A second option to consider is to increase the use of ex post productivity-based cost assessment mechanisms within an overall, ex ante, framework. This approach could be suitable for repeated 'business-as-usual' activities, and could also potentially be applied where there is a measurable change in the outputs of the network over time. For example, we could perform a benchmarking exercise on actual out-turn expenditures and realised efficiency, thus effectively making the cost benchmarking a part of the close-out phase of a control. This would simplify the price review process, as few of the mechanisms used when setting efficiency targets upfront would be needed. Instead, we could specify what adjustments would be considered when measuring comparative efficiency.

3.26. This idea of reviewing efficiency improvements after the fact, whilst agreeing ex ante the structure of the formula by which efficiency would be measured would

[60] 004 IPART Building blocks final june 02.doc (accc.gov.au)

lead to simplifications in the upfront cost assessment, although this might be offset by a more complex close-out process. We are interested in understanding under what circumstances this approach could deliver similar or greater benefits by comparison with ex ante incentives. We discuss in Appendix 3 in more detail the questions we will be considering with stakeholders to assess the potential effectiveness of these alternative models for incentive regulation.

3.27. We also consider what might be an appropriate level of detail in the measurement of outputs and outcomes. In RIIO-2, we implemented an improved asset health measure for the assessment of business plans and for cost benchmarking. While this was introduced in response to concerns about the poor measurement of outcomes in RIIO-1 and the implications for future stewardship of the network, we recognise that some network companies complained that this approach is unduly onerous.

3.28. Determining suitable metrics which effectively balance risk and reward for both networks and consumers for a transition which is occurring over a period of several price controls, has also shown to be difficult. We are keen to ensure that network companies can innovate, use flexible solutions to respond to consumers and system emerging needs, and plan works to ensure that networks services are in place where and when they are needed. However, measuring this effectively on an output basis has proven difficult. If networks plan on the basis of a rapid demand growth that then does not materialise in period, but may do so later, how can we then ensure that consumers long term interests are met? Or enable networks to undertake multiperiod workforce planning into account?

3.29. Digitalisation may allow us to maintain the use of detailed metrics to support delivery of outputs and outcomes, while reducing the level of effort required for the regulated networks to gather and submit the data required. It could also play an important role in delivering on strategically planned upgrade programmes. We are seeking views on whether either digitalisation, or further development of current models of monitoring of asset performance, could be used to support simplification of cost assessment, by giving us more confidence about the link between costs and outputs.

3.30. We additionally welcome views on whether there are less complex or more effective ways to apply incentive regulation to individual 'one-off' projects. RIIO-2, and especially RIIO-ET2, have made extensive use of engineering reviews to reduce information asymmetry and determine ex ante costs which we believe will lead to project delivery, along with output mechanisms to ensure that delivery

happens as planned. Ofwat has made use of mechanisms of this sort, with project proposals coming from licensees; independent engineering reviews validating costs; and incentives to encourage timely delivery and innovation. This is also in broad terms the solution we are putting in place with ASTI, where we have complemented licensee plans with delivery incentives of the sort familiar to good contract-management practices that incentivise timeliness.

3.31. We are seeking views on how far it is reasonable to apply these types of in-depth assessment methodologies for cost control, and whether there are cases where alternative risk-based approaches might be used to simplify cost assessment. As projects become smaller, the investment required by the regulator to reduce information asymmetry may become disproportionate. We are interested in whether lighter-touch approaches could also be effective in reviewing 'one-off' investments. If we were to reduce the intensity of review, how would we ensure customers are protected from inefficient delivery? We are also interested in what such mechanisms imply for monitoring of deliverables: how much effort is needed from the regulator to understand the value of what has been delivered, and where might digitalisation make this more effective?

Q.4. What is your view on the options identified for simplification of incentive regulation? What would be the benefits and costs by comparison to the approaches used in RIIO-2?

Archetype 3: 'Freedom and Accountability'

In this section we discuss the 'Freedom and Accountability' approach to delivery of investment by network companies. Under this model, Ofgem does not set upfront targets for costs or efficiency or require detailed investment plans. Instead, the process for procuring investment is to meet customer needs and reflects efficient delivery could be as follows:

- Ofgem determines the **outputs** and provides guidance on the **form of monitoring** for those outputs, based on a simplified upfront regulatory process;
- Licensees identify the most efficient **delivery** model to achieve the outputs, and provides assurance to Ofgem that it has met the outputs;
- Ofgem reviews the outputs delivered, and **monitors** costs on an ex post and light touch basis. This may include some rewards or penalties for outperformance of specified targets;
- Customers are protected against companies earning above the cost of capital by fixing returns to a specific cost-plus level.

3.32. This archetype would focus on requiring broad objectives (eg "economically efficient path to an agreed range of system roadmaps to net zero"), with regulatory effort focused on ex post monitoring of outputs. The mechanism for ensuring customers' needs are met at a reasonable cost would be the anticipation of ex post regulatory interventions. These could range from the strongest incentives in the form of the threat of disallowance to gentler methods, like ex post obligations to follow best practice in the future, or even bonuses for exceptional performance.

3.33. To address investor concerns about the perceived additional asymmetric risks from this model, the threshold for disallowance would need to be sufficiently high, and linked to pre-specified failures to deliver that would require enforcement. For companies that demonstrably meet the deliverables, this approach would resemble the cost-plus rate of return approaches used in much of the USA.

3.34. Companies might be free to innovate and to pursue the course of action they see as optimal, and they would be assured of the return on their investments, but all within bounds set by the accountability regime. An effective regime under this archetype might require a form of sufficiently clear accountability that balances the need to ensure investors have sufficient confidence in the regulatory contract, with genuine protection for consumers against wilful poor performance.

3.35. In the energy sector, this is how we currently regulate the ESO and the Data Communications Company (DCC). Both enjoy cost passthrough subject to performance evaluations. This kind of regulation is common for non-price regulations. For example, similar approaches are found for product regulation in the UK General Product Safety Regulations (GPSR).[61]

3.36. In the case of network licensees, this archetype might be suited to situations where there are many small incremental projects for which ex ante benchmarking and cost assessment are idiosyncratic and complex, but in which monitoring of outputs and outcomes might be relatively easy. We are interested in views on whether there are specific areas of network operation, maintenance, or growth for which this might be the case.

3.37. A common objection to rate of return regulation is that it tends to incentivise gold-plating of assets. The use of this archetype is therefore most likely to be relevant to circumstances where there is limited risk of over-investment by the network companies. Another potential concern is that this approach can lead to an 'easy life' for network companies, with operating costs tending to increase over time. As described above, we could explore addressing this risk through bonuses for ex post measured efficiency, or reducing permitted rates of return where there is evidence of inefficient investment as part of the softer ex post incentives. This archetype could thus combine some of the more formulaic uses of ex post information suggested under Archetype 2.

3.38. The disadvantage of this type of regulation may be that there are few incentives for cost-reducing innovation (unlike totex-based models) and the potential for regulatory discretion may increase perceived investor risk and therefore the cost of capital. We are interested in views as to whether there are any domains in which these disadvantages might be considered worth the prize of greater simplicity.

Q.5. What are the network activities where there would be benefits for a move to an ex post monitoring regime, and what would be the associated costs?

[61] In GPSR, there are standards that may be used as evidence for compliance with the overarching safety principles enshrined in legislation. Compliance with the standards however does not necessarily guarantee compliance with the law and it is the responsibility of the business to ensure their product is 'safe'. General Product Safety Regulations 2005 - GOV.UK (www.gov.uk)

4. Designing future network regulations

This Section sets out how our proposed archetypes could be applied to different activities across the each of the energy network sectors. It also summarises the questions we will consider about how to maintain a consistent approach to the financial framework.

4.1. In Section 3 we expanded on the three 'pure forms' of regulatory archetypes; in this section, we describe how we might combine these into the optimal regulatory mechanism, using these as 'building blocks'. We present an example model for each sector. These are intended to be taken as a starting point for discussion and do not represent a preference or a settled view at this stage.

4.2. Terminologically, we think of a price control as being composed of many building blocks; each building block belongs to a regulatory archetype; an overall regulatory model (eg RIIO) is made up of building blocks, and therefore reflects a particular mix of archetypes. In this review, we are considering whether this approach should be evolved with greater use of archetypes 1 and 3, which would result in a reduction in the focus on the periodic review.

4.3. In Figure 4, we illustrate this through examples of how some of the important elements of RIIO-ET2 would fit into this framework.

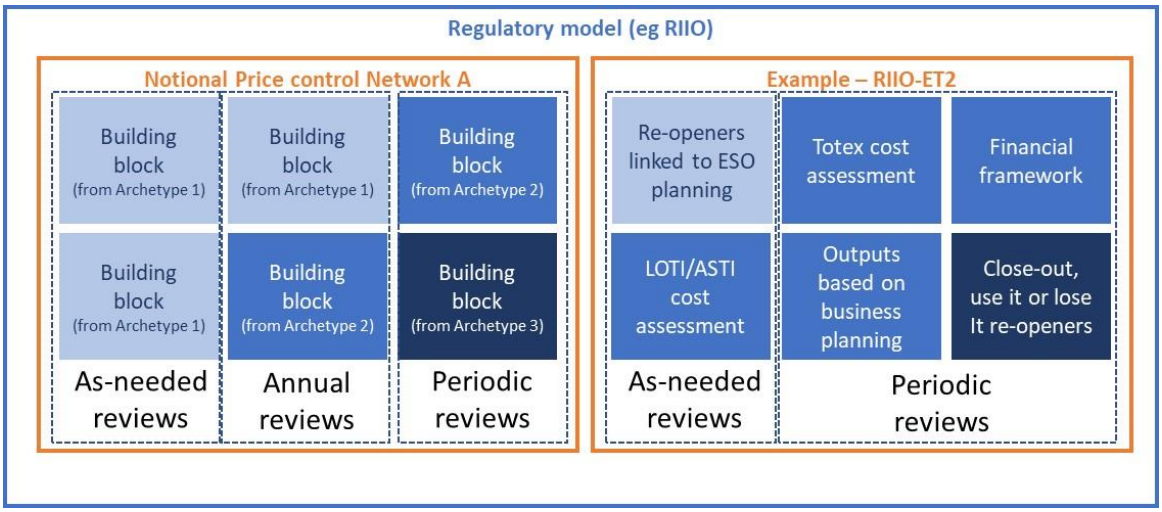

Figure 4. Archetypes and their application in building regulatory building blocks

4.4. The ET settlement includes building blocks through uncertainty mechanisms linked to external triggers that put it close to the "plan and deliver" archetype 1; the majority of the building blocks, like the totex cost assessment, belong to the very traditional "ex ante regulation" parts of archetype 2; and under the close-out

process for monitoring there is some potential for disallowance of expenditures, comparable to the Freedom and Accountability archetype. In this review, we are considering the case for an increase in the roles of Archetype 1 and/or Archetype 3, and the implications for the approach to the periodic review. In the sub-sections below we outline the combination of archetypes into example models for each sector.

Electricity Transmission

4.5. We start by assuming that ET can be separated into activities: Business as Usual (BAU)/Replacement, Reinforcement and New Build. Around 20% of RIIO-ET2 expenditure could be considered BAU; the Reinforcement/New Build split will depend to some extent on how these categories are defined. Both are likely to be important. Figure 5 illustrates the potential allocation of responsibilities for each of the activities of Plan, Design, Procure & Build, Maintain and Review.

	1. Plan	2. Design	3. Procure & Build	4. Maintain	5. Review
Replacement/ BAU Archetype 2	**Licensee Ofgem**	**Licensee Ofgem**	**Licensee**	**Licensee**	**FSO Ofgem**
Reinforcement Archetype 1/2	**FSO Licensee Ofgem**	**FSO Ofgem Licensee**	**Licensee (ex-ante allowance or open book) *OR* Competition**	**Licensee**	**FSO Ofgem**
New Build Archetype 1	**FSO**	**FSO Ofgem**	**Competition *OR* Licensee (open book)**	**Licensee *OR* Competition**	**FSO Ofgem**

Figure 5. ET Example Model (for discussion)

Note: Rows are types of activity, and the columns represent generic stages for all projects. Each cell lists the organisations involved in that activity at that stage. So, for example, it is the responsibility of Licensees to provide Replacement/BAU (row1) Plans (column1), and for Ofgem to approve the under an ex ante scheme; for New Build (row 3), on the other hand, the FSO, DSO, stakeholders and government are responsible for providing plans (column 1).

4.6. In this model, replacement and BAU activities would be regulated using mechanisms from Archetype 2. Plans are submitted by licensees for these activities, and we would consider whether it would be proportionate to implement any of the simplifications identified in the discussion of paras 3.23-3.29 This could include a trial of the use of productivity-based incentives on ex post outturn costs, rather than fixed allowances based on ex ante business plans, given the challenges in predicting the scale of the network during the future period.

4.7. Substantial new build (row 3, Fig 5) would be delivered under Archetype 1 in this model.[62] The planning phase is dominated by the new strategic planning institutions. Getting plans to be sufficiently granular to start a tendering process would also be the responsibility of the new planning institutions. Ensuring appropriate governance, to include governments and other stakeholders to inform these plans and identify requirements will be essential.

4.8. For reinforcement activities (row 2 in Fig 5), this model envisages mechanisms are used from both Archetypes 1 and 2. The planning phase is dominated by the new strategic planning institutions that this archetype assumes will be in place. However, for smaller discrete projects, a process of evaluating licensee engineering justifications and associated business plans might be more suitable; or there may be an iterative process between the licensee and the planner. The maintenance associated with reinforcement projects would be carried through ex ante Archetype 2 mechanisms, and possibly rolled into the processes already defined for Replacement/BAU. The review and monitoring of these processes are assumed to be operated by Ofgem and the FSO.

4.9. In the next phase of this review, we will be seeking stakeholder views on the practical implementations of these options, including what would be required for Archetype 1 to be applied in practice, and an assessment of the different cost control activities. We expect to assess the costs and benefits of the different approaches. We will gather more in-depth evidence within the engagement group described in Appendix 2.

4.10. This example model could employ a mix of periods. Replacement/BAU under Archetype 2 may continue to benefit from a periodic structure. To start dialogue, we propose to maintain a five-year period. For New Build under Archetype 1, we envisage that these are large projects, and that these could have targeted

[62] In practice would apply only to new build that is not covered by prior agreements under ASTI.

settlements with longer periods of regulatory certainty. Reinforcement (row 2), with the mixture of Archetype 1 and 2 mechanisms, may also require in-period decisions. As a result, the focus of a periodic review would be the assessment of replacement/BAU, and whether any update to the financial framework is necessary. The investments under Archetype 1 would be assessed at the point that need is identified, and the form and timing of business planning and stakeholder engagement would change accordingly.

4.11. In the next stage of the review, we will be assessing this model against the alternatives, including an incremental approach that builds more directly on the uncertainty mechanisms and re-openers designed and applied in RIIO-2. We are therefore seeking views on the feasibility and desirability of this alternative model. Is the separation of activities practicable? What would be needed to have the planning institutions acquire the right capabilities and powers to perform the roles envisaged? Is a mixture of regulatory periods practical and sensible, and what would be lost by moving away from the RIIO-2 approach of a single business plan and set of licence modifications? What might be the unintended consequences of these proposals?

Q.6. What are the benefits and costs of this approach for Electricity Transmission by comparison to an evolution of the approach in RIIO-2, and what are the implementation barriers?

Electricity Distribution

4.12. In ED, the net zero transformational transition has barely begun but is likely to soon become as far reaching at that seen in ET, with significant reinforcement of the network needed. Our starting point therefore is to consider the extent to which the proposed model for large new build in ET can also be applied to the new investments required to support the growth of the distribution network. In a transforming system, it will be critical to understand the growing electricity needs at a granular local level on a whole system basis and to maximise the opportunities for system optimisation.

4.13. Distribution planning is likely to be much more disrupted by flexibility and storage options, and innovation may play a much bigger role than in ET. This suggests that it will be important for this regulatory model to allow new entrants to propose new solutions, and the boundaries of these solutions may not be obvious to the new planning institutions. Rich temporally sensitive and locational data can unleash opportunities for optimised system planning and the development of innovative solutions. This can free the regulatory regime from managing significant uncertainty on the timing of the demand materialising.

4.14. At this early stage of the development of a Regional Planning model, the extent to which the ED model can use Archetype 1 in the way suggested for ET is hard to tell, although we are interested in early views on the degree to which it is practicable for the new planning institutions to push all the way to the design stage for many reinforcement activities. For the lowest voltage levels there may be merit in combining the strategic planning elements with ex post evaluation of Archetype 3.

4.15. The process towards future ED price controls remains relatively long. The RIIO-ED2 price control period has not yet started. The post-ED2 price control does not need to be in place until 2028, and we do not anticipate making a final decision in the autumn on the right model. However, some of the options for change, linked to our consultation on the regional system planner, will require a long lead-time to implement. As a result, we wish to indicate emerging thoughts on the appropriate future regulatory framework for this sector.

Q.7. What is the potential for Electricity Distribution planning and commissioning to move to an alternative model by the end of RIIO-2, and what might be the benefits and costs of doing so?

Gas Transmission and Distribution

4.16. Our example model for GT and GD is shown Figure 6. As with ET, we propose a split into distinct activities: Replacement/BAU, Decommissioning, and New Build, and for GT our starting point is to follow the approach taken in ET. Preliminary modelling suggests that 90% of RIIO-GD2/RIIO-GT2 spending will be on Replacement/BAU activities. This percentage is expected to reduce in the future, as more decommissioning and/or repurposing occurs in the longer-term; the timing and magnitude of this remains unclear.

	1. Plan	2. Design	3. Procure & Deliver	4. Maintain	5. Review
Replacement/ BAU Archetype 2	Licensee Ofgem HSE	Licensee Ofgem	Licensee	Licensee	FSO Ofgem
Decommissioning/ Repurposing Archetype 1	FSO RSP	FSO Ofgem Licensee	Licensee (Open book OR cost discovery) OR Competition	Licensee.	FSO Ofgem
New Build Archetype 1	FSO RSP	FSO Ofgem	Competition OR Licensee (Open book)	Competition Licensee	Licensee FSO Ofgem

Figure 6. Gas T&D example model (for discussion), organisations are listed within each box in order of responsibility in that area this model

4.17. For the gas networks, we envisage that the planning of Replacement/BAU be carried out by a combination of the licensee, Ofgem and HSE for the Iron Mains Risk Reduction Programme (IMRRP). A significant question for the next price control period will therefore continue to be how this ongoing expenditure is regulated.

4.18. As with ET, one option would be moving towards ex post productivity-based incentive mechanisms in Archetype 2 since this would allow for a more flexible approach to measuring efficiency as the system changes over time. We would assess the potential benefits from moving to an alternative approach against taking forward an approach that builds on that taken in RIIO-2. We would welcome views on the benefits from continuing with the use of ex ante

benchmarking for Gas Distribution in particular. We would also need to understand how we can ensure that the needs of customers are met in a changing environment. The appropriate period may still be 5 years, but this would depend on interactions with the decommissioning and repurposing activities, which are more uncertain at this stage. For distribution, the right period may also be linked to the timing of the IMRRP.

4.19. Over the next decade decommissioning and repurposing (row 2) might become a distinct activity, although timescales remain uncertain. We propose that plan and design phases should be operated under Archetype 1. The FSO whole-system planning approach is expected to develop strategic plans that will include planning assumptions, locations, and timetables for considering the future use of networks. We propose that plan and design phases should be operated under Archetype 1. The procurement of decommissioning and repurposing activities could be competed, although there could be some sense in using some open-book, cost-discovery model of procurement - since the costs of these activities are poorly understood and because this is an activity that is likely to be repeated a great deal. Initially, given this uncertainty, this could even be operated as an ex post allowance and performance evaluation under Archetype 3.

4.20. Government is developing a separate business model and regulatory framework for hydrogen networks. The management of any repurposing of existing networks for hydrogen will therefore need to ensure that the costs are transparently accounted for, allocated to the appropriate RAV, and paid for by the appropriate consumers. It is therefore likely that a degree of monitoring, potentially based on shared digital assets rather than bespoke reporting, will be useful.

4.21. Should new methane networks be needed, we propose that this build will be regulated entirely under Archetype 1, in the style that is proposed for ET. This has the added advantage in the GT/GD case that large new projects, which may be required for security of supply purposes, may also need to have accelerated depreciation in case they are expected to operate only for a relatively short time. This can be decided on a case-by-case basis under Archetype 1.

Should the gas price controls be rolled over for 2 years?

4.22. This discussion of the GT and GD example models has not considered what is perhaps the most pressing regulatory question for the sector today, which is one of timetable. There are two large-scale uncertainties hanging over the sector: what scale and type of hydrogen conversion should we plan for; and what heating decarbonisation solutions are envisaged on what timetable? These have such a

fundamental impact on the future of gas networks that there is an argument for delaying a completely new price control until these uncertainties are resolved to a greater extent. This could suggest a role for a simplified short-term price control.

4.23. If the new planning institutions apply themselves first to transmission-scale systems in gas and electricity, then it might make sense to bring all the transmission price controls onto the same timetable. FSO/Ofgem planning of need and designs would all be available at that scale, so the shift in model could occur at the same time. If we expect the distribution-level integrated planning to achieve the right level of capability only after that, it could be sensible to align gas distribution price controls to the slower timetable of electricity distribution controls.

4.24. We are interested in views on the timing of the next controls. Two potential options are: (a) all four controls could be synchronised to 2028 (meaning a mini price control in Gas & Transmission from 2026 to 2028). (b) the Transmission controls could run on a staggered cycle to the Distribution controls. This would mean a short-term price control in GD to 2028 to synchronise with ED, while ET and GT maintain their existing cycles. Options (a) and (b) would be alternatives to implementing the new approach for all sectors at the end of the current RIIO-2 reviews, with targeted alignment of incentives/plans that affect more than one of the sectors.

4.25. The importance of system planning capabilities for the new regulatory models, and realistic assumptions about institutional capability, lead us to an initial view that choice b) above is preferrable. We are interested in stakeholder views on this question. Delaying a GT and/or GD decision would imply performing an interim price control for the period 2026 to 2028. What regulatory simplifications could be applied for such a 2-year control? Except for the safety-related replacement programme, which is relatively predicable, the BAU operation of networks is a relatively static problem. A simplified roll-forward could therefore address many of the objectives of a more intensive review.

4.26. We will be assessing the option of a short, simplified price control, including how we might undertake a proportionate approach to cost assessment for an interim period. We will consider whether the simplification and the shortened period are likely to bring benefits, and what the costs could be of fixing allowances for a longer fixed period, eg to 2031, as part of the current review. As part of our engagement group outlined in Appendix 3, we will be holding discussions with gas network companies to discuss the potential practicalities and scope of a rollover.

We recognise that the gas network companies need guidance on their planning for the next price control review, and our current intention is to provide clarification on whether we propose to undertake a full price review for some or all the gas networks, and the implications for longer-term business planning, by the summer.

Q.8. What is your view on the most effective approach to regulation of Gas Distribution and Transmission beyond RIIO-2? What would be the benefits and costs of moving to a simpler approach to regulation of the ongoing costs of operating and maintaining the network?

Q.9. Should there be a shorter-term price control in gas distribution and/or gas transmission, and how could this work in practice?

Maintaining a stable financial framework

4.27. The financial framework for any price control is key in supporting the delivery of Ofgem's policy objectives through aligning the balance between risk and returns and, in turn, setting a reasonable level of return to enable the network companies to attract capital and finance their activities. Through what is commonly referred to as the 'financeability duty', we are required to have regard to the need to secure that licence holders can finance the activities which are the subjects of the obligations imposed under the relevant acts.[63]

4.28. Very large-scale, long-life infrastructure is a key feature of GB energy networks. GB electricity and gas networks currently have a combined Regulated Asset Value (RAV)[64] of £80bn.[65] Additions and improvements to this infrastructure must be paid for upfront, even if costs are recovered from customers over a long period of time. This means that it is vital that energy networks can raise sufficient and attractively priced investment capital from financial markets.

4.29. Currently, networks recover the costs of capital associated with investment in infrastructure via a single cost of capital allowance,[66] which is set at each periodic price control review (currently every 5 years). This single cost of capital

[63] Electricity Act 1989 (legislation.gov.uk), section 3A(2) and Gas Act 1986 (legislation.gov.uk), section 4AA(2)(b) set out "the Authority shall have regard to……(b) the need to secure that licence holders are able to finance the activities which are the subject of obligations imposed……".”
[64] A proxy for the current value of total capital investment to date.
[65] Closing RAV at 31 March 2022, nominal, from the relevant sector Price Control Financial Models.
[66] Sometimes referred to as an allowed return on capital.

allowance is set at a level which compensates investors fairly for the costs of capital associated with both historical and upcoming investments in the networks.

4.30. If the wider regulatory framework and incentive mechanisms change, our approach to the financial framework may need to adapt to ensure it remains fit for purpose. For example, Ofgem will need to understand whether significant and accelerated investment programmes are associated with higher or lower risks for investors, and whether this will in turn lead to a requirement to vary the cost of capital allowance according to the type of investment programme or asset.

4.31. It will remain vital that Ofgem can continue to demonstrate that we are enabling delivery of net zero at the lowest overall cost to consumers, incentives remain aligned with desired outcomes and that companies remain financially resilient and able to finance their activities without earning excess returns. At the same time, it will be important to ensure that investors maintain their confidence in the stability and predictability of the regulatory framework to secure that companies are able to retain access to capital and can keep their financing costs as low as possible.

4.32. Alongside the review of the different archetypes, we are therefore assessing how the financial framework might need to evolve to maintain a stable and low risk environment for investors. This will include how to ensure that there is sufficient clarity about how any changes will be implemented, which might affect the balance of risk and return taken by the investors in the networks. As part of our review, we intend to explore with a working group whether we would need to update our approach to cost of capital and financeability, if we were to move further away from a periodic review model.

Q.10. Would there need to be any changes to maintain a stable and consistent financial framework if we were to make greater use of different regulatory archetypes, and if so, what would those changes need to be?

5. Analytical framework and next steps

This Section summarises next steps for reaching a framework decision by early autumn 2023, including how we propose to assess the options for network regulation above.

5.1. In advance of coming to our views on the future regulatory framework, we intend to assess the options, as they might apply to each of the sectors, against a counterfactual. We propose that an appropriate counterfactual would be the RIIO-2 approach, assuming incremental change. Under this approach, we would need to demonstrate that any changes away from the RIIO-2 approach would be expected to deliver net benefits, using an appropriate analytical framework.

5.2. We propose to undertake an impact assessment, based on Ofgem's consumer interest framework (Figure 7) for assessing our key decisions and the trade-offs involved.

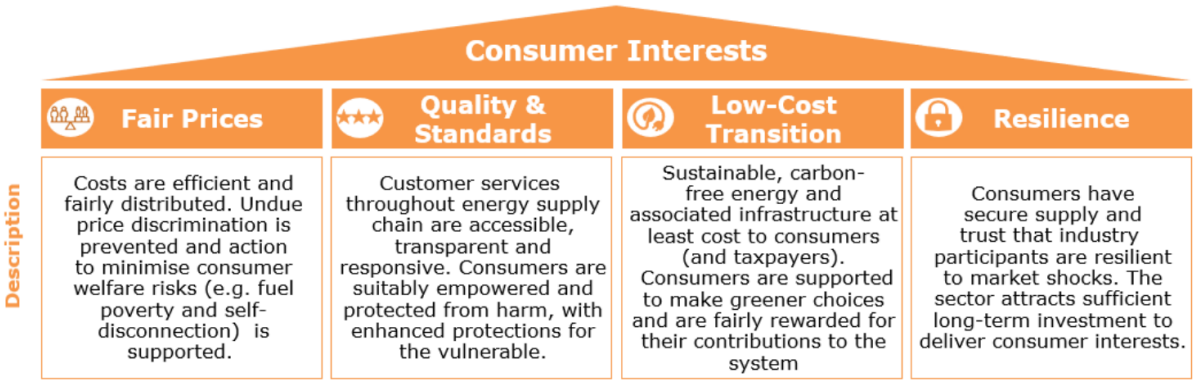

Figure 7. Proposed set of consumer interests, from Ofgem's 2022 Forward Work Programme consultation[67]

5.3. In assessing the options for regulation of different activities against this framework, we will assess the impacts on direct benefits and costs, where alternative options may lead to a change in operating and capital costs that would be passed to consumers. More broadly we will be mindful of the benefits of incremental versus more fundamental change across targeted areas of the network, and the impact this has on uncertainty, given our objective of attracting investment at lowest cost. In assessing each option, we will need to consider the trade-offs inherent in the sometimes-competing objectives of delivering at lowest

[67] Ofgem's Forward Work Programme

cost to customers versus enabling the timely and flexible rollout of the infrastructure needed to create a resilient long-term network.

5.4. We will also consider indirect and uncertain costs and benefits. This may include either a quantitative or qualitative assessment of the way that changes in incentive framework may lead to changes in network company behaviour, which could either increase or decrease the expected costs passed to consumers. We will also consider whether such changes might influence the broader quality of service provided to consumers.

5.5. Based on this analysis, at least for those sectors which are being taken forward after the summer for 2026 implementation, we intend to assess the alternative approaches set out in Section 4 against the counterfactual, and to come to a view of whether, taken together, there is a case for a move away from aspects of the RIIO-2 approach.

Q.11. Do you have any views on our proposed analytical approach?

Next Steps and how to engage

5.6. As we develop and assess models for future network regulation, it is important to ensure that this work is informed by stakeholders' views, priorities, and concerns.

5.7. In addition to asking for your written responses to this consultation, we intend to use a combination of working group discussions, supplemented with working papers and slides during March to May 2023.

5.8. Taking the questions above in the consultation we have developed five areas of further investigation:

- **Strategic Planning: critical enablers and regulatory options** [Appendix 2]
- **Alternative simpler approaches to incentive regulation** [Appendix 3]
- **Maintaining a stable approach to risk and return in a period of transition** [Appendix 4]
- **Designing the process for price review: lessons learned from RIIO** [Appendix 5]
- **Digitalisation and its role in unlocking smart regulation** [Appendix 6]

5.9. In the appendices, we provide further information on the scope of each working package and the key questions we propose to consider.

5.10. If you are interested in getting involved in evidence development process, please let us know which engagement groups(s) you would be interested in by registering here: Future Systems and Network Regulation Engagement Groups - Register of Interest Survey.

5.11. We note that these engagement groups are not exhaustive of all the areas that cover the price control process. In parallel, we will consider the transition from the overarching framework decision in the autumn to the sector specific applications (and associated timelines) that will become the focal point of the next stage of the project.

How to respond

5.12. We want to hear from anyone interested in this consultation. Please send your written response to FutureNetworkRegulation@ofgem.gov.uk by the **19th of May 2023**.

5.13. We will publish non-confidential responses on our website at www.ofgem.gov.uk/consultations.

Your response, data and confidentiality

5.14. 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.

5.15. 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.

5.16. 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.

5.17. 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.

Appendix 1 – Summary of Stakeholder Feedback to Open Letter

Overall challenges

Network companies (and several non-network responses) highlighted simplification as a key issue for the future price control; they considered that this was an unmet strategic objective of RIIO-2.

Many network companies raised concerns that delivering wholesale change for 2026 could be challenging based on historic timelines and expectations of delivering such reviews with the RPI-X@20 review process used as a benchmark/gold-standard for wholesale changes.[68]

Network companies suggested an adapted RIIO framework remains appropriate and instead of a wholesale review they called for more focus to establishing more standardised business planning processes.

Network companies perceived the RIIO-2 stakeholder engagement process to be positive, however they were concerned it had not been given a strong enough weight within the Ofgem's decision making process.

Several non-network responses raised concerns:

- about uncertain government policy holding back investment, while others suggested that Ofgem's legal remit should be expanded to include net zero.
- supply chains needing time to scale up/prepare to avoid delays or escalating costs.
- that reliability and resilience needs to include focus on climate adaptation.

In all sectors, embracing whole system planning and the potential roles of the FSO and DSO were seen as key drivers for regulatory change.

Sector specific feedback

In ET, there was broad recognition of the role of the FSO in strategic planning and needs case determination, with the ASTI framework providing lessons that could be applied to future price controls.

[68] Regulating energy networks for the future: RPI-X@20 Principles, Process and Issues (ofgem.gov.uk)

In ED, there was focus on the importance and role of the DSO and local planning authorities in establishing the need for future investment. In the first instance, establishing the institutional arrangements was seen as important.

Within gas network responses, companies noted that they are unclear what network scenarios should be used for the next price control review and called for more certainty.

Two stakeholder responses considered that a rollover of the 2026 gas price controls could support whole system thinking.

Several non-network companies highlighted that we were moving beyond whole-system, to whole economy and need to consider interactions with transport, heat, communications.

The majority of TOs, GDNs and some DNOs recognised that there is merit in considering different regulatory approaches (using and adapting from the RIIO framework) for different cost types eg 'business-as-usual' vs 'enhancement'. This was seen as way to support simplification, and to enhance strategic focus onto areas that have the highest value to consumers. For BAU areas longer term, simpler settlements, were suggested as areas to explore, but little detail was offered.

Greater speed and flexibility in regulatory process and decisions was seen as important.

Several networks, and non-network, companies noted that the framework needs a move away from a "demonstrated need" for investment with a high bar and towards forecast/anticipated need – and more focus on pace.

Appendix 2 – Strategic Planning: critical enablers and regulatory options

Scope:

Strategic plans, both national and local, have a key role in shaping network companies' business plans. Their required scope and capabilities differ across different regulatory models.

As outlined in Section 1, the development of a whole system plan is a cross-cutting issue and many government and Ofgem consultations have an impact on it. Although the FSO is not yet in existence, considerable work is ongoing across the industry, Government and Ofgem to shape its role. This workstream covers two areas of interest:

First, what level of specification can be expected or desired from the plans that are designed by the FSO, including around detail of investments required, approach to build and definition of outputs and outcomes.

Second, what are the options for ensuring efficient delivery at low cost of the investments identified by the strategic planner.

Objectives:

- Understand the scope, and capability, of national and regional strategic plans in the context of future price control models and the feasibility of establishing these for the next price control.
- Apply findings on strategic planning to inform the design of options within the scope of Archetype 1 ('Plan and deliver') as part of a future framework, including open book contracting, tendering, and direct procurement by the licensee.
- Where these options would be available, the trade-offs of using these models against the incentive regulation models, such as ASTI and LOTI, and opportunities to combine with Archetype 3 ('Freedom and Accountability').

Key questions (not exhaustive)

1. What national and local strategic plans are being developed by when, what is their scope, their level of granularity, and how might this change overtime?
2. How far (across sectors) and granular (across investment needs) could an independent, cross vector view become to determine future needs for 2026 (transmission) and 2028 (distribution)?

3. What tools would the FSO need to have in place to genuinely system plan across vectors (i.e. accounting for flex, and energy efficiency, and for outages)?
4. For each sector, for what types and sizes of investment are these likely to result in specified plans that can be used to support Ofgem's regulation, and accompanying risks and benefits for customers?
5. Where those tools are in place what are the trade-offs of implementing the following approaches versus an evolved RIIO-2 approach (eg an approach based on an evolution of ASTI or LOTI):
    - Direct procurement by the system operator, or Ofgem, using competition for plan, build and operation of the asset;
    - Direct procurement by the system operator, or Ofgem, using other procurement approaches: such as mandated direct procurement by the TO/DNOs;
    - Mandated implementation of a delivery process overseen by the system operator, with revenues being subject to standard commercial procurement processes, such as a requirement for effective tendering by the licensee supported by open book contracting.

Appendix 3 – Alternative simpler approaches to incentive regulation

Scope:

In our second archetype, we have identified a number of potential alternatives to the incentive regulation used in RIIO-2.

We will explore possible adaptations to the design of the existing RIIO-2 regulatory framework to make a distinction between repeated activities and less predictable and one-off activities. Repeated activities might be operating and maintaining a network, and potentially decommissioning, or high volumes of low value upgrades.

We will then consider options for simplification of network regulation for those repeated activities. This includes using simpler efficiency incentives, putting more weight on ex post efficiency measures, and the interaction with aggregate measures of asset health.

Objectives:

- Understanding the practicalities of separating out costs according to different types of expenditure network companies incur (by sector), and whether this separation could permit different forms of regulatory framework treatment.
- Consider their relative strengths and weaknesses of different forms of potential separation to the oversight of ongoing activities (by sector) and provide a preliminary evaluation of the practical steps required to develop and deliver the approach.
- Identify alternative forms of regulation which might be feasible with accurate separation of repeated activities, and the benefits and costs of these alternatives.

Key questions (not exhaustive):

1. Can separable categories of expenditure for repeatable activities be defined that will allow for:
    - ❖ an alternative, simpler ex ante regulatory framework (including cost assessment approach) to be applied for a separable group of costs and outputs?
    - ❖ a simple ex post productivity-based incentive to be defined (either against an external benchmark and/or benchmarked against other network companies) as an alternative to 'ex ante' productivity targets?

2. Under what circumstances would these options be more or less effective than the current RIIO framework?
3. Are there activities where cost efficiency is hard to measure, and a pure ex post review might become more appropriate?
4. For these options, what level of monitoring would be required to ensure that customers are 'getting what they are paying for' from the level of investment in base activities?

Appendix 4 – Maintaining a stable approach to risk and return in a period of transition

Scope:

If the wider regulatory framework and incentive mechanisms need to change, our financial risk and return framework may need to evolve.

Ofgem must continue to ensure that customer bills are no higher than required, incentives remain aligned with desired outcomes and that companies remain financially resilient and able to finance their activities without earning excess returns.

At the same time, it is important that investors maintain confidence in the stability and predictability of the regulatory framework. Our approach needs to be designed having regard to the need for companies to be able to retain access to the investment capital required and keep their financing costs as low as possible.

Objectives:

- To what extent the financial risk and return framework needs to change to adapt to any new regulatory framework; and
- How Ofgem should assess and manage financeability if future frameworks do not include fixed price-control review periods.

Key questions (not exhaustive):

1. What are the key objectives and considerations to which Ofgem should have regard in assessing whether, and to what extent, it should adapt its existing financial risk and return framework if we move to a broader use of different archetypes?
2. One option, if we use different archetypes across network activities, would be to set targeted levels of allowed returns (instead of a single allowed return). What are the benefits and costs of this approach, and what evidence would we need? Would this option be likely to increase or reduce the overall accuracy and reliability of the overall return allowances?
3. Can the existing financial risk and return framework be simplified to streamline the process for setting allowed returns, including in an environment in which we move away from periodic reviews?
4. How should financeability be assessed and managed in a changing environment (including one in which we move away from periodic reviews) and in a way which protects customers' interests?

Appendix 5 - Designing the process for price review: lessons learned from RIIO

Scope:

The periodic price control review process is long and resource intensive. The benefits of this need to be understood. Based on both lessons learnt from RIIO-2 and the consideration of alternative regulatory models, we will evaluate the role and benefits of the periodic price review process and options for change. Within this workstream we also plan to explore the role of stakeholder engagement and capturing the consumer voice and wider lessons learned from the RIIO-2 process.

Objectives:

- Identify key lessons learned from RIIO-2 to inform the other engagement groups and the detailed sector specific policy work after the FSNR framework decision.
- Identify different options for the role of consumers in future price controls.
- Identify risks and benefits from periodic reviews across the range of activities and associated uncertainties

Key questions (not exhaustive):

All the following questions should be considered in the context of the system transformation outlined in section 1 of this consultation, which is likely to result in new challenges and uncertainties during future periods:

1. If we were running RIIO-2 again, what lessons can we learn from the process through the lens of simplification, in the following areas:
    - ❖ The business planning process (eg governance, timelines)?
    - ❖ The price control review process (cost assessment, outputs, and incentives)?
    - ❖ The approach to ongoing network performance monitoring (particularly for GD/GT and ET, although we welcome early observations from the ED sector)?
2. What benefits did the RIIO-2 business plans deliver and how important are the business plans in identifying and shaping key RIIO building blocks (eg ODIs, PCDs, Strategic Investment, BAU costs)?
3. Broadly, how do the RIIO business plans differ to companies' own internal business plans used over the regulatory cycle?

4. What changes may be needed to the role of consumer engagement during the price control review?
5. Could potential changes to the regulatory frameworks represent an opportunity for different forms of consumer engagement in particular areas of the price control?
6. What can we learn about improvements to asset health monitoring approaches and its implications for future regulatory design?

Appendix 6 - Digitalisation and its role in unlocking smart regulation

Scope:

Making better use of Energy System Data and digital technologies has the potential to deliver a more efficiently planned, maintained and operated energy system. Opportunities to gain new real time information, develop insights and to share this with different actors can enable optimised responses across the whole system. The networks, FSO and Ofgem can use these opportunities to help address the net zero, resilience and cost challenges – in addition to increasing productivity within networks themselves. Digitalisation can support the energy system link more effectively with customers and other critical stakeholders to deliver whole economy benefits. Regulation should maximise these opportunities, as well as considering how digitalisation can enable better regulation.

Objectives:

- The extent to which a more sophisticated location-specific, temporally-sensitive, and cross-vector modelling approach is feasible and can be developed.
- What this development pathway might this mean for the regulatory frameworks in future – including in specific areas such as flexibility, planning and coordination in network regulation (generally) and asset management (specifically); and
- How Ofgem should assess and best utilise the potential of an almost real-time monitoring in network regulation.

Key questions (not exhaustive):

1. What regulatory mechanisms and tools (eg licence conditions) could support the network companies in moving towards increased digitalisation beyond RIIO-2?
2. What can a digital twin do to close the loop between planning and monitoring – what is needed, and what is feasible by when?
3. How could a digital twin be utilised to assess the optimal national, and regional, balance between flex and network investment requirements?
4. When could we feasibly get a digital system that can monitor real time network conditions and automate future needs at all levels, timescales, and vectors? How can it be delivered and what are its limitations?

5. Could a digital twin model be combined with the Archetype 3 regulatory approach to provide a more flexible approach to network regulation, and if so for which activities and by when?