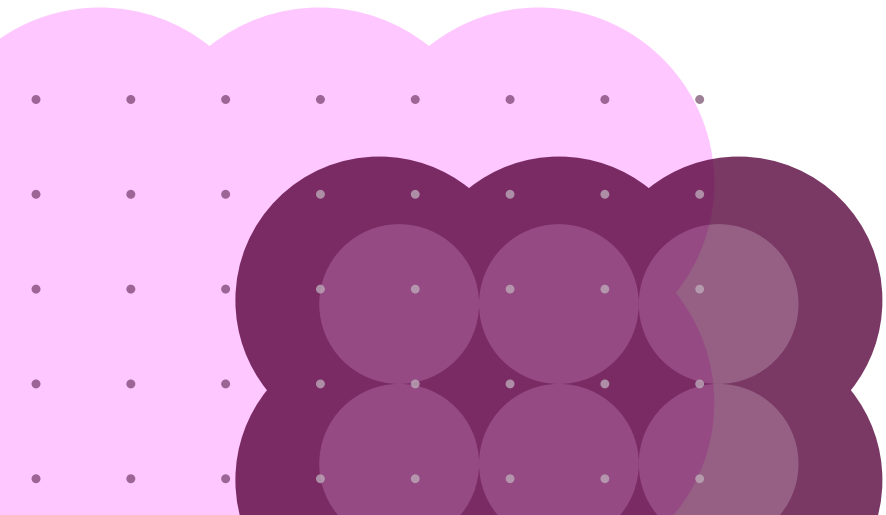
NESO1 Innovation Annex

NESO
National Energy System Operator

Contents



NESO Innovation

Innovation at the National Energy System Operator (NESO) aims to accelerate the path towards a sustainable future for everyone. We do this by generating and testing new ideas, technologies, processes or approaches to solve critical challenges, gaining relevant insights and enabling change.

NESO's commitment to innovation is three-tiered:

- **To lead innovation** by collaborating with stakeholders across the energy sector to create a Whole System Innovation Strategy, delivery roadmaps and outcome frameworks.
- **To enable innovation** by fostering a culture of experimentation and knowledge sharing across digital, commercial and technology domains—supporting innovators and accelerating adoption.
- **To deliver innovation** in areas aligned with NESO's roles and strategic objectives and transition successful projects into business-as-usual (BaU) operations.

At NESO, we recognise that innovation is inherently uncertain and high-risk. Our approach is grounded in long-term strategy and a commitment to public good outcomes, including decarbonisation, affordability and system resilience.

NESO's innovation efforts are designed to deliver value for money by ensuring that every investment in innovation contributes to tangible benefits for the energy system and its users. By strategically directing innovation resources, NESO not only drives efficiency and cost savings in the energy sector but also enhances system reliability and resilience. The innovation solutions we develop are scalable and adaptable, providing long-term benefits such as reduced operational costs, enhanced consumer engagement, and accelerated progress towards decarbonisation. Through the integration of cutting-edge technologies and collaborative approaches, NESO maximises the impact of its activities, ensuring that both current and future energy challenges are met with robust, sustainable solutions.

Due to the dynamic nature of innovation, NESO's innovation activities cannot be delivered through BaU mechanisms. Combining quantitative and qualitative evidence, this Innovation Annex outlines a clear rationale for flexible funding, including the use of the Network Innovation Allowance (NIA). This ensures continuity and scalability of impact throughout the RIIO-3 funding period. This Innovation Annex sets out NESO's commitment to delivering innovation, demonstrating the funding, processes and strategic factors that will enable us to succeed.

RIIO-2 Network Innovation Allowance

Over the course of RIIO-2, NESO will have received a total of £46.86 million of **Network Innovation Allowance (NIA)** funding, including the 10% compulsory contribution, in 2018/19 prices. As shown in Figure 1, expenditure has increased exponentially across the five-year period, with 2025/26 spend forecasted at 5.2 times the amount spent in 2021/22.

Excluding the 10 projects carried over from RIIO-1, the beginning of RIIO-2 saw 14 new projects being registered. Our RIIO-2 NIA portfolio has since grown to a total of 134 projects at present, comprised of 47 live projects, 26 in the pipeline and 61 completed projects. The graph demonstrates steady and consistent growth across the five years price control period, with an average growth of 30 projects per year from 2022/23 to 2025/26, which is proportionate to the spend profile (in today's prices).

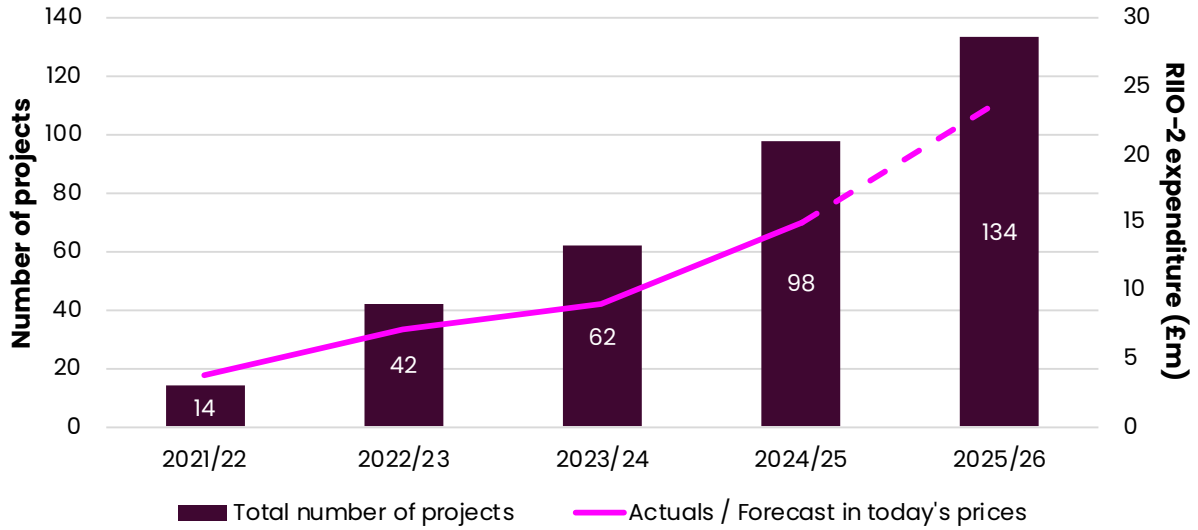


Figure 1: **RIIO-2 NIA Spend and Number of Projects**

In the past two years, our NIA portfolio has started to embrace our new NESO responsibilities including taking on Strategic Energy Planning and Connections Reform projects: 23% of the RIIO-2 portfolio is committed to innovation activities in these areas, incurring approximately £2.5 million of expenditure due to our new responsibilities.

During RIIO-2, NESO's innovation portfolio has implemented multiple highly impactful programmes, that continue to benefit the whole energy sector, including:

- **REVEAL** which was initially introduced in RIIO-2 BP1 to address the evolving energy market's demand for a smarter and more flexible energy system with increasingly complex solutions. To achieve this, NESO requires the capability to freely and securely validate new concepts and services outside of its core operational systems. After a successful proof of concept funded by NIA, NESO is now undertaking a 36-week design and build work package, funded through BP3 Future Innovation Productionisation. This will facilitate simultaneous communication with multiple market participants through various channels like those used in real-time operations.
- **Virtual Energy System** The Data Sharing Infrastructure (DSI) Pilot has demonstrated the transformative potential of scalable and secure data sharing in revolutionising the energy system. This initiative promises substantial benefits, such as enhanced operability and resilience, reduced greenhouse gas emissions, and lower consumer bills. In April 2025, NESO was appointed by Ofgem as the **Interim DSI Coordinator**. As part of this pivotal role, NESO will collaborate with Ofgem, industry stakeholders, and government bodies to design and implement a secure and interoperable framework for energy system data sharing, following Ofgem's public consultation on the future governance of data sharing infrastructure in the energy sector. This initiative strengthens our leadership in energy system digitalisation. Ultimately, the data sharing infrastructure will underpin the development of the Virtual Energy System, an ambitious programme to create interconnected digital twins of the entire Great Britain (GB) energy system.

  With the pilot now complete, we have begun preparing and mobilising for the Minimum Viable Product (MVP). The delivery is expected to begin in Autumn 2025 and finish by Spring 2027. This includes a period of testing and trialling with MVP users which will be focussed on regulated networks and Elexon. At the end of the MVP, we will have a functioning DSI with live initial use cases and defined Service Level Agreement.

- **Solar PV Nowcasting** launched in 2021, set out to improve short term solar forecasting by using machine learning techniques to give the Control Room more accurate short-term solar forecasts as well as longer range probabilistic forecasts. In partnership with Open Climate Fix,

we developed a tool that uses weather data, real PV outputs, satellite images, and custom algorithms to accurately predict solar generation patterns.

The project delivered a 20% reduction in mean absolute error, a significant improvement in renewable forecasting. By adopting these outputs in system operations, NESO expect to reduce forecast error by about 50MW. With a wholesale price of £80/MWh, this could save £35 million in one year and £175 million over five years.

NESO Innovation Ambition

2025/26 Whole Systems Innovation Strategy

Since becoming NESO in October 2024, we have an even greater responsibility in helping GB meet its net zero targets. In December 2024, the government published the Clean Power 2030 (CP30) Action Plan. This set a clear course for the next five years, outlining the path to a stable, affordable and green electricity system. This guiding ambition is the foundation for our 2025/26 Whole System Innovation Strategy, which focuses on the next five years to align with CP30. To achieve the pace and scale of change required, NESO and industry need to act now. However, it is just one milestone on the journey to net zero. NESO is strengthening collaboration with the energy sector, Ofgem and government to create a unified view on where innovation is required across the energy system beyond 2030, ensuring we are equipped for the challenges that lie beyond. The six innovation priority areas that we have identified are:

1. **Optimise network capacity:** By 2030, GB must double its transmission infrastructure to support new renewable generation. Innovation can help us optimise existing network assets and boost capacity on the current network, lessening reliance on new investment while speeding up the transition.
2. **Leverage digitalisation and AI:** Managing a clean power system demands smart operations that blend human expertise with artificial intelligence (AI) and digital tools. Innovation is key to scaling and embedding these technologies across the energy network.
3. **Unlock demand-side flexibility:** As intermittent renewable energy grows, greater grid flexibility is crucial for continued stability. This requires trusted, customer-driven solutions that drive greater market participation. It also requires innovative digital tools that improve forecasting and planning.
4. **Enable customer energy efficiency and decarbonisation:** Meeting renewable energy demand while electrifying key sectors requires improving energy efficiency and expanding renewable generation. Innovation in markets, business models and technology are vital to support this transition and manage the impacts of rapid electrification.
5. **Drive whole systems integration:** To achieve our clean energy goals, we must transition to a whole systems approach to energy planning. Innovation is needed to design an intelligent system – one that integrates solutions across electricity, gas, heat, carbon and transport networks, in a way that works efficiently for everyone.
6. **Safeguard system security and resilience:** As our energy system becomes more interconnected, innovation in computing, cybersecurity and forecasting is crucial to managing new risks, such as cyber threats and climate-driven extreme weather.

Focusing efforts on these innovation priorities will enable us to reach our shared goals as cost-effectively and efficiently as possible. Prioritising value for money in innovation helps ensure that investments are impactful, sustainable, and aligned with broader economic and environmental

objectives. This includes supporting NESO's strategic objective of delivering consumer value, particularly through the optimisation of balancing costs, which are a growing part of system costs. Innovation in our first three priority areas will be central to supporting the reduction of balancing costs:

- **Optimising network capacity** will reduce the need for costly redispatch and curtailment by improving utilisation of existing assets and accelerating capacity upgrades. This helps minimise constraint costs and improves system efficiency.
- **Leveraging digitalisation and AI** will enhance forecasting, situational awareness and operational decision-making. Smarter, faster system control reduces reliance on expensive balancing actions and improves the accuracy of market signals.
- **Unlocking demand-side flexibility** will enable more responsive and distributed participation in balancing markets. By shifting demand to match supply, particularly during periods of high renewable output, we can reduce the need for more costly reserve and supply-side flexibility services.

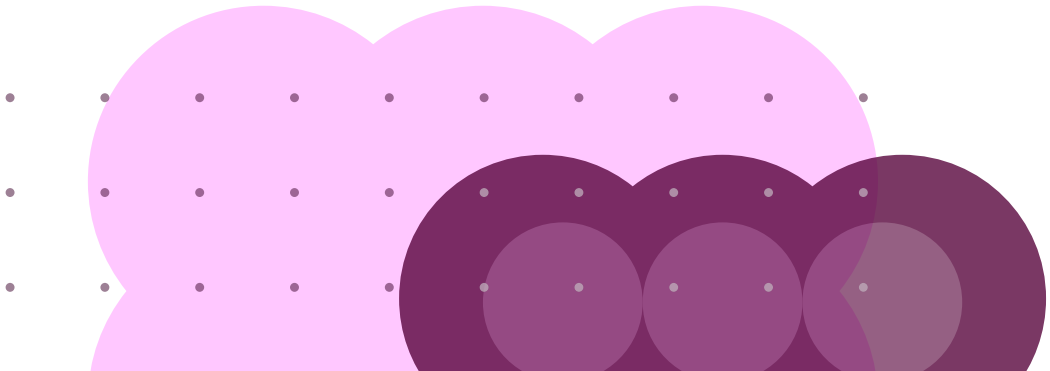
Our six innovation priorities were developed collaboratively, using primary and secondary research to identify opportunities for where innovation is needed to meet our collective goals. Critically, the ever-changing nature of innovation will result in these priority areas adapting over the next five years and beyond. These changes will be influenced by external factors, including changes in technology, economy, society and wider environment. Recognising this and building flexibility in our portfolio approach is vital, to ensure innovation supports the most pressing challenges at any given time.

Transformative ambition

Innovation taking place at NESO spans from continuous improvement within BaU activity through to systematic innovation projects and programmes, funded primarily through the Strategic Innovation Fund (SIF) and NIA. These ideas test novel and higher-risk ways of achieving NESO's goals and solving challenges of the GB energy system. This is achieved through trialling new technologies, tools or processes with the potential to achieve more impactful outcomes. These NIA and SIF-funded projects can be categorised into core, adjacent and transformational innovation:

- **Continuous improvement:** Support day-to-day enhancements through BaU activity (e.g. refining tools, updating guidance and embedding feedback into delivery). Continuous improvements fall outside of scope of NESO Innovation Departments processes, governance and funding mechanisms.
- **Core innovation:** Incremental improvements to maximise efficiency and effectiveness of systems, approaches or tools. These innovations are distinct from continuous improvement, as they are still deemed too risky to be implemented straight into BaU.
- **Adjacent innovation:** Projects that sustain or improve outcomes at NESO by replacing existing processes or technologies with novel solutions to achieve our goals.
- **Transformational innovation:** Projects that are exploratory and ambitious in scope and scale. They focus on creating entirely new capabilities and challenge existing paradigms across the whole energy system. Innovation on this scale is high-risk and high reward, often involving unproven technologies, novel processes or disruptive models.

The role of impactful innovation is increasingly critical as we face some of the greatest challenges in the history of the energy sector. The ambition of our strategic innovation priorities is to help



co-ordinate the whole sector and prepare for a rapidly changing energy system. This is widely reflected across the energy system including The Department of Energy Security and Net Zero's (DESNZ) Clean Power 2030 Action Plan[1], Energy System Catapult's resilience report[2], and DESNZ, Ofgem and NESO's Clean Flexibility Roadmap[3].

In the last two years of the RIIO-2 period, the maturity of NESO's innovation portfolio has continued to grow with programmes that bring whole sector benefits. Some examples of NESO-led transformational initiatives that will continue to drive impact during RIIO-3 include:

- **The Volta Programme** seeks to improve how the GB Control Room operates by enhancing systems for generation, transmission, distribution, and interconnections. These will be combined into advanced, adaptable systems using the latest technology. This transformation will introduce advanced capabilities for scenario development and a suite of powerful optimisation tools designed to manage uncertainty and enhance operational security, all while keeping customer costs as low as possible. A key benefit for our stakeholders will be the integration of AI capabilities, which will enable full transparency and explainability of our decisions and actions, fostering greater trust and accountability across the system.

  In the final year of RIIO-2, we have invested £5 million into Volta to support 5 projects, and the programme is anticipated to develop a further 10 projects in the next 5 years, some of which will be eligible to draw down on NIA funding.

- **NESO AI ambition**. More broadly, we are harnessing AI to transform the planning and operation of GBs' entire energy system. Our cutting-edge **AI Operations Navigator** will proactively manage network balance, using AI to predict imbalances and optimise for cost, carbon reduction, and resilience. This innovation will turn grid balancing from a challenge into a strategic advantage, offering rapid, predictive, and decentralised control across all energy sectors. The system is designed to be intelligent, transparent, and guided by human insights, ensuring it supports resilience, affordability, and the transition to net zero emissions.

  Additionally, our **AI Energy Planning Navigator** will provide a continuous and comprehensive energy demand and supply plan for future scenarios. By simulating and recommending policies, it will address vulnerabilities and supply risks, creating a balanced and secure network that adapts to real-time market changes through AI interactions.

  Finally, to further advance the industry, we are establishing a **NESO AI Community and Marketplace**. This platform will foster collaboration among NESO, start-ups, corporations, and academic institutions, accelerating the adoption of AI across the energy sector. Members will collaborate on energy challenges, share open AI models, and drive the growth of AI start-ups and academic research in GB, while supporting AI policy and framework development.

Funding Innovation

To develop our NIA request to Ofgem aligned to the RIIO-3 funding timescales, three options have been considered. We have set evaluation criteria to assess each option against and provide a recommendation for our funding request. The following evaluation criteria will help to ensure that the innovation funding:

- **Supports a higher proportion of Development and Demonstration projects during RIIO-3** as we anticipate an increased focus on Development and Demonstration projects over the next five years, which have a higher average cost per project than Research projects.
- **Enables NESO to deliver impact in the next 5 years** by concentrating efforts on innovation and implementation activities which are most aligned with our strategic goals and anticipated funding split.

1 Clean Power 2030 Action Plan: A new era of clean electricity – main report - GOV.UK
2 Resilience in our Net Zero Energy System - Energy Systems Catapult
3 Clean Flexibility Roadmap

- **Provides certainty of budget over the RIIO-3 period**, so that NESO can remain agile and provide timely support for innovation as needs arise.

This section provides an overview of the recommended option and methodology used to calculate the funding request and the alternative options considered are presented at the end of the section.

Option 1: Increase the NIA allocation for RIIO-3 to £95 million in today's prices (£72 million in 2018/19 prices) (recommended)

Using historical project cost data from RIIO-2, we have modelled the volume of projects required at the Research, Development, and Demonstration stages to deliver meaningful impact for the priorities outlined in our Innovation Strategy. We are requesting £95 million in NIA funding (in today's prices) to support the innovation portfolio during RIIO-3, with a focus on increasing project maturity rather than the number of projects. We have identified near-term and long-term priorities and planned the necessary scale of Research, Development, and Demonstration to ensure that each pound of NIA funding invested by NESO contributes to delivering our Innovation Strategy and achieving CP30.

This option is recommended because our proposed allocation of £95 million is crucial for NESO to successfully execute the Whole Systems Innovation Strategy, offering a dynamic and adaptable funding source that is essential for fostering innovation and derisking implementation to achieve CP30. Notably, this is the only option that satisfies all evaluation criteria (as shown in Figure 6), meaning that choosing any other option would prevent us from delivering the necessary level of impact.

To support our recommendation, we have detailed our methodology and assumptions made below.

RIIO-3 Network Innovation Allowance (NIA) budget

Our NIA funding request is underpinned by a robust methodology, combining:

- Analysis of our RIIO-2 portfolio and expenditure,
- Projections of innovation activity over the next five years,
- Alignment with our strategic innovation priorities, and
- Our ambition for the composition of the innovation portfolio, aligned to the RIIO-3 funding period.

We conducted a gap analysis comparing our 2025/26 strategic innovation priorities with our existing portfolio, retrospectively aligning this with our future ambitions. Across the six strategic priorities identified for 2025/26, we have outlined both near-term and longer-term focus areas, requiring a balanced and adaptive innovation approach throughout the RIIO-3 period. For each priority, we have also clarified NESO's role—whether as a core lead or in a supporting capacity[4]—which directly informs the expected allocation of funding across the innovation portfolio.

Where NESO has a core role, we will take a more proactive stance in driving and delivering innovation projects. In contrast, for areas where NESO plays a supporting role, our involvement will be more limited, and this is reflected in the anticipated funding distribution shown below.

For near-term priorities, our focus will be on the later stages of innovation (Development and Demonstration), aiming to deploy solutions through NESO or partners across the sector as quickly as possible. These priorities are designed to accelerate progress toward the CP30 goal.

In contrast, our longer-term priorities ensure continued investment in innovation beyond 2030. During the early RIIO-3 period, we will concentrate on early-stage innovation (Research and

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Development), with a transition to later stages (Development and Demonstration) from FY 2028/29 onwards.

Table 1: Funding Split by NESO Innovation priority

NESO Innovation priority	Type	RIIO-2 Funding split (%)	RIIO-3 Anticipated Funding split (%)
Leverage digitalisation and AI	Near-term	44%	30%
Safeguard system security and resilience	Longer-term	18%	20%
Unlock demand-side flexibility	Near-term	11%	20%
Enable customer energy efficiency & decarbonisation	Longer-term	10%	7.5%
Drive whole systems integration	Longer-term	9%	15%
Optimise network capacity	Near-term	8%	7.5%

Especially in the last two years of the RIIO-2 period, our portfolio has seen a significant increase in innovation projects under the Digitalisation and AI strategic priority area as shown in the percentages in Table 1, with kicking off initiatives and programmes such as Volta and Data Sharing Infrastructure (DSI) Pilot. As we transition these towards Business as Usual (BAU) and deployment, where possible, we have incorporated the initiatives into the relevant investment lines within the business plan, including a new investment line for AI Strategy. We now aim to achieve a more balanced portfolio of innovation projects in RIIO-3 as shown above.

The matrix below provides an indicative split across our innovation strategy themes in RIIO-3 (based on number of projects[5]):

Table 2: Overview of Innovation Strategy Priorities and Scale of Projects

Priority Type	Project Type	2026/27	2027/28	2028/29	2029/30	2030/31
Near-term	Research	Low	Low	Low	Low	Low
	Development	High	High	High	High	High
	Demonstration	Medium	Medium	Medium	Medium	Medium

5 Using historical data from RIIO-2, we have developed a scale from low to high as follows: Research (Low=8, Medium=11, High=17), Development (Low=5, Medium=10, High=12), Demonstration (Low=5, Medium=7, High=10).

Priority Type	Project Type	2026/27	2027/28	2028/29	2029/30	2030/31
Longer-term	Research	High	High	Medium	Medium	Medium
	Development	Medium	Medium	High	High	High
	Demonstration	Low	Low	Medium	Medium	Medium

We are not expecting growth in number of projects but rather in the scale of the portfolio for Development and Demonstration projects, focusing on accelerating deployment. Our methodology therefore assumes the number of projects within our portfolio to remain consistent at 130 projects over the five-year period. The rationale for assuming that NESO's portfolio growth will be similar RIIO-2 (Figure 1) is for two reasons: the portfolio will likely begin with 10 new projects at the start of RIIO-3 and is likely to evolve at a similar pace and average growth rate of 30 new projects per year.

Aligning our RIIO-3 strategic ambition to the scale of projects required in Figure 3, we have modelled the number of projects required at the Research, Development and Demonstration stages across all strategy themes over the next five years.

Using average project costs for Research, Development and Demonstration based on RIIO-2 data, we have estimated the split of NIA spend during RIIO-3 by innovation strategy priority (Figure 2) and project type (Figure 3) as follows:

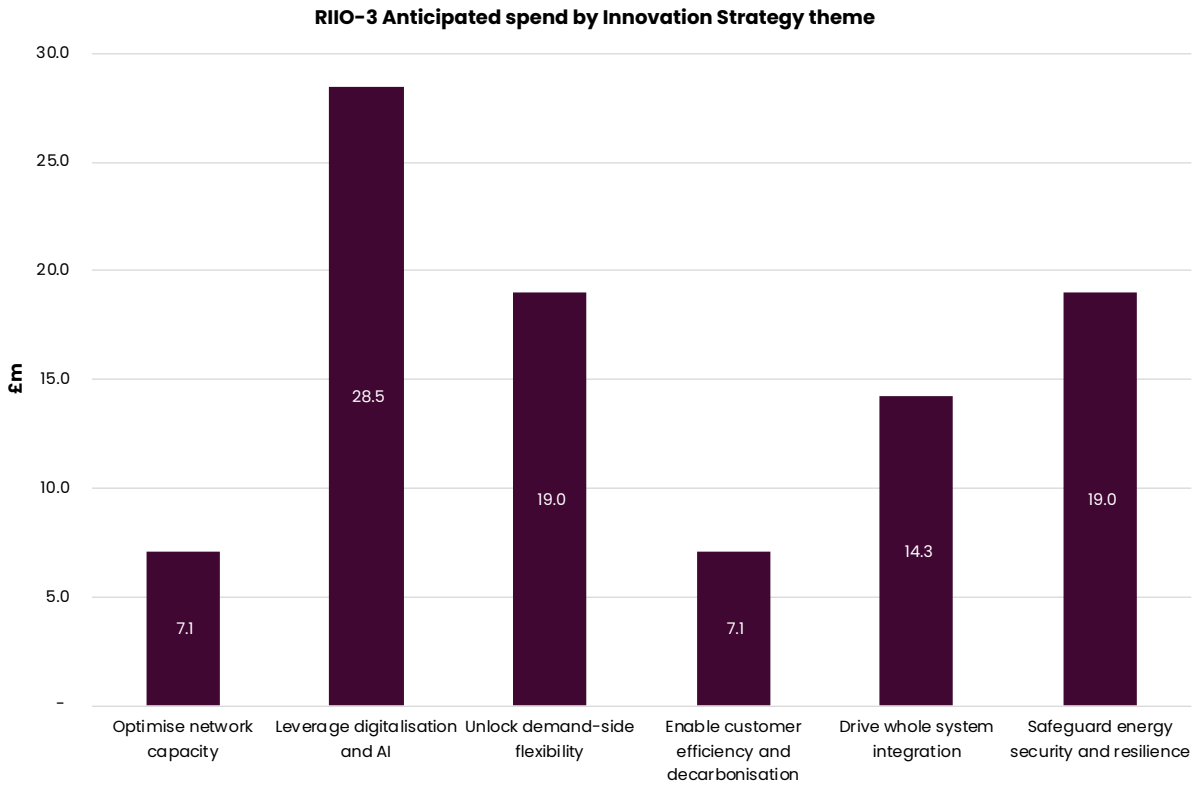

Figure 2: Estimated NIA Spend during the RIIO-3 period by Innovation Strategy Priority in today's prices

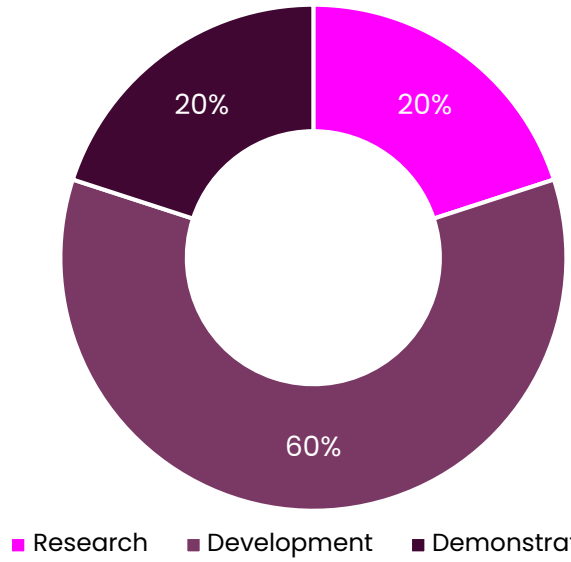

Figure 3: **Estimated NIA Funding Split by Project Type during the RIIO-3 funding period**

Analysis of RIIO-2 shows that the monthly costs for a Development project cost 2.8 times as much in 2025/26, when compared to 2021/22. We understand that costs will continue to rise, however as the exact rate at which remains unknown, we have also assumed a flat rate of inflation at 3.2% (in line with 2025/26) per year. Our request for NIA funding during the RIIO-3 period is £95 million in today's prices, which equates to approximately £72 million in 2018/19 prices.

Due to NESO's expanded remit, we have noted an increase in partnered projects over RIIO-2 which we expect to continue as NESO's role is further embedded within the whole system. Consequently, we require flexibility for the ability to respond at pace as vectors such as hydrogen planning and Carbon Capture, Utilisation, and Storage (CCUS) planning may come online.

Our forecasted NIA spend of £95 million during the RIIO-3 period aligns with the scale of the opportunities ahead, our current capacity to effectively address them and the ambition of NESO Innovation. With 60% of our 5-year budget provisionally allocated to Development projects, we believe this to be in line with, and reflective of the growing maturity of our portfolio and higher ending Technology Readiness Levels (TRLs).

NESO ensures value for money through investment in innovation projects with the potential of delivering significant benefits to the energy sector. This not only cuts costs by streamlining operations and enhancing decision-making but also develops solutions that provide lasting economic and environmental benefits. By working with a wide range of partners and networks, NESO ensures that the benefits of innovation are widely shared and impactful through knowledge sharing and collaboration. This approach supports the move towards a cleaner energy system, delivering lasting value to consumers, industry, and wider stakeholders.

It's important to emphasise that innovation often takes time to generate tangible benefits, and there is typically a delay, meaning the full impact of innovation activities may not be realised within a given regulatory period.

In addition to the direct value realised through NESO's operational roles, innovation serves as a multiplier, funding high-risk initiatives which give rise to benefits such as enhanced operational efficiency, improved strategic insights, accelerated adoption of advanced technologies, improved modelling and forecasting and the facilitation of whole-system integration. The cumulative effect of these innovation-driven enhancements can be quantified and, for the proposed innovation portfolio, is estimated to deliver an additional impact (estimated around £120m- £250m) beyond

the benefits achieved through NESO's core functions[6]. This demonstrates the critical role of innovation in amplifying value across the energy sector and underscores NESO's commitment to maximising the return on investment for consumers, industry, and society.

As NESO is a not-for-profit public corporation, we expect that our NIA expenditure during RIIO-3 will be fully recoverable, in the same way as our RIIO-2 NIA expenditure is.

Other Options Considered

Option 2: Increase the allocation for NIA to £110 million in today's prices (£83 million in 2018/19 prices)

With several innovation projects progressing at pace to the Development and Demonstration stages, the NIA allocation should be increased to £110 million to deliver impact against 25/26 Innovation Strategy. The methodology used to calculate this amount has been developed as part of the justification for the recommended option, plus a 15% contingency to enable NESO to continue supporting highly transformational innovation programmes such as Volta, without impacting access to NIA funding for core and adjacent innovation projects which are just as crucial on the path to CP30.

NESO innovation resourcing has increased in line with the level of activity over the RIIO-2 period and we believe that we are currently in a steady state. With a dedicated and experienced team in place, NESO Innovation is well-positioned to focus on the growing maturity of projects and progress projects towards implementation and BaU.

In requesting £110 million of NIA funding, NESO would need to grow the functionality of innovation further, which would not be an effective use of funding, nor would this significantly impact NESO's ability to deliver on our strategic goals. Due to this, this option is not recommended.

Option 3: Retain the same allocation - £60 million today's prices (£46.86 million in 2018/19 prices)

In RIIO-2, NESO received £46.86 million of NIA. Adjusted for today's prices, this is £60 million for the duration of RIIO-3 to support innovation and implementation activities.

Whilst this option accounts for inflation, comparison between 2021/22 and 2025/26 shows that the average cost of an innovation project has doubled, with average project costs for Development and Demonstration projects having increased by 2.8 times and 2.2 times respectively.

Assuming that the average cost for Development and Demonstration projects will continue to increase over the upcoming price control period, and a higher proportion of Development and Demonstration projects will be undertaken during RIIO-3 to support our Innovation Strategy and CP30 objectives. This option would result in a reduced volume of innovation projects at the Development and Demonstration stages being undertaken to fit within the constraints of the budget. Consequently, this could limit NESO's ability to deliver innovation through NIA at the scale necessary and deliver transformational programmes with real-world impact such as REVEAL and Volta, therefore this option is not recommended.

6 This assessment remains conservative due to inherent limitations in comparing a two-year business plan against a five-year budget proposal. Notably, broader impacts such as innovation spillovers and knowledge generation have not been fully encompassed within the current scope. While attribution of impacts has been informed by expert judgement, further validation will be required through detailed performance management of individual projects to ensure robustness and accuracy. The value presented is applicable for the 5-year funding period given the lag that exists between innovation and benefits realisation.

Below is an overview of the options and how they were evaluated against the evaluation criteria:

Table 3: **Assessment of Funding Options against Evaluation Criteria**

Evaluation criteria	Option 1 (recommended)	Option 2	Option 3
Supports a higher proportion of Development and Demonstration projects during RIIO-3	Sufficient NIA funding to support growing portfolio maturity	Sufficient NIA funding available funding supports growing portfolio maturity	Insufficient NIA funding to support growing portfolio maturity
Enables NESO to deliver impact in the next 5 years	Sufficient NIA funding to deliver impact	Sufficient NIA funding	Insufficient NIA funding to deliver impact
Provides certainty of budget over the RIIO-3 period	Sufficient NIA funding provides flexibility or certainty of budget	Sufficient NIA funding however, increased resourcing requirements do not make this a feasible option	Insufficient NIA funding- does not provide flexibility or certainty of budget

How Activities Will Be Delivered

Driving whole energy system change demands governance that supports speed, failure and iteration, and a strategy that is transparent, collaborative and aligned with whole system goals. Our refreshed Innovation Strategy and processes reflect this. Embedding ambition and impact measurement whilst engaging widely to co-develop and disseminate solutions.

The management of innovation ensures that the right innovation projects are mobilised at the right time to maximise their benefit to NESO and the energy system. It also ensures the best allocation of resources to manage the process. NESO innovation processes and governance have been continually strengthened to ensure this. Recent updates to our governance include enhanced transparency measures and streamlined approval processes to support agile delivery. Operational excellence will remain a core focus, ensuring consistency and quality throughout.

Our innovation activity stages ensure that promising solutions or learnings will be identified, developed, and translated into delivery and knowledge dissemination across the sector.

- **Horizon Scanning and Insights:** We will monitor emerging technologies to assess their potential impact, risks, and opportunities. Insights will be shared internally to guide challenge identification and project selection. We utilise tools and platforms that identify emerging trends, inform strategy, and avoid duplication to support this activity. This includes AI-powered software, technology deep dives, and external data sources.
- **Challenge Identification:** Strategic challenges will be defined utilising our Innovation Strategy, through extensive research and stakeholder engagement. These challenges will shape the direction of the innovation portfolio and ensure alignment with NESO and industry goals.
- **Idea Sourcing:** Open innovation calls are used to attract a diverse range of ideas. All NESO NIA projects involve collaboration with third parties, which may include start-ups, academic institutions, small-to-medium enterprises, and major technology companies with niche expertise. This approach supports a vibrant and inclusive innovation ecosystem.

- **Idea Maturation:** Ideas will be gathered from internal and external sources—workshops, brainstorming, and digital platforms. NESO will support the maturation of ideas through supporting co-creation with third parties. This includes supporting the establishment of test beds, sandboxes and accelerators that can support more innovation activity.
- **Energy Network Collaboration:** NESO fulfils a critical role in the energy sector through our close collaboration with a wide variety of partners[7] and stakeholders. Innovation projects and activities generate insight, learnings and knowledge that we share across different actors, facilitating further innovation. NESO will collaborate closely with trade and consumer bodies to support the identification and delivery of innovation activities. These partnerships help align efforts across networks, avoid duplications of previous innovation funded work or of work being concurrently delivered by other networks, and maximise sector-wide impact.
- **Project Selection and Approval:** Shortlisted ideas will undergo an initial review to assess feasibility, benefits, and risks. Then, viable projects will be presented to decision-makers. Selection is based on strategic fit, resource availability, and expected outcomes. When the project scope has been further defined and if approved, the funding is then allocated.
- **Project Delivery:** Approved projects will be tracked through regular reviews and adjustments will be made as needed. NESO will establish strategic partnerships with technical expert organisations on an enduring basis, to support project delivery in addition to external partners, and to supplement internal resources when needed.
- **Impact and Value Tracking:** Tools and frameworks will be used to measure innovation outcomes from ideation through to deployment, ensuring accountability. A comprehensive benefits framework will be established to measure the impact across our innovation portfolio. Each project will undergo a robust Impact Assessment at the ideation stage to assess the strategic fit in line with the priority areas outlined in the 25/26 Whole System Innovation Strategy and if successful, will be evaluated against metrics appropriate for its maturity (i.e. Research, Development and Demonstration). For example, NESO may evaluate the maturity of technologies developed through innovation projects or capture the number of research publications produced. We will track the performance of anticipated against actual benefits for each project, and capture any further benefits realised post-project completion as part of our regulatory reporting.
- **Implementation:** Proven innovations will be embedded into Bau. This includes planning for deployment, communicating changes, and monitoring adoption.
- **Dissemination:** NESO will present NIA project one-pagers at Energy Networks Association (ENA) Project Notification meetings and the Institute of Gas Engineers and Managers (IGEM) Future Energy Networks - Project meetings to check for duplication, receive challenge and scrutiny from across networks. In addition, major innovation concepts will be shared with our Selection Board to ensure strategic alignment and visibility.
- **Innovation Culture and Training:** NESO will provide training, resources, and opportunities for colleagues to build innovation capability and engage with the wider innovation ecosystem.

Measuring Innovation

NESO Innovation continually evaluates the effectiveness of our innovation projects, driving tangible benefits and meaningful impact for the organisation, consumers, and the broader energy sector. We have captured some examples of actual or expected benefits across the portfolio to demonstrate the impact we have delivered over the course of RIIO-2:

- Following the completion of the **Stability Market Design** Innovation project in 2023, we launched our first enduring stability market to procure inertia from existing assets. Since then, we have successfully awarded five contracts for inertia provision covering the period from October 2025 to September 2026. The contracts are expected to yield consumer savings of £47.3 million and provide inertia with zero carbon intensity.

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- During the initial trial of the **Dynamic Reserve Setting** innovation in the Control Room, this saved NESO from buying an additional 1GW of unnecessary reserve within just 2 hours. The project has been recently sanctioned to draw down on BP3 450 Future Innovation Productionisation funding to support its full implementation into control room operations. Additionally, we are exploring the development of a regionalised reserve model to further reduce waste and lower overall reserve requirements by offsetting reserves in neighbouring regions.
- The **Demand Flexibility Service Evaluation** is one of the largest non-commercial evaluations of demand flexibility using real consumption data. The findings will enable NESO, Distribution System Operators (DSOs) and importantly, energy retailers and flexibility service providers to improve their commercial offers. This work has enhanced the development of flexibility services within NESO, and Centre for Sustainable Energy have also incorporated the learnings into the Smart & Fair work programme that looks across the energy market (NESO, DNOs, retail) to ensure that energy consumers are enabled to participate in flexibility services with a fair outcome.

  The potential revenue streams of domestic flexibility through existing energy markets and flexibility services are as follows:

  - Redispatch avoidance - £105/kW per year (Element Energy analysis based on FES 2021)
  - Wholesale arbitrage - £85/kW per year (daily 4h price spread based on 2021 data)
  - DNO network reinforcement - £64/kW per year (Element Energy analysis)
  - Balancing mechanism - £47/kW per year (Element Energy analysis)
  - TSO reinforcement avoidance - £37/kW per year (Element Energy analysis based on FES 2020/21)
  - Capacity market - £12/kW per year (2021 T-4 clearing price; a conservative value lower than cost of new entrant)
  - Operating reserve - £1.40/kW per year (Element Energy analysis)

As a demonstration of our commitment to deploying successful innovation, NESO also launched the Innovation Incubator team in March 2024 to accelerate the deployment of completed innovation projects, provide guidance through the process towards implementation, and support the realisation of benefits faster.

To date, NESO has utilised £4.26 million of Future Innovation Productionisation funding to support 6 projects, including the development of Minimum Viable Products for the **Virtual Energy System** and **REVEAL**, and implementation support for **Dynamic Reserve Setting** and **Automated Identification of Sub-Synchronous Oscillation Events**. We have also funded the implementation of **Battery Storage Modelling for Enhanced Connection Assessments** and **Construction Planning Assumptions** to aid in Connections Reform.

These efforts have facilitated significant industry change, including the integration of new technologies, the use of statistical scenario modelling, and the application of automation to improve the efficiency of system connections. In the upcoming five-year period, we will continue to facilitate the transition of successful innovation into BaU, and our request and justification for additional Future Innovation Productionisation funding for NESO 1 is included in this business plan.

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