

## Enertechnos response to Ofgem ED3 Framework Consultation

### About Enertechnos

[Enertechnos](#) is a UK clean-tech company, developing innovative solutions to enable the better delivery of electricity and support the transition to net zero. The company was founded with a singular purpose - to provide a solution to help to deliver decarbonisation.

Our innovative cable technology – the Capacitive Transfer System, ‘CTS’ – improves energy efficiency across electricity networks, reduces energy losses and cuts carbon emissions from wasted energy. It can play a key role in achieving the Government’s clean power ambitions - cabling is a vital but often overlooked part of the energy system. The CTS can particularly play a key role in improving the resilience and efficiency of electricity distribution networks.

The deployment of cleaner and smarter cabling such as CTS will help to reinforce the grid and help achieve the Government’s clean power targets by ensuring it is ready for the significant increase in renewable resources and reactive power.

### Executive Summary

As the UK moves towards clean power and Net Zero, the electrification of transport and heat and the rise of AI means that demand for electrical energy in the UK grid is set to rise by between 194% to 268% between now and 2050. To be able to deliver this amount of energy, the grid must be significantly upgraded and the regulatory framework adapted to drive this change. Enertechnos’s recommendations for Ofgem’s RIIO-ED3 Framework are summarised below.

- **Modernising infrastructure**
  - Ofgem’s recognition of rising electricity demand underscores the need for urgent upgrades to grid infrastructure, particularly cabling.
  - Legacy cabling systems lose significant energy annually. CTS can cut losses by up to 10% and enhance grid resilience.
- **Boosting innovation**
  - Current frameworks inadequately incentivise innovation.
  - Reinstating mechanisms like the Losses Discretionary Reward (LDR) and requiring cost-benefit analyses of traditional vs. innovative solutions will accelerate progress.
  - Aligning the Strategic Innovation Fund with innovators’ needs will improve technology deployment.
- **Proactive investment**

- Anticipatory investments in advanced cabling technologies are essential to avoid inefficiencies, blackouts, and delays in achieving net-zero targets.
- A national cabling strategy addressing supply chain and workforce challenges is necessary to meet future demand.
- **Prioritising environmental and consumer Goals**
  - Stronger focus on measurable energy loss reductions should be integrated into consumer outcomes like Networks for Net Zero.
  - CTS supports environmental targets by reducing losses and enabling renewable energy integration.
- **Regulatory Reform**
  - Current DNO practices and regulatory frameworks often stifle innovation.
  - A directive approach to price controls, mandating innovative solutions and aligning investments with strategic goals, is critical.

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

We agree with Ofgem's characterisation of the wider context for ED3, particularly the recognition of increased electricity demand due to the electrification of transport and heat and the expected rise in demand for electricity from data and artificial intelligence centres as AI continues to transform our economy. Indeed, according to Socomec, hyperscale data centres' demand for electricity could grow by 35% a year until 2040, and projections suggest data centres could account for 13% of global power consumption by 2030<sup>1</sup>. To tackle these trends, there is an urgent need for a smarter, more resilient network to keep up with increased demand.

Furthermore, we agree that the previous approach emphasising that flexibility in the electricity grid will not be sufficient to keep up with demand. ED3's proposed emphasis on strategic planning and in particular the role of innovative clean technology in this will help the UK address the challenges facing electricity distribution networks in the coming decades.

However, we would put greater emphasis on the critical role of upgrading physical grid infrastructure, and in particular cabling. As we set out in our report published last year, '[Solving the UK's Cabling Challenge](#)', legacy cabling solutions, which form the backbone of the current distribution network, are increasingly unfit for purpose in the context of rising electricity demand. These systems are highly inefficient, with energy

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<sup>1</sup> Socomec, 2024. 'Understanding the power consumption of data centres'. Available online: <https://emea.socomec.com/en/solutions/business/data-centres/understanding-power-consumption-data-centres>

losses amounting to approximately 26 TWh annually – equivalent to the output of a nuclear power station such as Hinkley Point C<sup>2</sup>. This inefficiency increases costs for consumers and undermines the resilience of the grid. We are pleased to see Ofgem recognise the need to reduce losses on the distribution network through the ED3 framework.

The solution to reducing losses is via the adoption of innovative cabling solutions, such as Enertechnos' Capacitive Transfer System (CTS), offer a transformative opportunity to address these issues. If deployed throughout the grid, the CTS could significantly reduce energy losses (by up to 10%), deliver more power over longer distances (by up to 70%), and reduce the cost of cabling (by up to 37%).

The ED3's regulatory framework needs to enable the adoption of loss reducing innovations like the CTS. This would align with the consultation's objectives of enabling a proactive, forward-looking approach to grid investment and ensuring long-term value for consumers. However, at present, the existing regulatory and investment frameworks do not adequately incentivise the deployment of innovative technologies like the CTS. Our response details our thoughts on how this can be rectified later in this response.

Furthermore, as we move towards a decarbonised energy network with greater amounts of renewable generation such as offshore and onshore wind, we must consider the effect this will have on the level of reactive power produced and how this will impact the stability of our grid. Reactive power, which is essential for running components such as motors and transformers, has the important role of controlling the voltage throughout the grid and allowing an efficient and reliable circulation of active power.

We need to find new ways to manage reactive power and make better use of less expensive assets such as innovative cabling solutions so that we can reduce our reliance on costly balancing services. The CTS is a solution that can help manage reactive power, although the deployment of the technology is being held back by regulatory barriers.

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

We welcome Ofgem's overarching objective for ED3 to ensure that electricity distribution networks provide the necessary capacity to meet decarbonisation goals at the least cost while supporting sustainable economic growth.

We also support the proposed consumer outcomes, in particular Networks for Net Zero, Resilient and Sustainable Networks, and Smarter Networks. These align closely

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<sup>2</sup> Department for Business, Energy and Industrial Strategy, July 2022. 'Digest of UK Energy Statistics'. <https://www.gov.uk/government/statistics/digest-ofuk-energy-statistics-dukes-2022>

with our vision for a modern, efficient, and sustainable electricity grid that embraces innovation to deliver for both current and future consumers.

As a UK-based developer of innovative cabling solutions, Enertechnos believes that realising this objective and delivering these outcomes will depend on fostering the deployment of advanced technologies that address the critical challenges facing the UK grid.

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

We agree that additional controls around network investments should be introduced in the ED3 price control period. Such controls are essential to ensure that investments align with long-term decarbonisation goals, address critical inefficiencies in the electricity distribution network, and support the deployment of innovative technologies.

The challenges of decarbonisation and increasing electricity demand require a more strategic and proactive approach to network investments. Without robust controls, there is a risk that investments will perpetuate reliance on outdated and inefficient infrastructure, leading to higher energy losses, increased costs for consumers, and delays in achieving net-zero targets. Addressing the inefficiencies of legacy technologies requires regulatory frameworks that encourage innovation and investment in future-ready infrastructure.

We propose that these additional controls should contain the following features:

- DNOs should be mandated to adopt innovative new technologies such as the CTS where these will lead to efficiencies across the grid. This will deliver long-term cost reductions through future-proofing the grid.
- Energy loss reduction should be incentivised through the reintroduction of mechanisms like the Losses Discretionary Reward (LDR). These mechanisms should include measurable metrics for loss reduction and rewards for achieving them.
- Obligate DNOs to present cost-benefit analyses that compare business-as-usual technologies with innovative alternatives. This would enable Ofgem to assess the value of investments not just on immediate costs but on their long-term benefits, such as reduced energy losses and improved resilience.
- Ensure that network investments are closely aligned with Regional Energy Strategic Plans (RESPs) and other strategic frameworks. This would provide clarity on future demand and enable anticipatory investments that prevent future capacity bottlenecks.
- Introduce tighter monitoring and accountability mechanisms, such as Price Control Deliverables (PCDs), to ensure that investments deliver the promised

outputs. This could include tracking the deployment of innovative technologies and measuring their impact on network efficiency and resilience.

- Cognisant of an unpredictable global trade environment, tie investments to the development of robust domestic supply chains for cabling and other technologies. This would enhance national energy security and support economic growth.

By introducing these controls, Ofgem can ensure that network investments deliver long-term value for consumers, reduce environmental impacts, and support the UK's transition to a net-zero economy with a future-proofed grid.

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

We strongly agree that the incentives for DNOs must adapt from RIIO-ED2 to address the evolving challenges of decarbonisation, growing electricity demand, and the consequent need for greater grid capacity. We agree that the existing framework is too focused on short-term cost savings and deferment of investment, leading it to be insufficiently aligned with long-term strategic goals. Overall, this approach dampens incentives to adopt innovative technologies.

Firstly, we must address the fact that DNOs are overly risk-averse, and the existing regulatory environment lacks adequate mechanisms to encourage DNOs to invest in and deploy innovative solutions. This could be addressed through the regulator taking a more proactive approach in mandating investment and setting clear expectations that a business-as-usual approach will not be sufficient to achieve overarching objectives.

For instance, a mechanism to achieve this could be a requirement on DNOs to carry out dual cost-benefit analyses—comparing traditional and innovative approaches—during grid upgrade planning. This would ensure that long-term benefits are taken into account, encouraging appropriate anticipatory investment.

Secondly, we strongly agree with the proposal to reintroduce the LDR or an equivalent scheme which – though dropped in ED2 – would incentivise the deployment of advanced innovations to significantly reduce network losses and improve overall system efficiency. Losses reduction should also be a key metric of comparison between DNOs and high performers rewarded.

Thirdly, the funding of programmes like the Strategic Innovation Fund should better align with the timelines and needs of innovators and pathways for testing, propagation, and widespread adoption of new technologies should be established. This would create a stable environment for public and private investment in innovation and potentially unlock significant long-term benefits.

The RIIO-ED3 framework presents an opportunity to reshape DNO incentives to drive innovation, support strategic investments, and align with long-term decarbonisation goals. By adapting incentives to focus on measurable outcomes such as loss reduction and capacity building, Ofgem can ensure that DNOs are incentivised to innovate to secure a grid prepared to meet the challenge of net zero at lower cost to consumers.

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

Global supply chain and workforce pressures are significant factors contributing to longer lead times for network reinforcement. These challenges must be addressed proactively to ensure timely delivery of critical infrastructure for the net zero transition. We recommend doing this in particular through a national cabling strategy, which we addressed in our recent report 'Solving the UK's Cabling Challenge'<sup>3</sup>.

As countries around the world seek to upgrade grid capacity, the surge in global demand for cabling and associated materials will become a key driver of delays. The International Energy Agency (IEA) estimates that 80 million kilometres of distribution and transmission grids will need to be added or replaced worldwide by 2040<sup>4</sup>. This heightened demand, compounded by the need for frontloaded investment to achieve decarbonisation targets, increases the risk of material shortages.

More specifically, copper, a vital material for traditional cabling systems, is experiencing severe supply constraints. Analysts project that global demand could exceed supply by 50 million tonnes annually by 2035. Production challenges in key supplier countries like Chile and Peru are likely to exacerbate these shortages, driving price volatility and supply chain uncertainty<sup>5</sup>.

Unfortunately, the UK's heavy reliance on international markets for cabling systems and components poses additional risks. Limited domestic manufacturing capacity leaves the UK vulnerable to geopolitical disruptions and delays in accessing essential supplies which must be tackled through active industrial strategy.

Any plan to overcome these issues with cabling supply chains must reckon with the fact that there is a critical shortage of skilled workers in the UK's cabling sector, particularly for roles in electrical design, testing, and commissioning. National Grid estimates that

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<sup>3</sup> Enertechnos, 2024. 'Solving the UK's Cabling Challenge: A blueprint for the new government' Available online: <https://www.enertechnos.com/wp-content/uploads/2024/08/Enertechnos-Solving-the-UKs-cabling-challenge-1.pdf>

<sup>4</sup> IEA, October 2023. 'Electricity Grids and Secure Energy Transitions', <https://iea.blob.core.windows.net/assets/ea2ff609-8180-4312-8de9-494bcf21696d/ElectricityGridsandSecureEnergyTransitions.pdf>

<sup>5</sup> Credendo, May 2024. 'Copper Sector: Record-Breaking Copper Prices Amid Speculation of Supply Shortages'. <https://credendo.com/en/knowledge-hub/copper-sector-record-breaking-copper-prices-amidspeculations-supply-shortages>

260,000 new roles will need to be filled to support the net zero workforce by 2050, adding pressure to an already strained labour market<sup>6</sup>. Global competition for engineering and technical expertise intensifies these challenges, making it difficult for the UK to recruit and retain the workforce needed to meet demand.

Whilst these challenges must be tackled through building a more resilient domestic manufacturing base, advanced cabling technologies – like the CTS – can help mitigate supply chain risks by reducing the usage of traditional materials like copper. These technologies also improve efficiency and reduce energy losses, which aligns with the broader net zero goals and limit the quantity of material needed for grid upgrades.

The more proactive approach to network reinforcement set out in ED3, underpinned by long-term strategic planning and regulatory incentives for innovative solutions, can help mitigate the risks associated with global supply chain and workforce constraints. However, given this is insufficient and prohibitively expensive alone, innovative technology can help the UK to ensure its electricity distribution networks are fit for the net zero transition.

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

Yes, we agree that the risks and downsides for consumers of network underinvestment in reinforcement significantly outweigh those associated with overinvestment. While overinvestment may lead to marginally higher initial costs, the long-term benefits of increased efficiency, resilience, and alignment with net zero targets far exceed the potential downsides. Conversely, underinvestment risks systemic failures and higher cumulative costs.

The risks of underinvestment are numerous and pose an existential challenge for decarbonisation alongside all but ensuring higher long-term costs. These include:

- A more constrained network, potentially leading to blackouts. This is because legacy cabling systems are inefficient and unable to meet the rising demand for electricity during peak periods, particularly in winter. This could lead to increased energy costs for consumers, and disruption to critical services.
- Inefficiencies driven by a lack of reinforcement, for instance caused by repeated costly interventions at the same sites to meet incremental demand. These piecemeal approaches ultimately increase the lifetime cost of network upgrades.

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<sup>6</sup> National Grid, January 2020. 'Building the Net Zero Energy Workforce'. <https://www.nationalgrid.com/stories/journey-to-net-zero/net-zero-energyworkforce>

- Delaying the integration of renewable energy and low-carbon technologies like heat pumps and EV chargers which require significantly increased grid capacity to work at scale. This would not only impact the UK's climate targets but also delay consumer access to the cost-saving benefits of clean energy.

Meanwhile, the limited negative impacts of overinvestment – notably higher upfront costs – can be mitigated through a strategic approach to planning the grid and the adoption of innovative new technologies. For instance, the CTS can reduce energy losses, future-proof the grid, and provide greater capacity for new demand. These technologies ensure any perceived overinvestment results in long-term cost savings and efficiency as strategic, frontloaded investment helps alleviate future supply chain and workforce bottlenecks. Overall, this should smooth delivery timelines and ensure that network reinforcement aligns with expected demand.

With innovation reducing the cost of investment in grids over the long term, consumers will be provided with an environment which will encourage the quicker take up low-carbon technologies, reducing reliance on imported energy and enhancing energy security. Limited initial costs are a short-term trade-off for long-term savings and stability.

The risks of underinvestment—blackouts, inefficiency, missed climate goals, and higher cumulative costs—are far greater than the downsides of overinvestment, which can be managed through innovation and strategic planning. Anticipatory investments in modern cabling solutions and reinforcement projects will deliver a more efficient, reliable, and future-ready grid, ensuring consumer benefits while meeting the UK's net zero ambitions.

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

Deferring network reinforcement may offer limited benefits, such as the potential for technological advancements and better alignment with emerging demand patterns. However, the risks to the deliverability of decarbonisation, system resilience, and cost efficiency significantly outweigh these benefits.

Deferral of network reinforcement creates significant risks for the delivery of ED3's overarching objectives and consumer outcomes. These include:

- Increased energy losses, as deferral would perpetuate the use of outdated, inefficient copper cabling systems. As outlined these losses are set to rise as demand grows, undermining energy efficiency and sustainability.
- The stalled integration of renewable energy and low-carbon technologies like EV chargers across the UK, potentially derailing progress toward net zero targets

and delaying the consumer and national security benefits of a decarbonised energy system.

- Incremental, just-in-time upgrades which are costlier over the long term, leading to increased costs to consumers. Deferral often necessitates repeated interventions at the same sites, increasing the cumulative costs of reinforcement compared to proactive, future-proofed investments.
- Exacerbated supply chain and workforce bottlenecks in the context of a global competition for critical materials like copper and skilled labour that are already straining the energy sector. Deferring reinforcement risks creating a "bow wave" of demand, further overwhelming supply chains and workforce capacity when projects are inevitably required at scale.
- A less resilient energy grid, with delays in reinforcement leaving the grid vulnerable to rising electricity demand, particularly during high-demand periods such as winter. This increases the likelihood of blackouts and system failures, with significant consumer and economic impacts.

While there are potential benefits to deferring network reinforcement, the risks to deliverability—including inefficiencies, escalating costs, supply chain bottlenecks, and missed decarbonisation targets—are far greater. A proactive, anticipatory investment strategy is essential to ensuring a reliable, efficient, and future-ready grid. Strategic deployment of innovative technologies like the CTS can mitigate risks and deliver long-term value to consumers while supporting the UK's net zero ambitions.

## **Q21. To what extent should the price control be more directive on specific anticipatory and strategic investments to achieve the 'networks for net zero' consumer outcome?**

The price control should be significantly more directive in encouraging specific anticipatory and strategic investments to achieve 'networks for net zero'. A proactive regulatory framework is essential to ensure that the electricity distribution network is prepared for the rapid electrification of transport and heating, the integration of intermittent renewable energy, and the growing demand for distributed energy resources (DER).

We recommend that Ofgem adopts a more directive approach for the following reasons:

- As discussed above, energy losses on the UK's distribution network are a critical but often overlooked challenge. Adopting advanced cabling technologies, such as the CTS, can dramatically reduce these losses, cutting electricity demand and lowering operational costs for consumers. A more directive price control should mandate or strongly incentivise the adoption of such innovative solutions as part of the anticipatory investment strategy.

- Traditional “just-in-time” approaches to network upgrades are no longer fit for purpose in the face of unprecedented electrification and renewable energy deployment. Instead, strategic investments in future-proof infrastructure, such as high-efficiency cabling, are needed to prevent bottlenecks, enable greater system flexibility, and reduce the risk of stranded assets. A directive regulatory framework could ensure that Distribution Network Operators (DNOs) prioritise investments that align with long-term system needs and whole-system value.
- Innovative technologies – particularly in the cabling sector – offer substantial cost benefits over their lifecycle. However, DNOs may be hesitant to adopt these solutions without clear regulatory guidance or incentives due to perceived risks and upfront costs. By embedding ambitious requirements on metrics like losses and capacity within the price control framework, Ofgem can encourage investment in the innovative approaches that are needed to achieve these within reasonable cost limits.
- There is no time to spare, as deferred investment in innovative cabling risks exacerbating existing inefficiencies, increasing costs, and missing critical milestones for the net-zero transition. Frontloaded investments in advanced technology can help smooth delivery, address supply chain bottlenecks, and ensure that the network is prepared for much higher future demand.

To achieve the networks for net-zero outcome, we propose the following specific measures:

- Require DNOs to consider innovative technologies, such as the CTS, in all investment plans and cost-benefit analyses.
- Reinstate the LDR or introduce a similar mechanism to encourage DNOs to prioritise reducing network losses.
- Set clear expectations for DNOs to deliver anticipatory investments aligned with Regional Energy Strategic Plans (RESPs) and whole-system priorities.

By adopting these measures, Ofgem can ensure that DNOs embrace innovative, efficient, and forward-looking solutions, driving progress towards a resilient, low-carbon grid. This proactive approach will maximise consumer benefits, reduce long-term costs, and help secure the UK’s net-zero future.

**Q22. Do you agree with our characterisation of strategic and anticipatory investment and our expectation that these activities would have different regulatory drivers and controls?**

We broadly agree with Ofgem’s characterisation of strategic and anticipatory investment, as well as the recognition that these activities require distinct regulatory drivers and controls. In particular, we want to highlight that greater emphasis should be

placed on incentivising the adoption of innovative technologies in both anticipatory and strategic investment. These innovative technologies are vital to achieve long-term system needs to fulfil the ‘networks for net zero’ consumer outcome.

Strategic investments are critical for ensuring the network has the capacity and efficiency to meet long-term decarbonisation goals. These investments, such as grid reinforcement and upgrading legacy infrastructure, are best supported by directive regulatory controls. A directive to upgrade the UK’s legacy cabling infrastructure should be a prominent example of this sort of strategic investment.

Our current overreliance on outdated cabling solutions that incur significant energy losses, as highlighted in our report on the UK’s cabling challenge, demonstrates the need for a proactive approach. Proven innovative solutions like the CTS reduce network losses and enhance resilience, making them a strong candidate for strategic investments across the grid.

Anticipatory investments, dealing with uncertain need, are essential given the dramatic changes in electricity demand with the decarbonisation of the UK economy. They require flexible regulatory mechanisms that support the development, testing, and deployment of innovative technology and methods within the grid, which as discussed throughout this response have the potential to increase grid efficiency, cut costs for taxpayers and consumers, and ultimately support net zero and energy security.

Examples of good regulatory frameworks for anticipatory investment include:

- The reintroduction of mechanisms like the LDR or a similar scheme to incentivise early adoption of innovative solutions to system-wide issues like losses.
- Redesigning programmes like the Strategic Innovation Fund (SIF) so that funding aligns more closely with innovator timelines and needs, supporting each stage of the innovation process.
- Mandating DNOs to present dual cost-benefit analyses comparing business-as-usual and innovative approaches, enabling informed decision-making and justification for upfront investments.

Overall, we recognise that strategic investments should have clearly defined outputs and deliverables, ensuring alignment with long-term objectives whilst anticipatory investments should be incentivised through mechanisms that account for uncertainty, providing DNOs with the confidence to invest in forward-looking solutions. Innovation is the key link between the two types of investment, with anticipatory investments identifying and developing new and transformative technologies before strategic investments support their deployment throughout the grid.

**Q23. Should the price control provide more guidance or guardrails around the use of particular network solutions to achieve the ‘networks for net zero’ consumer outcome**

**In the context of greater electrification, is our current approach towards regulating reliability appropriate for ED3?**

We believe the price control should amend its guidance and guardrails around the use of particular network solutions to better enable innovation and flexibility in delivering the 'networks for net zero' consumer outcome. The current regulatory framework, while ensuring accountability, often creates barriers to the adoption of innovative technologies. A more permissive and outcome-focused approach is needed to encourage Distribution Network Operators (DNOs) to adopt cutting-edge solutions that can drive efficiency and resilience in the energy system.

The current regulatory framework does not do enough to incentivise DNOs to trial or deploy innovative solutions. For example, the withdrawal of the LDR in RII0-ED2 removed a key mechanism for incentivising DNOs to reduce network losses using novel technologies like the CTS.

Rather than prescribing specific solutions, the price control should focus on the desired outcomes—such as reducing energy losses, improving resilience, and supporting the integration of renewables. This would enable DNOs to:

- Tailor their investment strategies to regional needs and opportunities.
- Incorporate cutting-edge technologies into their plans without the fear of regulatory penalties for deviating from standard methods.
- Present a cost-benefit analysis comparing business-as-usual solutions with innovative alternatives, ensuring decisions are informed by both immediate costs and long-term benefits.

We urge Ofgem to limit prescriptive guidance around network solutions in the ED3 framework and instead adopt an outcomes-based approach which encourages investment in and deployment of innovation. This shift will ensure the regulatory framework supports, rather than stifles, the progress needed to achieve a sustainable and modern energy system.

**Q42. How should our guidance for cost benefit analysis evolve to better enable optioneering between different interventions, taking relevant long-term risks and benefits into consideration?**

To align with the principles of proactive investment and anticipatory planning, DNOs should be required to model innovative and business-as-usual solutions in their cost-benefit analyses. This approach will help justify necessary upfront investment in

advanced technologies, demonstrating their long-term value and supporting Ofgem's goals of driving efficiency while enabling the transition to net zero.

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

We broadly agree that the current approach to setting the ongoing efficiency challenge, as used in RIIO-ED2, provides a structured and transparent basis for encouraging productivity improvements among Distribution Network Operators (DNOs).

However, we believe there is a critical need to refine this framework to better accommodate the deployment of innovative technologies, such as advanced cabling solutions, which can deliver substantial long-term benefits for the grid and consumers. Some key areas where tweaks would be appropriate include:

- The ongoing efficiency challenge should account for the unique cost trajectories and performance benefits of innovative technologies. For example, modern cabling solutions like the CTS have the potential to significantly reduce energy losses across the grid, improving operational efficiency and cutting carbon emissions. However, these solutions may initially appear costlier under traditional metrics, which do not fully capture their lifecycle savings or system-wide benefits.
- Recent supply chain disruptions and price volatility in critical materials, such as copper, highlight the need for a more dynamic approach to efficiency benchmarking. While the existing methodology offers a solid foundation, it must be flexible enough to address the challenges associated with scaling up innovative technologies in a competitive and resource-constrained market.
- As detailed, we recommend reinstating or replacing the LDR mechanism to encourage DNOs to adopt more efficient cabling and infrastructure solutions.

In general, a forward-looking efficiency framework should balance near-term cost controls with the long-term benefits of building a more resilient, efficient, and sustainable grid – and we are glad to see this is a core part of Ofgem's proposals in ED3. With some further tweaks, this can be improved yet further. By incentivising investment in advanced cabling technologies, the ED3 framework can reduce energy losses, improve grid capacity, and ultimately lower costs for consumers.

**Q47. What are the key factors (including benefits and costs to consumers) that Ofgem should take into consideration when conducting its review of the appropriate approach to regulatory depreciation in ED3 and beyond?**

When reviewing the approach to regulatory depreciation in ED3 and beyond, Ofgem should prioritise the long-term benefits of innovative infrastructure investment to

consumers and the energy system as a whole over short term concerns or funding incentives.

Achieving net zero by 2050 requires a grid capable of handling 194% to 268% more electricity demand<sup>7</sup>. This necessitates proactive investment in innovative, future-proof infrastructure. A depreciation model that prioritises these investments supports anticipatory grid expansion, ensuring the network remains resilient under growing pressure from renewable integration and electrification.

Losses across the distribution network represent a significant and unnecessary cost to consumers, especially as electrification increases. However, modern cabling technologies, such as the CTS, reduce these losses, improving efficiency and lowering energy bills. A depreciation model that incentivises the adoption of such technologies would align investment with consumer interests and long-term savings.

It is widely acknowledged that spreading costs over an extended depreciation period ensures that those who benefit from a more efficient, net zero-ready grid contribute fairly to its development. This approach also mitigates short-term bill increases while securing long-term economic and environmental benefits.

By adopting a regulatory depreciation model that embraces innovative technologies like the CTS, Ofgem can reduce long-term costs, support the net zero transition, and ensure fair outcomes for current and future consumers.

**Q53. Our aim is for the ED3 framework to be structured to deliver high impact, transformative innovation – do you think that further changes, alongside those proposed for the other sectors in our RIIO-3 SSMD, are required to deliver this?**

We welcome the steps outlined in the ED3 framework to tackle critical challenges such as reducing network losses and improving innovation. The inclusion of measures to encourage greater efficiency, digitalisation, and innovation is a significant step forward. The SIF and the Network Innovation Allowance (NIA) continue to provide essential mechanisms for supporting research and development while incentivising the adoption of transformative technologies.

We also support the focus on leveraging innovative approaches to address system inefficiencies, such as the substantial energy losses on distribution networks. Acknowledging these losses as both a financial and environmental challenge is critical, and we are pleased to see this recognised as a priority within the new framework.

However, there is an opportunity to go further. Innovation should not only be supported but embedded as a core priority across all elements of the regulatory framework. To

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<sup>7</sup> National Grid ESO, 2024. Future Energy Scenarios. <https://www.nationalgrideso.com/Document/322316/download>

ensure the ED3 framework achieves its goal of delivering high-impact, transformative innovation, we suggest building on the proposals in the following ways:

- While previous mechanisms, such as the LDR, faced challenges, their withdrawal has created a gap in driving innovation to address this critical issue. A revised or equivalent scheme could incentivise DNOs to adopt cutting-edge solutions specifically targeting loss reduction, such as advanced cabling technologies, with measurable benefits.
- To foster a forward-looking approach, DNOs should be required to submit two models as part of their cost-benefit analyses for network upgrades: one evaluating business-as-usual technologies and another considering innovative solutions. This would ensure that investment decisions reflect long-term benefits, including reduced carbon emissions and enhanced system resilience.
- While funding mechanisms like the SIF and NIA support research, the regulatory framework must also ensure that promising innovations can move seamlessly into commercialisation and deployment. This could include streamlined processes for testing and scaling technologies, supported by clear long-term funding visibility.
- The ED3 framework rightly identifies collaboration as critical for delivering transformative outcomes. Enhanced interoperability between DNOs, as well as coordinated data-sharing initiatives, will ensure that innovations are scalable and their benefits can be maximised across the entire network.
- Ofgem's strategic priorities should align with the deployment of transformative technologies, ensuring that DNOs have clear incentives to invest in innovations such as advanced cabling solutions that directly address challenges like energy losses and resilience.

By building on the ED3 framework's promising foundation and adopting these additional measures, the regulatory framework can better support the deployment of the transformative innovations necessary to deliver a net zero-ready electricity distribution network.

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

Whilst it is encouraging to see ED3 taking a more active stance on encouraging innovation among DNOs, there still remain several challenges to deploying innovative technology and practices across networks.

Risk aversion is the overriding challenge which makes the current system inhospitable to innovative technology. DNOs often exhibit a cautious approach to adopting new technologies due to perceived risks and regulatory structures that prioritise cost

minimisation. This focus on short-term cost reductions discourages the adoption of solutions with higher upfront costs but significant long-term benefits.

Alongside a reintroduction of the LDR or equivalent, a more strategic, stable funding mechanism is essential to foster greater willingness to innovate by providing confidence to both innovators and DNOs.

Fragmentation is a key challenge and undermines the collaboration that is critical to scaling innovation. DNOs too often work in silos, leading to inefficiencies and limited interoperability as well as duplicated efforts. Coordinated efforts to share data and standardise technologies would enhance the scalability of innovative solutions between DNOs and across the grid.

By addressing these challenges, DNOs can fulfil their critical role in deploying transformative innovations that support a net zero-ready electricity distribution system.

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

We strongly agree that an integrated approach to managing asset health alongside load-driven expenditure is essential to future-proofing the electricity distribution network for resilience and demand growth.

Coordinating asset health and load-driven investments ensures that infrastructure upgrades not only address current capacity needs but also anticipate future challenges, including climate resilience and increased electrification. For example, as well as reducing energy losses and improving grid efficiency, the CTS cabling solution requires less cable for the same load. This ensures a robust network that is easier and cheaper to maintain, for example in the face of climate change-driven extreme weather events.

An integrated approach also allows for the identification of synergies between maintenance and capacity upgrades. For instance, upgrading legacy cabling systems during scheduled asset replacements reduces both energy losses and operational costs over time. Proactive planning avoids costly emergency interventions and ensures infrastructure is adequate for long-term growth in demand.

By combining load-driven upgrades with robust asset health strategies, the grid can better integrate decentralised renewable energy sources and support distributed energy resources (DERs). This reduces bottlenecks and increases flexibility, enabling consumers and generators to benefit from more reliable and efficient connections to clean power.

In conclusion, an integrated approach to managing asset health and load-driven expenditure offers significant opportunities to build a resilient, efficient, and future-ready electricity distribution network. By embedding innovation and forward-looking planning into regulatory frameworks, we can ensure that the grid meets the evolving needs of consumers while supporting the UK's transition to net zero.

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

We agree with retaining and strengthening the main components of the environmental framework from RIIO-ED2, as these mechanisms are essential to achieving a sustainable, resilient, and efficient electricity network.

The existing components of the RIIO-ED2 environmental framework—such as science-based targets (SBTs), Environmental Action Plans (EAPs), and Annual Environmental Reports (AERs)—have established a clear and measurable foundation for addressing the environmental impact of electricity distribution. Retaining these components is vital to ensuring accountability, transparency, and public support as the sector transitions to net zero.

Energy losses are a critical environmental and financial challenge, with current annual losses equivalent to the output of a nuclear power station. The framework should explicitly incentivise the adoption of innovative technologies, such as the CTS, which can reduce these losses and limit both greenhouse gas emissions and the amount of energy generation needed in future, as well as concomitant pollution.

The CTS also offers additional environmental benefits by being easier to underground compared to legacy cabling systems. Undergrounding infrastructure improves resilience to climate impacts, such as extreme weather events, while minimising the visual and ecological disruption caused by overhead cables. Encouraging the adoption of technologies like the CTS would strengthen the environmental framework by addressing resilience and sustainability simultaneously.

We would also encourage Ofgem to ensure that innovative approaches to environmental protection are supported with anticipatory investment, development, and commercialisation using the mechanisms we have discussed elsewhere in this consultation response.

To conclude, the RIIO-ED2 environmental framework has laid a solid foundation for progress, but its success depends on continued evolution and embrace of innovation. Retaining and strengthening key components, with a renewed focus on energy loss reduction, resilience, and incentivising innovation, will ensure the electricity network is both sustainable and future-proofed.