GB Gas Networks Annual Innovation Summary

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Report Highlights

Innovation remains at the heart of the GB Gas Networks' strategy to enable a secure, resilient and equitable energy transition. The 2024/25 Annual Innovation Summary Report captures the collective progress of the four Gas Distribution Networks – Cadent, Northern Gas Networks, SGN, and Wales & West Utilities – alongside the transmission network operator, National Gas. Since August 2024, the GB Gas Networks have been members of Future Energy Networks (FEN), who coordinated the production of this report.

Supported by the Network Innovation Allowance (NIA) and Strategic Innovation Fund (SIF), the networks continue to invest in projects that accelerate decarbonisation, enhance system performance, and deliver benefits for customers and the wider energy system.

High-level Timeline

Over 2024/25, significant progress has been made through projects delivered via network innovation funding. While there are many notable milestones, this high-level timeline highlights a selected set of pivotal events which were key in either shaping the progress made or are exemplary cases of innovation and collaboration.

- Innovation Zero
  April 2024
- Utility Week Live
  May 2024
- All-energy exhibition and conference
  May 2024
- Future of Utilities Summit
  June 2024
- International pipeline conference
  September 2024
- No-Dig Live
  October 2024
- Energy innovation summit
  October 2024
- Completion of Hydrogen Heat Programme
  Dec 2024
- Opening of H100 Fife demo homes
  Feb 2025
- Energy innovation basecamp
  February 2025
- SIF community forum
  March 2025
- Biomethane connect Europe
  March 2025
- Launch of Green Gas Taskforce
  April 2025

2024/25 Year in Review

In November 2023, the five GB gas network companies, comprising the Gas Distribution Networks (GDNs) and National Gas Transmission, announced their intention to resign their membership of the Energy Networks Association (ENA), effective from the end of 2024. On 1 August 2024, these networks formally joined a new membership organisation, Future Energy Networks (FEN). As a result, this report focuses exclusively on the innovation activity undertaken by the gas networks, reflecting the sector's distinct technical, regulatory, and decarbonisation pathways. As such, the statistics in this report should not be compared directly to those in prior, joint gas and electricity reports.

Guided by the six shared innovation themes, the gas networks have committed millions of pounds to innovation projects that will deliver real benefits to consumers across Britain. In 2024/25[1], 48 projects were registered with a total committed spend of nearly £13m. They have also attended and organised over 60 in-person and online knowledge sharing events, fostering engagement with new partners and industry stakeholders.

Balanced Scorecard

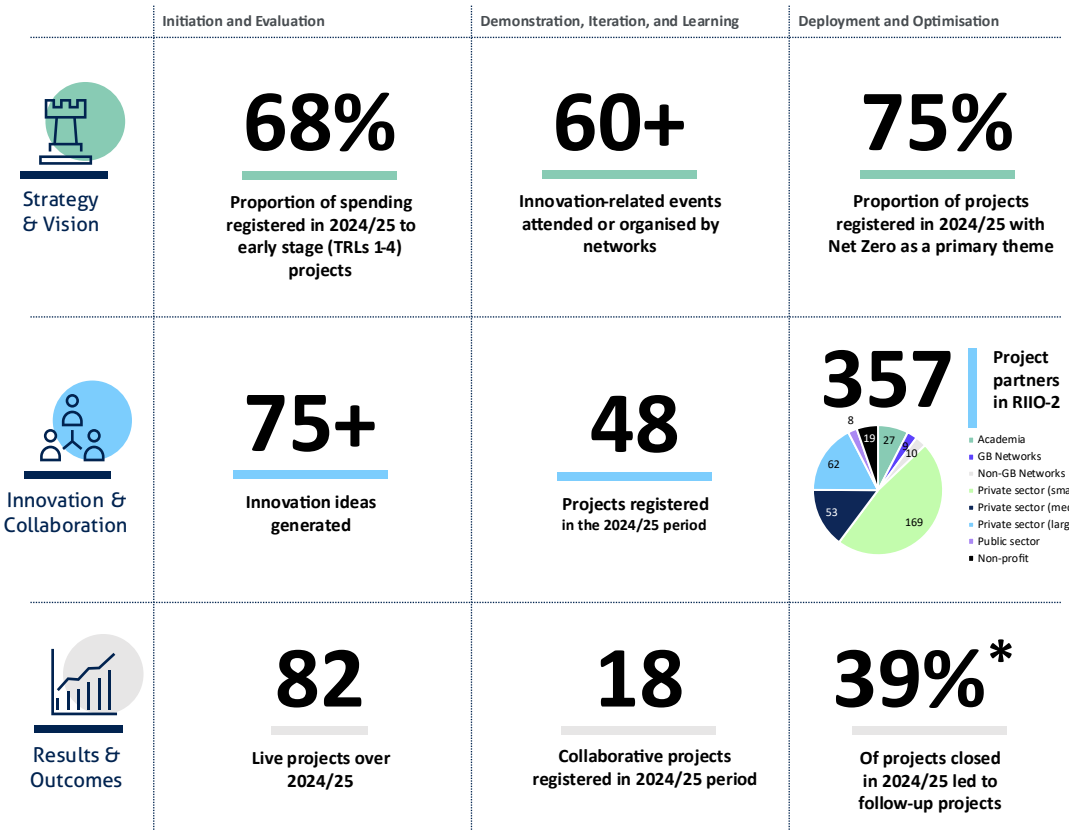


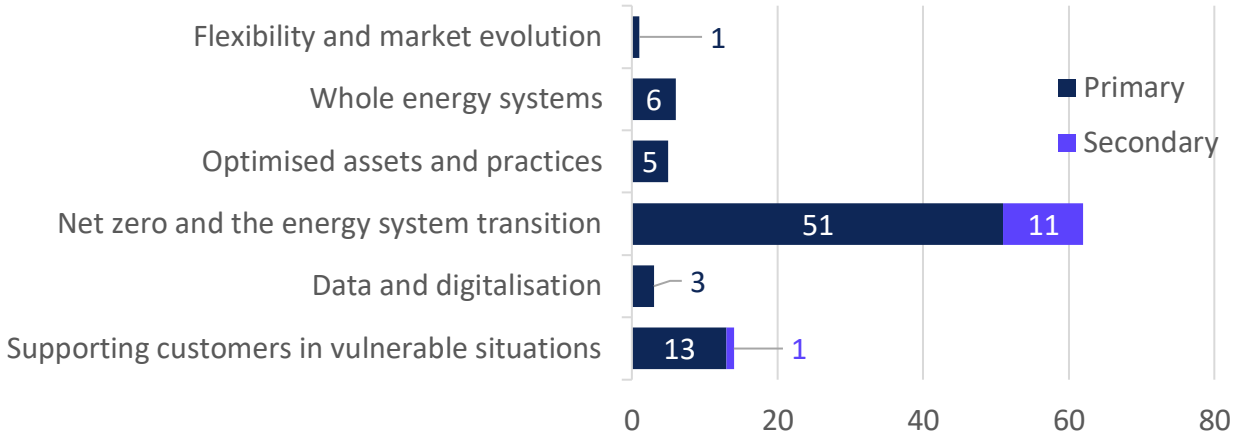
Figure 1. 2024/25 Balanced Scorecard

* This figure is calculated using the projects listed in the IMF submissions as directly leading into a follow-up project, as a proportion of projects which have "next steps" listed. It is likely to be an underestimate, as other projects' findings may still be used as a smaller part of future projects, or directly in future projects which have yet to be formally registered.

[1] This report concerns the 2024/25 regulatory year, running from April 2024 to March 2025.

Project Themes

Innovation projects are classified by their primary and secondary themes – a breakdown is given below.



75% of the innovation projects registered over 2024/25 were listed with "Net Zero and the energy system transition" as the primary innovation theme, reflecting the priority placed on ensuring that gas networks adapt to the UK's energy transition. This includes several areas and technologies; several projects have focused on building the evidence case for how gas networks can be repurposed to carry hydrogen in an energy system of the future, while others have focused on the integration of biomethane into the gas grid.

The second most populated innovation theme is "supporting consumers in vulnerable situations", with 13% of projects registered in 2024/25 listing this as their primary innovation theme - this highlights the continued importance of the gas network in maintaining a secure and affordable energy supply for those most at risk, and in ensuring that the energy transition is fair and equitable.

How Benefits are Delivered

A significant proportion of gas networks' innovation over 2024/25 (and more broadly during RIIO-2) has focused on building the evidence base on how their infrastructure can be repurposed for use in a Net Zero energy system. These projects necessarily begin at the early TRL levels – corresponding to Research and Development (R&D) projects. A breakdown of the TRLs of the of projects registered in 2024/25 is shown in the table below. In that year, TRL 1-4 (i.e. early-stage) projects account for 69% of the work, and 68% of spending. The early-stage nature of this work makes it difficult to quantify the financial value of these projects using simple heuristics or accounting rules; this is compounded by the fact that the projects deliver learnings that will inform future policy decisions, so it will feature more in some future energy system development scenarios than others.

TRL Map	% Projects	% Spend
TRL 1	4%	3%
TRL 2	33%	21%
TRL 3	17%	18%
TRL 4	15%	26%
TRL 5	15%	15%
TRL 6	6%	11%
TRL 7	6%	3%
TRL 8	2%	2%
TRL 9	2%	1%

However, the R&D carried out under these projects builds the evidence-based foundation for further development across the energy system; the insights gained over their duration lead directly to subsequent projects – based on available IMF data, over 40% of the projects which closed in 2024/25 led to new projects, building on the previous findings. These early-stage projects increase TRLs and mitigate the deployment risks associated with innovative technologies. For example, WWU's Smart Pressure Control roll-out project builds on the RIIO-1 Optinet project, outlined further in the report, which deploys the innovation findings from the earlier project into network operation. Similarly, the HyLine project continues to build on learnings from earlier project phases back to 2021, all enabled by innovation funding.

This work is beginning to deliver real world impacts; SGN's pioneering project at H100 Fife is moving into the operational phase, demonstrating the production, storage, and distribution of 100% green hydrogen directly to domestic residences, allowing customers to see how hydrogen is used in the home, and gas engineers to work with hydrogen boilers and cookers in an operational setting. Similarly, Cadent's Project Helix has taken a wearable CO alarm from the drawing board through the prototype stage to field trials, and aims to release a product to market in the next 12 months.

Low-TRL technologies crucial to the net zero transition can also be incubated and brought to market using innovation funding through dedicated trial environments, such as NG's FutureGrid – a high-pressure test facility at DNV Spadeadam, a purpose-built using recently decommissioned NTS assets – where a wide range of tests of hydrogen blending can be carried out in a secure offline environment, replicating every part of the gas transmission system.

The Innovation Process - Objectives

Innovation project goals centre on a set of linked Objectives, Principles and Themes developed in 2024 by the gas and electricity networks in the Energy Networks Innovation Strategy. The adoption of this strategy, outlined in Figure 2, across the energy system ensures that innovation works towards developing a safe, resilient and low-carbon energy system that fulfils its users' needs. Innovation projects will address at least one of these objectives to ensure that efforts are targeted at the most significant challenges networks face.

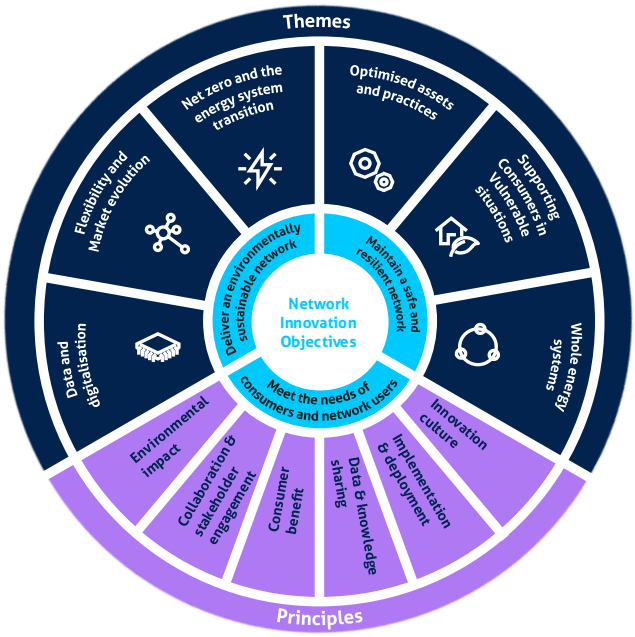
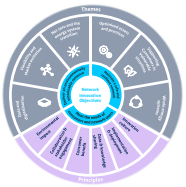


Figure 2. Network Innovation Strategy

What do the projects achieve?



The focus of these **objectives** is to meet the needs of consumers (including those in vulnerable situations) in a safe and environmentally responsible way while maintaining a resilient network.

How do networks approach innovation?

The six **principles** target the way that networks approach innovation, rather than the content or subject of a particular innovation project.

What themes do projects focus on?

The six **themes** are the priority innovation areas developed collaboratively by the networks. Each theme is associated with a set of focus areas which indicate the networks' priorities in that area. These themes and focus areas help direct innovation so that it targets the biggest challenges for the future energy system.

Network progress against objectives

2024/25 innovation projects have made progress against each of these objectives – selected examples and high-level metrics are given below.

Innovation Objective 1: Meet the needs of consumers and network users

Networks have made significant progress against meeting customer needs through innovative projects, such as NGN's Futures Close Heat Programme and Cadent's Finding the Hidden Vulnerable, which have delivered emissions reductions, customer support and financial savings. Both projects have made use of valuable NIA funding support to improve customer experience across the network, especially for at risk and vulnerable households, which would otherwise have been adversely affected. In general, projects benefit consumers monetarily through financial savings, or non-monetarily, such as by improving network resilience or ensuring a secure supply of gas to consumers. Although the latter type of benefits is harder to quantify, it is an important part of the overall value to consumers.

In some cases, the benefits to the consumers are realised following years of consistent work to translate an idea to a BAU rollout. This year, although 69% of registered projects started at TRL 1-4, 58% of active projects will bring their solutions to a TRL of at least 5 at the time of their completion. The evidence gathered by the early TRL projects will enable gas networks bring forward solutions to meet network users' long term and future needs.

Other projects have made use of prior learnings to bring innovative technologies closer to BAU rollout. Cadent's Low Power Hot Water Phase II is an example of a consumer-oriented project which has built on evidence gathered previously – in this phase, prototypes of graphene ink-based heaters manufactured by Haydale, a key project partner and nanomaterials pioneer, are developed and optimised based on the findings of Phase I.

Examples of non-monetary consumer benefits

58%

Of 2024/25 active projects will end at TRLs 5-9

Innovation Objective 2: Deliver an environmentally sustainable network

Numerous projects over 2024/25 have aimed to make gas networks more environmentally sustainable – and significant work has investigated and stimulated the adoption of 'green' gases, including hydrogen and biomethane.

A broad portfolio of work has looked at developing a hydrogen-capable network, connecting future hydrogen production to use sites, with several flagship projects supporting hydrogen integration. These include:

- Project Union from National Gas, in which existing transmission network will be repurposed to create the spine of national hydrogen network, ensuring a continual supply of natural gas while avoiding the cost associated with decommissioning.
- SGN's H100 Fife and LTS Futures projects; the former will develop an end-to-end 100% hydrogen network, connecting generation (through electrolysis) to dedicated distribution network supplying homes in Buckhaven and Denbeath with green hydrogen for heating and cooking, while the latter repurposes 30km of gas distribution network for hydrogen use, demonstrating a world-first connection of two new connections though live welding, and 'hot tapping' of the operating pipeline.
- WWU's HyLine Cymru, in which a new 130km hydrogen pipeline running from Pembroke to Port Talbot will be built, supplying hard-to-decarbonise industrial customers with low-carbon hydrogen.

- East Coast Hydrogen in which National Gas, NGN and Cadent, look to connect the hydrogen production in Teesside and the Humber, salt cavern storage and industrial off-takers in north east England through new and existing transmission and distribution infrastructure.

The work carried out in these projects is jointly developing the knowledge base needed to understand the task of repurposing the gas grid, or parts thereof, for blended or pure hydrogen as a low-carbon energy - the associated technologies are currently in their early stages, as this work continues and develops these technologies toward maturity, later stage projects will investigate the potential role of hydrogen in the gas at greater scale. As detailed below, learnings from these projects will define the networks' contribution to the Hydrogen Heating Programme, which will support the government's decision on hydrogen's use in heating.

Completing the Hydrogen Heating Programme

The Hydrogen Heating Programme (HHP), led by the Department for Energy Security and Net Zero (DESNZ), has been a landmark initiative aimed at understanding whether hydrogen could safely and practically play a role in heating homes and businesses as the UK moves toward Net Zero. From the start, the programme was designed with a clear purpose: to generate the evidence that the Health and Safety Executive (HSE) would need to make an independent judgment on the safety of hydrogen heating.

To guide the work, HSE set out more than 130 specific pieces of evidence required, covering every aspect from technical network adaptations and appliance conversions to consumer behaviour and operational safety. HHP's trials and demonstrations were carefully designed to address each of these requirements, producing a rich and detailed evidence set that would give HSE the insight it needed to assess whether hydrogen could be safely used at scale.

By winter 2024, the programme had delivered the full evidence package. HSE is now reviewing this information through its structured Evidence Review Groups, supported by panels of experts, applying the legal safety test of reducing risk "as low as reasonably practicable" (ALARP). Their conclusions will be reported to DESNZ, Ofgem, and industry, and will directly influence decisions on whether and how hydrogen heating could be rolled out across the country.

While the value of this evidence cannot yet be quantified financially, it represents a uniquely important body of knowledge. It provides government, regulators, and networks with the insight, confidence, and clarity to make informed decisions. From the outset, generating this evidence has been the programme's key objective, and it now stands as a foundational resource for shaping the future of hydrogen in the UK's energy system.

Other work this year has focused on use of biomethane; WWU's Smart Pressure Control project investigates how to manage demand fluctuations to increase networks' capacity for biomethane, while all networks will explore biomethane's use as part of work done by the Green Gas Taskforce, discussed later in the report.

While the incorporation of low carbon gases into the network is a key innovation focus in sustainability, networks are also working to reduce the emissions associated with network operation - through projects such as Reducing Gas Emissions during Pipeline Commissioning.

Taking a wider view, environmental sustainability of the gas grid has also been advanced by projects such as SGN's Carbon Networks, which explored how the network can support the growing Carbon Capture, Utilisation and Storage industry. Powering Wales Renewably, a SIF Beta phase project from the National

Energy System Operator (NESO), addresses environmental sustainability from a system perspective; a holistic view of system environmental impact is crucial as networks look to meet deadlines set out in the Clean Power 2030 Action Plan.

Also supporting these goals, WWU's Accelerating Progress project has developed our understanding of the realistic, achievable and cost-effective options available to gas distribution networks to contribute to the reduction of emissions, and identified cost-effective, feasible decarbonisation measures that could tackle 23% of the gap to meeting carbon budget six emissions targets. This includes continuing progress in reducing methane emissions and increasing the volume of biomethane in the GB gas system. Outputs from the project have been published by FEN and shared with a wide range of stakeholders.

Supporting Clean Power 2030

As RIIO-2 progresses and preparations for RIIO-3 begin, gas networks are investigating paths to meeting government deadlines for decarbonisation. The first of these is Clean Power 2030, which looks to reduce electricity production reliance on fossil fuels and focuses on renewables. To meet this target, a gas power system will still be required, but its use will be limited to times when renewable sources are unavailable. This changes the usage scenario for gas networks and could require winter level gas flows to be supported in the middle of summer.

Gas networks are currently assessing the impact of these changes on the natural gas network and are considering innovative solutions to support these ambitions. For example, National Gas Transmission are adopting a "three-molecule approach", encompassing the continuation of natural gas delivery, while reducing the carbon content through biomethane and hydrogen blending with the use of Carbon Capture, Utilisation and Storage (CCUS) to capture emissions (requiring transport of CO_2), as well as the rollout of 100% hydrogen pipelines.

Projects such as Wales and West Utilities' Accelerating Progress project is identifying new ways for gas distribution networks to cut their emissions and boost their contribution to decarbonisation.

Innovation Objective 3: Maintain a safe and resilient network

Safety of consumers and infrastructure operators is at the heart of all network operations, and many of this year's gas network projects have included a particular focus on the topic, for example SGN's Predictive Safety Interventions aims to reduce injuries and fatalities of workers in utilities- in the Alpha phase, this SIF project deployed a proof-of-concept machine-learning model, which accurately quantifies risk scores in real time, and prompt a preventative or mitigating actions, this model will be iteratively improved and extended in the Beta phase, into which it has now moved. Improving the safety of infrastructure operators will reduce operational costs for the networks and the physical and psychological impact these injuries may have on the workers.

Meanwhile, the Accessible CO Alarm project focuses on consumer safety – developing a prototype of an accessible CO alarm with integrated IoT features, tailored to the needs of vulnerable and disabled individuals.

These projects illustrate the ongoing work focussing on safety across all stages of the gas value chain, from mitigating the risks involved for those working with the physical network to ensuring consumers can use gas safely within their homes.

Networks are also innovating to improve resilience, minimising the chance of outages – NGT's B-Linepack+ project explored the feasibility of intermediate scale gas storage sites to supplement linepack capacity, providing system resilience and flexibility. This programme has received vital SIF funding and has since moved into Alpha phase, and closer to BAU integration.

1-2 tonnes

Estimated storage capacity of B-Linepack+ demonstrator at 30-80m depth

Stakeholder Engagement Driving Innovation

Networks strive to generate additional value via engagement and collaboration with energy system stakeholders and other interested parties, to support the development of novel initiatives and ideas. Key planks of this effort are knowledge dissemination and sharing events, holding webinars, and continuously engaging with existing and new partners. All gas networks also attended the Energy Innovation Summit in October 2024 – their flagship energy network knowledge dissemination event.

Energy Innovation Summit

In 2024/25 the gas networks continued to play an active role in the ENA Energy Innovation Summit.

Networks collaborated on a single platform where delegates could access the major learnings from all NIA and SIF projects. Networks collaborated on a single platform where delegates could access the major learnings from all NIA and SIF projects. The event brings together industry leaders, innovators, policymakers and stakeholders to demonstrate how innovation is delivering on the government's energy strategy.

This year, the Summit was focused on the topic of *Accelerating innovation to deliver Net Zero*, and the agenda prioritised three themes:

- Accelerating system capacity to enable mass integration of low-carbon technologies
- Understanding the challenges of operating in Net Zero and enabling an inclusive transition for all
- Ensuring reliability and resilience of an increasingly critical energy system

Over 2024/25, in addition to the Basecamp, gas networks have deliberately broadened their reach by actively participating in leading industry gatherings such as Innovation Zero, Utility Week Live and All-Energy in Glasgow. They engaged directly with innovators, academics, policy makers and industry players to ensure that insights from the gas sector were shared in diverse settings. This more outward-facing approach is helping to foster collaboration and ensure gas network innovation is integrated into the wider energy transition conversation. By reaching beyond traditional channels, the networks created new opportunities for collaboration, raised the visibility of gas network innovation, and ensured that learning and knowledge exchange extended well beyond Basecamp into the wider energy and innovation ecosystem.

Next Steps

In the coming months, gas networks will continue to build on the projects developed and learnings gained over 2024/25 as they prepare for the upcoming RIIO-3 price control period. Future projects will aim to use these learnings to move up the TRL scale and closer to business-as-usual implementation. Projects already planned in the pipeline that will build on this year's work, include the second phase of WWU's Hydrogen Storage Feasibility Study, which will be NIA funded, and the Alpha phase of NGT's SIF-funded Future Operability of Gas for System Integration project, which will be in its Alpha phase of development.

Networks will continue to work closely together to support the innovation process and are working to strengthen communication and planning throughout project lifecycles, articulating benefits clearly to drive internal buy-in, and advocating for additional funding and regulatory support to enable smoother integration of innovative solutions into everyday operations.

Innovation Context

2025 marks a turning point in how gas network innovation is managed, reported, and mobilised – this year, gas and electricity networks are publishing their *Annual Innovation Summary* reports separately. By focusing on the innovation work of the gas networks, this report provides a clearer picture of the projects, progress and learnings that relate directly to the future of the gas networks, and how it will interface with the wider energy system. The challenges and opportunities gas networks face include building the evidence base for the use of hydrogen, scaling up biomethane, green gases, developing hybrid heating solutions, and ensuring the continued safety and resilience of our existing infrastructure as the transition unfolds. Publishing a standalone report allows us to explore these areas in greater depth, while continuing to collaborate with our electricity colleagues where our work overlaps. Taken together, the gas and electricity reports provide a full view of network innovation across Great Britain; individually, they provide sharper insight into the contributions of each sector.

Value of network funding

Innovation projects deliver value for consumers, the wider energy industry, and networks while supporting the progress towards government policies and targets. Broadly, the outputs of innovation improve network security, resilience, and provide the data and insights the network operators need to make better decisions about how to operate and invest in their networks as the energy system decarbonises. These innovations contribute to the broader transformation of networks to support the Net Zero transition, providing holistic solutions rather than point-to-point fixes. The benefits of innovation can then be passed to network users, for example, in the form of new or improved services, or reduced bills.

How the RIIO structure unlocks innovation and ensures value for money

The RIIO model encourages innovation across the gas sector, resulting in concrete social, financial or environmental benefits, but also less-quantifiable improvements in decarbonising the network or improving consumer vulnerability. Through the Strategic Innovation Fund (SIF) and the Network Innovation Allowance (NIA) funding mechanisms, the RIIO-2 framework guides innovation in the gas sector to ensure that all projects meet Ofgem's eligibility criteria of:

- Facilitating energy system transition and/or benefiting consumers in vulnerable situations,
- Delivering net benefits to consumers,
- Being novel, involving research, development or demonstration, and
- Avoiding duplication

Several foundational capabilities have been developed through innovation work over the course of the RIIO-1 and RIIO-2 price control periods, by leveraging network funding to deliver progress in the innovation space. The RIIO model has enabled iterative improvements and collaborative knowledge-sharing across the GB energy system, underpinned by performance-based incentives. These processes ensure that innovation is original in its approach and complementary to existing work, thereby maximising efficiency and avoiding repetition. Crucially, the RIIO framework provides a pathway for scaling successful demonstrations into business-as-usual, ensuring that technologies and practices deliver measurable consumer value and play a meaningful role in the transition to Net Zero.

As GB moves towards Net Zero targets, natural gas continues to be a critical fuel, and the RIIO structure is driving innovation and progress in the GB gas sector's energy transition. As such, a key innovation area has been the decarbonisation of the gas grid. Recent government strategic policy decisions have indicated support for blending up to 20% hydrogen (by volume) into the GB gas distribution network, and development of hydrogen safety and technical cases is fundamental to supporting the future integration of hydrogen into the gas transmission and distribution networks. Innovation projects, enabled by RIIO, have

supported the development of detailed feasibility and design studies and development of the safety case and physical testing of hydrogen in the gas network through demonstration projects to create the evidence base for policy and future decision making, in both transmission and distribution networks. The work, including Blending Infrastructure for the NTS, Hydrogen Blending in LPG Feasibility Study, Hydrogen Blending: National Safety Evidence Review, HyNTS FutureGrid Deblending and HyDeploy – is essential for improving public understanding and gaining trust in the use of hydrogen as a critical future energy source, especially in hard-to-electrify parts of the GB energy system.

Funding Schemes

This report focuses on two of the largest innovation funding sources, the Strategic Innovation Fund (SIF) and the Network Innovation Allowance (NIA), which deliver significant value to networks and customers through the innovation cycle. Led by Ofgem and Innovate UK, SIF provides significant capital funding to progress innovative ideas into real-world trials of new technologies. As the networks' core innovation funding mechanism, NIA funding is administered directly by the networks to progress all aspects of innovation.

The SIF programme was launched at the start of RIIO-2 as a competitive funding pool focused on areas of strategic importance to the energy system. Funding for these projects is organised into distinct rounds which focus on developing solutions from the idea stage into large-scale demonstrations. This funding stream reduces the risks associated with first-of-a-kind projects for networks and consumers. Recently, the SIF programme renewed its annual application structure to a cycle-based framework, so that funding for potential Discovery, Alpha and Beta projects can be applied for at three points during the year (from 2025 onwards), and projects can apply directly to the Alpha and Beta phases without having necessarily having to pass through the preliminary stages; in 2024/25, gas networks had 5 active Discovery phase projects, 2 in Alpha and 4 in Beta.

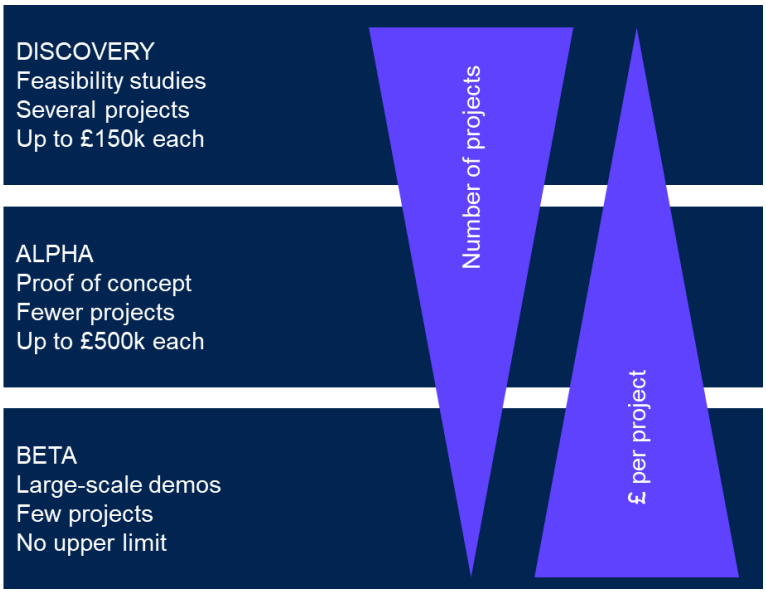


Figure 3: SIF Project Phases

The SIF aims to accelerate the pace of innovation in the energy sector, with a particular emphasis on demonstrating and scaling up new technologies and approaches. SIF promotes collaborative projects that bring together diverse stakeholders to tackle large-scale network challenges, helping build partnerships that can help address complex issues across the energy system. Increasingly, SIF-funded projects are entering into the Beta phase, and these form a significant proportion of the project portfolio spend. Overall, the SIF accounts for 13% of projects and 52% of the funding of gas network innovation projects active in 2024/25, indicating its increasing prominence as an innovation funding source. More information on the progress made across SIF projects are in the SIF Annual Report published by Ofgem and Innovate UK.

For gas innovation projects launched in 2024/25, the NIA represents 92% of the projects and 92% of the funding registered in the IMF[2] in this period. NIA funding is network-led and encourages collaboration between networks, de-risks low Technology Readiness Level (TRL) innovation work, allows for iterative learning, and permits innovation progress across a wide range of issues, enables innovation development up to demonstration level, whilst also complementing other project funding types. The programme requirements are summarised below.

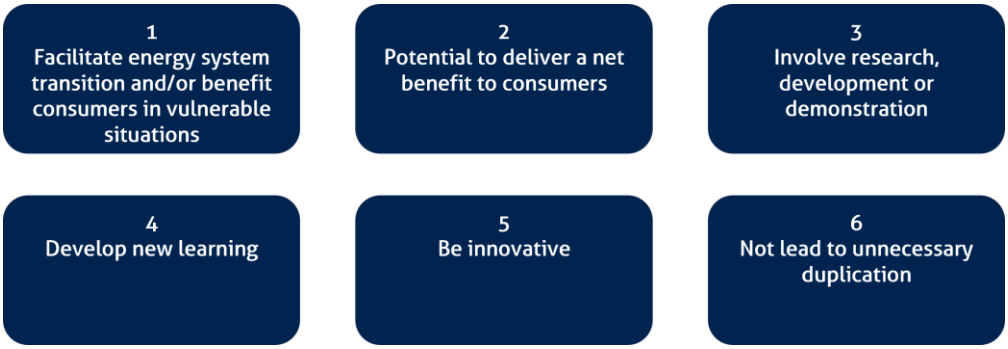


Figure 4: NIA Eligibility and Process Requirements

The table below shows a high-level breakdown of innovation funding in the gas networks space, and accounts for all projects active over 2024/25 (note that as this represents all active projects rather than just projects launched, the numbers presented here are different to those quoted above).

	NIA	SIF
Proportion of projects	87%	13%
Proportion of funding	48%	52%
Key Benefits	• The **agile**, **robust**, and **flexible** self-governance process of the NIA allows networks to quickly address innovation challenges as they emerge and change in a rapidly evolving landscape. • Allows for quick responses to emerging challenges.	• Projects progress based on demonstrated results in previous phases, lowering funding risk.
	• **Collaboration:** Supports sharing knowledge and working together to make the most of expertise and perspectives across a diverse range of stakeholders, including networks, stakeholders, and third-party innovators. • **Non-competitive nature:** Networks can work together effectively on shared challenges and objectives. • **Trial and error:** Projects with uncertain outcomes (i.e. higher risk, higher reward ideas) can progress with lower risk, particularly those developing/progressing low-TRL solutions. • **Breadth of approach:** Projects encompass a diverse array of sectors and challenges, fostering comprehensive technological advancements that address industry-wide issues from multiple perspectives. • **Working at pace:** The structured yet flexible approach to funding supports timely progress in innovation, enabling networks to meet fast-evolving challenges and decarbonisation targets. • **Iterative improvements:** Projects can be continuously refined over long periods, and successful demonstrations can then be integrated into BAU operations. • **Customer focus:** Both mechanisms require that projects deliver customer outcomes, such as enhanced service reliability, supporting vulnerable customers, and providing cost savings.	

[2] In addition to projects funded via the SIF and the NIA, innovation projects can also be funded via BAU; in 2024/25, no BAU funded projects run by gas networks were reported through the IMF.

Innovation Cycle

All network innovation projects follow a structured three-stage process from idea generation through to benefits realisation, regardless of theme or subject matter network (see figure 5 below). Of course, innovation is an iterative process, and not all innovations lead directly to BAU rollout – some projects instead create foundational evidence or test future feasibility. More information about the innovation process and how to get involved is provided in the Future Energy Networks Innovation Process (FENIP).

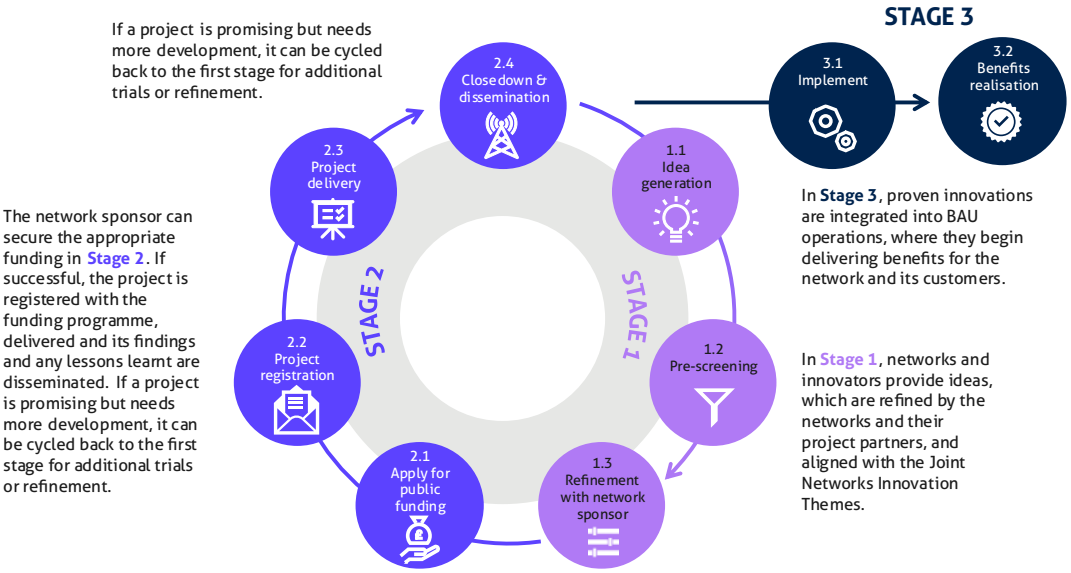


Figure 5. The innovation process

Ideas are funnelled through the innovation process from ideas generated, to projects developed, and finally integration into BAU. This year, data from the IMF[3] show networks reviewed over 75 ideas with 35% of those ideas coming from external partners – the progress of those ideas is shown in the figure below.

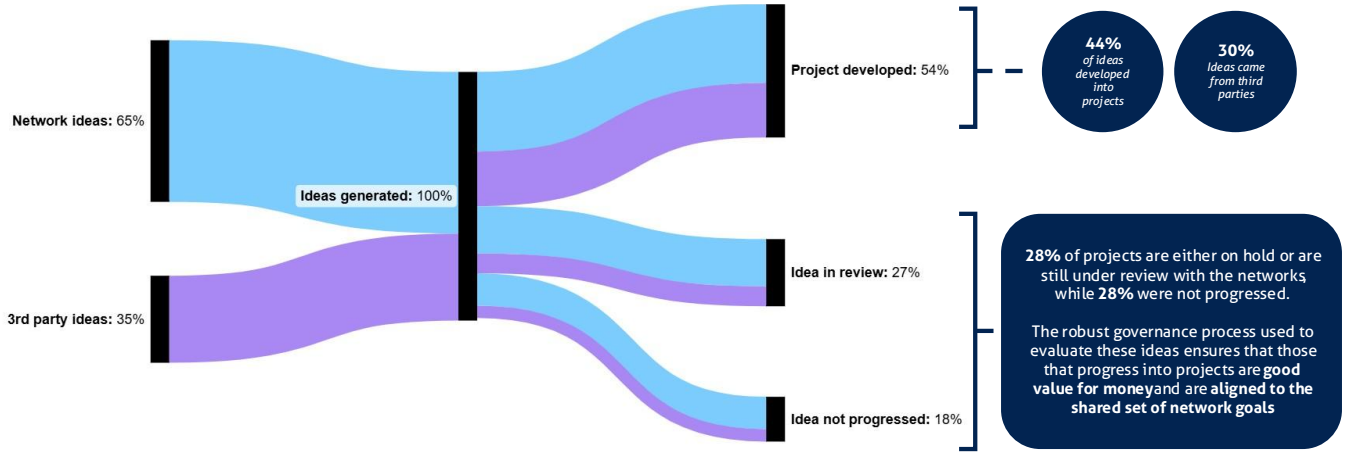


Figure 6. The innovation funnel for ideas received in 2024/25

[3] Data behind Figure 6 and Figure 11 later in the report are taken from the Idea Log in the 2024/25 combined IMF entries from the networks; not all projects are captured in the IMF, so this will not give a complete picture of the development of innovation project ideas in 2024/25, but does give a sense of the flow of ideas.

Innovation as a tool for achieving policy objectives

The UK is transitioning to a Net Zero energy system, with the Clean Power 2030 Action Plan seeing the government commit to 95% of power being produced by clean sources by 2030. This evolution of the energy system policy landscape also includes the UK Government's strategy for driving the adoption of low-carbon gases, including hydrogen, and biomethane. Gas networks will continue to play a role in the evolving energy system and, as shown in the table below, the innovation projects are an important tool for accelerating progress in achieving the UK's policy objectives.

Policy	Overview	Relevance to gas networks
Clean Power 2030 Action Plan	UK government committing to at least 95% of Britain's power being produced by clean sources by 2030.	• Sets out the UK government's strategic vision for the transition to a low-carbon, resilient and digitally enabled energy system. • Unabated gas is likely to shift to a reserve role, with an increased role for potentially carbon-neutral gases like hydrogen and biomethane. Implications for gas network innovation likely to include increased focus on projects around blending hydrogen and biogases and operating the network safely at falling throughput.
Hydrogen Update to the Market 2025	UK government re-commits to hydrogen as a cornerstone of the energy transition and emphasises its role in achieving Net Zero and energy security.	• Provides policy support and facilitates trials for blending of hydrogen into existing gas networks. • Sets out funding mechanisms for hydrogen production schemes with which gas networks may collaborate. • This update identifies sectors in which hydrogen may be a cost-effective solution, for example industrial processes and off-road machinery. Gas networks' innovation may look to serve or adapt to these end uses. There could be a renewed focus on blending and/or repurposing gas networks to carry hydrogen.
Green Gas Support Scheme	The Green Gas Support Scheme (GGSS) provides tariff support for biomethane produced via anaerobic digestion which is injected into the gas grid.	• Incentivises biomethane production by providing tariff support for anaerobic digestion plants that inject to the grid. Projects that innovate in enabling a higher biomethane blend in the gas network are relevant to this policy.
National Policy Statements for energy (EN-1, EN-2, EN-4)	Framework for approving nationally significant infrastructure projects.	• Prioritises infrastructure that aligns with strategic priorities. • Reduces uncertainty for developers and investors, allowing faster deployment of innovative solutions. • "Nationally significant" criteria means that this is likely particularly relevant to transmission networks Projects that develop the evidence base for additional policy statements related to hydrogen or CO_2 pipelines and storage are relevant to this policy.
Future Homes and Buildings Standard	A set of regulations pertaining to new and existing domestic and non-domestic buildings, introduced in 2023.	• Effectively rules out gas boilers, including hybrid and hydrogen-ready boilers, in new homes from 2025. Likely to have implications for the number of connections to the gas network and create innovation demands around a decreasing gas network customer base and throughput.

In June 2025, DESNZ published a policy paper titled "Midstream gas system: update to the Market". It identified three transitional challenges which networks will need to overcome through innovation:

1. Ensuring resilience of gas supply and infrastructure as UK Continental Shelf (UKCS) production declines and reliance on other forms of supply increases.
2. Balancing infrastructure investment and affordability to maintain a safe and reliable network while protecting consumers from spikes in bills.
3. Managing a planned and orderly operational transition as parts of the gas network are repurposed or decommissioned over the longer term

The framework is to be supplemented by a series of consultations and calls for evidence between autumn 2025 and 2026; it will work in conjunction with existing network regulation and funding allocation and will be overseen by Ofgem. The current price control period (RIIO-2) runs until March 2026, and the next round (RIIO-3) will cover the period from 2026 to 2031, during which funding and innovation plans are likely to increasingly reflect these challenges, against a broader background of a declining role of natural gas and the increased role for carbon-neutral gases.

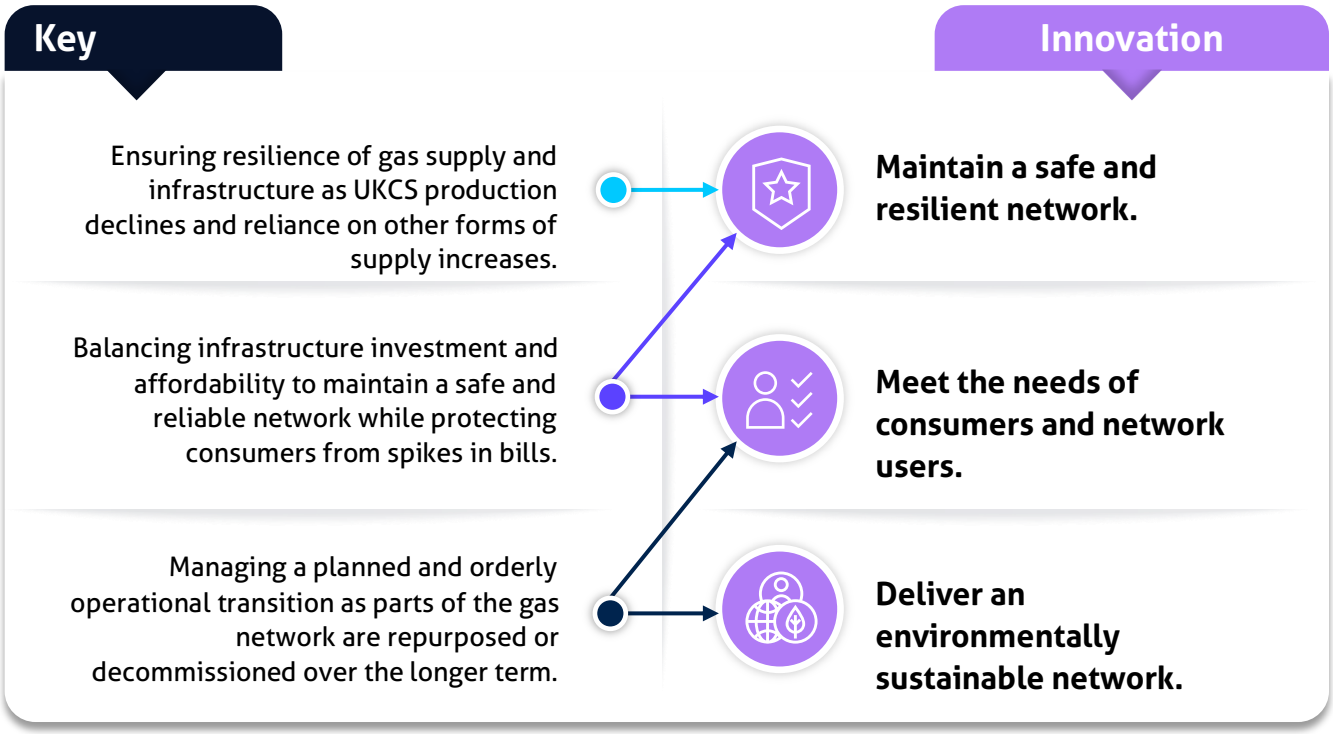
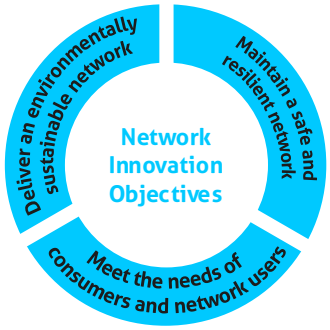


Figure 7: Mapping of key challenges to innovation objectives

Progress against Objectives

2024's Energy Networks Innovation Strategy sets out the three objectives of network innovation funding, based on the policy goals above, and a set of related themes and principles. Innovation projects in 2024/25 have maintained this focus and have driven progress towards the energy network-wide objectives.



Some examples of 2024/25 gas network innovation projects that have made important progress against each of these, and how the objectives and themes have shaped project outcomes, is outlined below.

Objective 1: Meeting the needs of consumers and network users

Delivering benefits to both networks and consumers is core to innovation; where possible, projects aim to quantify benefits which are then collated and reported in the IMF. Each project also uploads an assessment of its expected quantitative and qualitative benefits to the Smarter Networks Portal (for projects commencing before January 1, 2025) and FEN Innovation Portal (for projects commencing from January 1, 2025). The qualitative and non-financial benefits are by their nature more difficult to capture but are essential to innovation progress.

Financial benefits

Innovation can deliver financial benefits for consumers through several routes – research from projects such as Futures Close Heat Programme is exploring how various heating decarbonisation options will be installed and perform across UK housing stock. This project, led by NGN with collaboration from Cadent and WWU, will ensure that future domestic decarbonisation strategies maintain the required heating in homes while minimising the environmental impact.

> "The Digital Platform for Leakage Analytics has been a 4-year project from ideation through to SIF-beta project – and product – delivery. The partnership team has brought together a combination of modelling and sensorisation technologies to step-change the accuracy & transparency of emissions reporting from gas networks. We're pleased to have a clear and funded route through which Cadent & UK gas networks can scale up, apply and deliver benefits following on from the project."
>
> Chis Rison, Head of Smart Networks, Cadent

Financial benefits of 2024/25 projects, although often hard to quantify given the early-stage nature of many projects, range from the low £100,000s to over £1 billion in net financial benefits by 2050, demonstrating the significant potential impact of innovation initiatives – with SIF Beta projects showing particularly promising financial forecasts. An example is the SIF Beta Digital Platform for Leakage Analytics project, which aims to transform gas leakage detection across GB's gas distribution networks through advanced data-driven modelling and testing of gas sensor technologies. The project, led by Cadent, is expected to deliver net cumulative discounted financial benefits across the UK ranging between £0.8 billion to £3.2 billion by 2050 (depending on adoption rates

and technology mixes used), and could facilitate up to 35% reduction in methane emissions from pipes and Above Ground Installations (AGIs) in the 10 years following deployment.

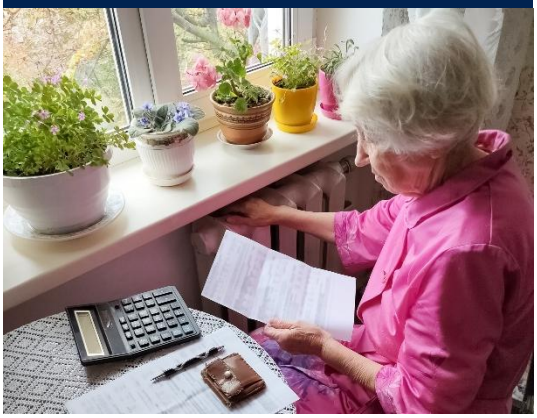
Customer experience and safety

Customers' experience of the of the gas networks also hinges on non-monetary factors such as the network's safety and security of connection, particularly in more remote areas of the country; the Finding the Hidden Vulnerable project aims to ensure that customers on the Priority Service Register receive the support they need in the event of any gas supply interruptions, as detailed below.

Through the project Rethinking Communication for Digital Exclusion, Cadent and several electricity networks are tackling digital exclusion of individuals across the UK from accessing critical information and services. The communication strategies developed through this project will make sure that all consumers, regardless of digital access, receive the information they need on time.

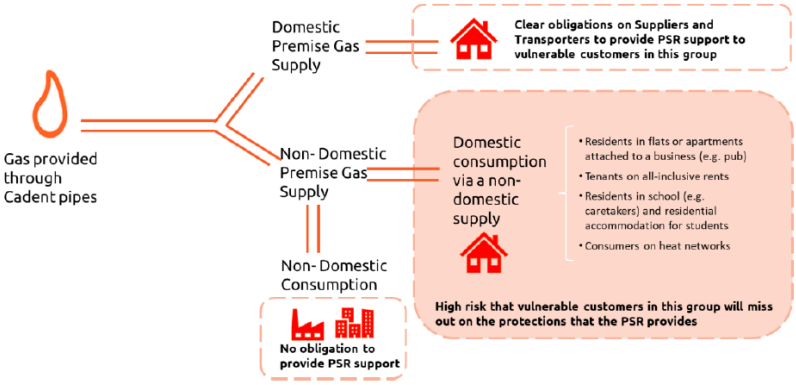
Finding the Hidden Vulnerable

Project ID:	NIA_CAD0115
Budget:	£120,000
Networks:	Cadent
Duration:	Dec 2024 – Feb 2025
Status:	Complete
Funding:	NIA



Overview:

In some situations, customers in vulnerable situations could be missing out on the protection offered under the Priority Service Register (PSR) because they are "hidden" behind a non-domestic supply contract, for example residents in flats or apartments attached to a business. Led by Cadent, the Finding the Hidden Vulnerable project aims to establish whether data-driven solutions can find these hidden customers, to ensure they receive the support they are entitled to. Working with Capgemini, Cadent has completed an exploratory stage which developed and tested a hypothesis about property types likely to house hidden customers in vulnerable situations. They conducted extensive industry research, performed data scoping exercises and completed user interviews.



Learnings and Next Steps:

This work developed and validated the idea integrating existing datasets enables identification of hidden customers at a property and at household level, by studying the length of residency, demographic and household composition, and property classification. This data will be used to test whether a hidden vulnerable data model would enhance our current processes and systems, by providing users with additional customer information that enables improved resource planning. This offers more a proactive approach to serving customers with priority support. Phase 2 of the project – currently under assessment – will deliver a predictive data model using static data sources to identify hidden vulnerable customers.

Network-wide system benefits

The true power of the innovation process lies in the combined impact of innovative projects on system transformation. The work done by individual projects can lead to learnings that can be applied across the networks. For instance, the Decentralised System Resilience project by SGN investigated how gas network infrastructure can support storage and balancing in a decentralised UK energy system.

Projects can also tackle challenges such as the decarbonisation of heating from different angles, as is the case for WWU's Pathfinder projects which support local and regional planning providing invaluable system insights to understand the operational impacts of decarbonisation, allowing a variety of stakeholders e.g. local authorities, to understand engineering trade-offs, and the Future Close Heat Programme.

Additionally, innovation projects can support system-wide transformation. For instance, the gas networks have an important role to play in the adoption of hydrogen in the UK-wide energy systems. Several projects across gas networks are working to push this sector forward from different angles.

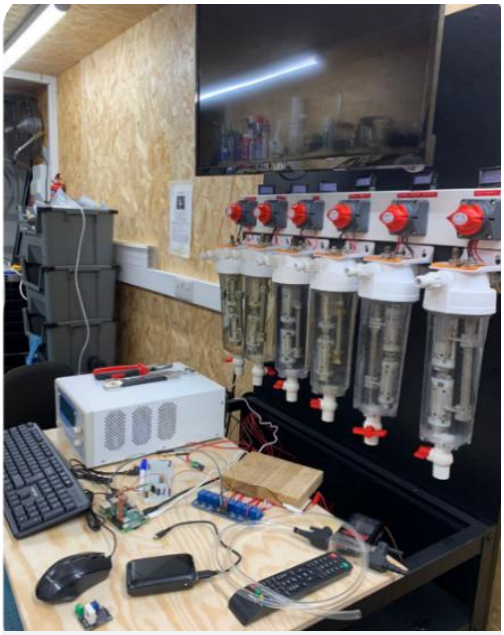
Enabling hydrogen adoption across the UK

Gas networks are exploring different parts of the hydrogen value chain, from the production of hydrogen to its distribution and end-use.

Production

Securing reliable electricity for electrolytic hydrogen production is key to its success. Nuclear power could be a part of the solution, and NGN and WWU have launched the Scaling Hydrogen with Nuclear Energy (SHyNE) project to understand how Nuclear Enabled Hydrogen (NEH) could play a role in the gas networks' decarbonisation. Novel electrolysis technologies are also being explored.

Through projects such as AlCHEM (Advanced Low Carbon Hydrogen and Energy Management), WWU is exploring the use of liquid waste biomass to produce green hydrogen. Its considered biomass electrolysis technology could use 75% less energy than conventional water electrolysis.



Control system used during NextGen Electrolysis - Alpha

The networks are also using innovation to mitigate the impacts of hydrogen production on water reserves. Through the NextGen Electrolysis project, WWU and its project partners are exploring the effects of using different wastewater types, such as harvested rain or river water to produce green hydrogen using novel electrolysis methods. This project has the potential to substantially reduce capital costs, reducing the cost to the consumer and resulting in environmental benefits. The proposed solution offers removal of water treatment processes, providing flexibility and resilience to produce hydrogen, which could provide resilience for the wider system. The beta phase of the project is testing the technology at a Welsh Water treatment facility near Cardiff and at the Yeo Valley production site in Cannington.

Preparing the transmission network

Example of pipeline considered for repurposing

To demonstrate the ability of the National Transmission System (NTS) to safely and reliably transport hydrogen, a high-pressure hydrogen test facility was developed using decommissioned transmission assets for the FutureGrid Phase 1 Facility. Led by National Gas in collaboration with several partners, including NGN, projects undertaken here are contributing evidence for the UK government decision on hydrogen blending. The facility's testing facilities are also being used to demonstrate other technologies such as hydrogen refuelling and the transport of CO_2 in pipelines, leading to cost savings for each project. The FutureGrid projects showed that over 100 standards may require update and review for the NTS to be hydrogen-ready; National Gas' Hydrogen Repurposing Process for the NTS aims to address some of those gaps by developing a process for repurposing NTS assets to transport hydrogen, without this understanding, the cost of stranded assets to the network could reach £6.5 billion.

Preparing the local transmission network

SGN's Local Transmission System (LTS) Futures safely repurposed a mothballed 30km pipeline running from Grangemouth to Granton, to provide evidence that the pipeline can carry 100% hydrogen. The trial has also led to innovations in operational and maintenance processes. In this project, 'live hot work', where connections are made to a live pressurised pipeline, was completed for the first time on an in-service hydrogen pipeline. The project also developed training packages for SGN to upskill operational staff for live trial activities. The results of LTS Futures will serve as a blueprint for repurposing the LTS network for hydrogen use and will provide guidance for UK Government Energy Policy decisions.

Trial site preparation

Connecting hydrogen production with end use

East Coast Hydrogen

Several networks are developing hydrogen pipelines to connect the points of production to the point of end use. For instance, East Coast Hydrogen is a collaboration between National Gas, Northern Gas Networks and Cadent to connect planned hydrogen production and storage with industrial users in the region, over the next 15 years. Starting by connecting the industrial clusters of Teesside and the Humber Region, East Coast Hydrogen aims to connect to distributed hydrogen demand in Yorkshire, Tyneside and the East Midlands before eventually connecting with other networks further afield to create a national hydrogen network .

East Coast Hydrogen will provide the opportunity to connect up to 11 GW of hydrogen production capacity and up to 4 TWh of hydrogen storage by 2030.

Utilising the NZARD UIOLI fund East Coast Hydrogen was able to submit a reopener this year and received the financial award to complete the 2 year Front End Engineering Design stage. Receiving this funding has allowed work to begin on the network infrastructure needed to transport low-carbon hydrogen, East Coast Hydrogen will then look to connect producers and storage providers to a range of customers, who expect to need over 63 TWh/year of low-carbon hydrogen to decarbonise their operations. This fuel switching will save up to 12 $MtCO_2$ per year by 2037.

Using hydrogen

Gas networks could help provide the infrastructure to facilitate further adoption of hydrogen vehicles. The HyDrive project from WWU investigated the feasibility of connecting hydrogen refuelling stations (HRS) to the current gas network. While more work remains to be done to develop this concept, this project will help identify what role GDNs will play in hydrogen mobility. Projects such as FutureGrid Deblending have also explored the integration of hydrogen mobility and the NTS.

Furthermore, the Hydrogen in Multi-Occupancy Buildings (MOBs) projects (link to page for phase 4), led by SGN, are investigating how MOBs can be converted from natural gas to hydrogen. They will provide standards and guidance that can be adopted by all GDNs.

HRS testing at FutureGrid facility

Objective 2: Delivering an environmentally sustainable network

As mentioned in the policy section above, with the publication of the Clean Power 2030 action plan the UK government has committed to at least 95% of Britain's power being produced by clean sources by 2030. The gas network will therefore need to innovate and evolve as it moves to support energy sources such as hydrogen and biomethane, as well as integrating with renewables to create a coordinated whole energy system. Alongside this, networks are also seeking to ensure that maintenance and construction operations on their physical infrastructure are delivered in an environmentally sustainable way which minimises impact on the local community and wider society.

The UK's gas network offers an opportunity to repurpose existing infrastructure in the transition to a low-carbon economy, reducing capital costs. For instance, pipelines can offer a low-cost route for distributing large quantities of hydrogen[4] - cost benefits may be greatest where repurposed pipelines avoid the need to build new, dedicated hydrogen infrastructure. Both routes are being explored through projects such as HyLine Cymru, led by WWU with partners in the South Wales Industrial Cluster (SWIC), and Project Union, led by National Gas and for which funding was approved over the 2024/25 period.

Reducing the carbon intensity of natural gas in the National Transmission System (NTS) has been an innovation focus for many years, with the use of biomethane, and biomethane injection particularly, a key focus. A complementary option is blending hydrogen into the gas network, alongside a low carbon certification scheme, which could enable demand to decarbonise before the switch to pure hydrogen or electrification infrastructure is complete. Hydrogen in the NTS (HyNTS) is a broad and significant portfolio of projects developed by National Gas to build evidence on hydrogen blending and assess its viability and impact on the NTS – this is examined more closely below. Topics covered include gas analyser feasibility studies, deblending feasibility and demonstration, linepack studies and understanding blending infrastructure requirements for our hydrogen blended future.

National Gas have also constructed the FutureGrid test facility at DNV Spadeadam to carry out a wide range of essential hydrogen tests, including some which require high pressures in a secure, offline environment. The outcomes of these projects will demonstrate how the NTS can safely and reliably transport hydrogen.

[4] Transportation of hydrogen as compressed gas is cheaper via pipelines than through tube trailers. Source: Hydrogen Transport and Storage Cost Report

HyNTS programme – operational methodologies

Project ID:	NIA_NGT0222
Budget:	£841,312
Networks:	National Gas
Duration:	Apr 2024 – Mar 2025
Status:	Complete
Funding:	NIA

Benefits:

Identifying missing information needed to update the rules and procedures for hydrogen.

This will support a testing program that collects the necessary evidence to make these updates, ensuring that hydrogen networks can operate safely and effectively.

Overview:

The HyNTS programme is building evidence for the hydrogen safety case and network capability for transporting hydrogen, leading to Project Union, which is a programme to develop a new hydrogen network. Projects under HyNTS will prove the capability for repurposing portions of the network, rather than relying solely on new build assets.

To ensure safe transportation of hydrogen, operational procedures and policies will need to be updated to reflect hydrogen's different physical properties to natural gas. The HyNTS Operational Methodologies – Phase 1 project aims to review internal policies and procedures and identify what evidence is required to update them to operate a hydrogen transmission system.

Progress:

Several projects have identified the required updates to policies and procedures. Building on this, this project identifies the internal operational procedures to gather the required evidence to update them and identify any need for new policies.

"The Operational Methodologies project has been a vital step in preparing our network for a hydrogen future. By systematically reviewing our internal policies and procedures, we've built a clear picture of where updates are needed and where new guidance must be developed. This work strengthens our ability to repurpose existing assets safely and efficiently, ensuring we continue to deliver value for consumers while supporting the UK's Net Zero goals. It lays the foundation for the physical testing now underway in our HyNTS Operational programme, helping us move from insight to implementation with confidence".

- Katie Petherbridge, Innovation Delivery Manager, National Gas

Learnings:

Many documents from NGT's policy suite were reviewed, and it was found that several of these documents are now withdrawn or no longer relevant to NTS operation. This underscored the importance of a methodology update. Several key themes were repeated across many documents, specifically the Safe Setting to Work and Safety and Technical Competencies (STC) which will require updating for hydrogen operations.

Next steps: The findings from this project will be used to guide innovation projects across the HyNTS

As the demand for natural gas reduces, parts of the NTS can also be repurposed to transport carbon dioxide. The availability of a transportation system is a key enabler for the large-scale adoption of carbon capture, utilisation and storage (CCUS), as it may not be possible to store the CO_2 at the point of capture. Through projects such as Carbon Networks, Wales and West Utilities (WWU) is exploring the to understand the role for gas networks in the growing UK CCUS market. While several projects are working towards the repurposing of the NTS to support the low-carbon transition, projects such as Reducing Gas Emissions During Pipeline Commissioning by Northern Gas Networks are working to minimise the environmental impact of gas operation in the meantime.

Reducing gas emissions during pipeline commissioning

Project ID:	NIA_476
Budget:	£83,175
Networks:	NGN
Duration:	Dec 2024 – Oct 2025
Status:	Live
Funding:	NIA

Overview:

In 2019, Northern Gas Networks partnered with ROSEN to explore how to reduce emissions from the operation of their gas network. The project found that their highest emitting activity was the commissioning of gas mains. This is because gas needs to be purged through the new network before it can be reconnected with the existing one. NGN took this as an opportunity to revise the standard purging calculation tabled used by gas engineers.

NGN re-partnered with ROSEN to explore this topic further and determine how these calculations could be refined to minimise the amount of gas released during pipe replacement and upgrades.

Learnings:

NGN developed updated calculation tables with shorter purging times.

Benefits:

87,000 tonnes of methane annually

Potential emission reductions from new gas purging calculations if successful and rolled out across the NGN network, without any operational disruption or additional costs.

Next steps:

NGN and ROSEN are now preparing to conduct 10 field trials across pipes of varying diameters to validate their effectiveness.

Innovation projects frequently build on the findings of previous innovation work, for example, HyLine Cymru will build a new 130km hydrogen pipeline from Pembroke to Port Talbot with the intention of delivering the low-carbon hydrogen needed for decarbonisation of industry in southwest Wales. The project has been built on learnings from earlier project phases enabled by innovation funding as shown in Figure 8. The construction and operation of the pipeline would lead to several technical, economic and environmental benefits to both the network users and the rest of the energy system. For instance, it could unlock up to 3GW of offshore wind generation by providing a route to market for clean energy producers. Furthermore, through the displacement of fossil fuels, the pipeline could support the removal of up to 10% of the GB industrial emissions (3.2 $MtCO_{2e}$/year).

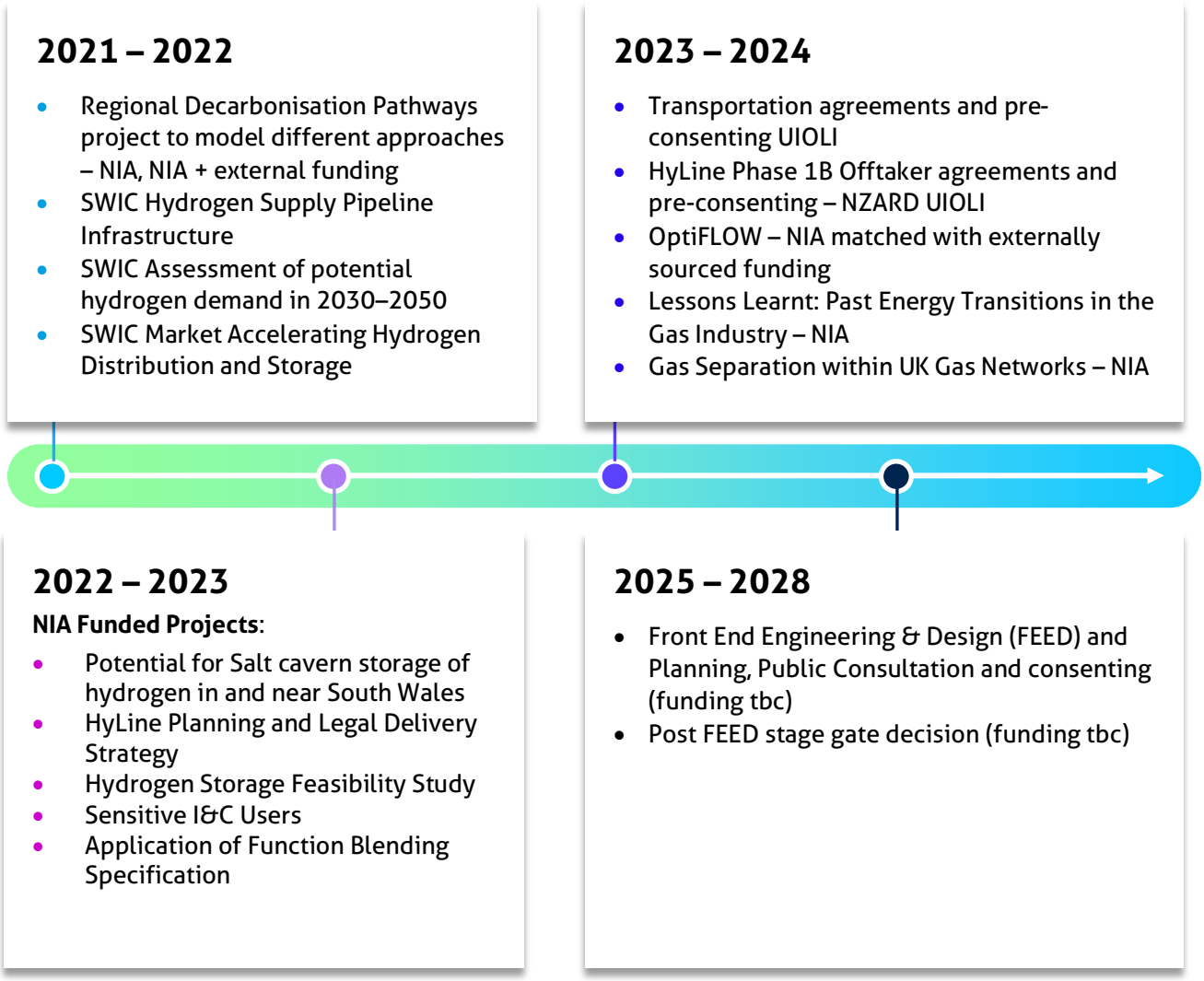


Figure 8: HyLine Cymru timeline

Innovation Themes

The Energy Networks Innovation Strategy connects the objective of an environmentally sustainable energy system with the themes of "data and digitalisation", "flexibility and market evolution", and "Net Zero and the energy system transition" – below, we identify how projects from the last year have been informed by consideration of these themes, and improved our understanding of them.

Data and digitalisation work is often an enabling tool for later projects and evidence-based decision-making by increasing the information available for networks to use in future projects as well as BAU operations and resilience planning, with a view to enabling or unlocking a greener energy system.

Projects in this area focus largely on building digital tools and advanced modelling techniques to support more efficient operations and planning. They often span multiple themes, for example, Cadent's Digital Platform for Leakage Analytics (DPLA) SIF project, supported by NGT, focuses on reducing gas (both methane and hydrogen) leakage to improve system efficiency to support Net Zero targets[5]. The project integrates advanced analytics and machine learning to enhance network monitoring and so environmental outcomes. Meanwhile, WWU have joined the Powering Wales Renewably project, which will create a digital twin of Wales' entire energy system. This will improving coordination across energy networks. The project is a collaboration involving NESO, the Welsh government, CGI, National Grid Electricity Distribution, National Grid Electricity Transmission, National Gas, SP Energy Networks and CENIN Renewables.

[5] This project is also discussed separately in the Collaborative initiatives in 2024/25 section

Powering Wales Renewably – SIF Beta

Project ID:	10121485
Budget:	£12,195,722
Partners:	NESO, Welsh Government, WWU, National Grid Electricity Transmission, SP Energy Networks Distribution, SP Energy Networks Transmission, National Grid Electricity Distribution, National Grid Transmission Plc
Duration:	Jan 2025 – Jan 2029
Status:	Live
Funding:	SIF Beta – Round 2

Overview:

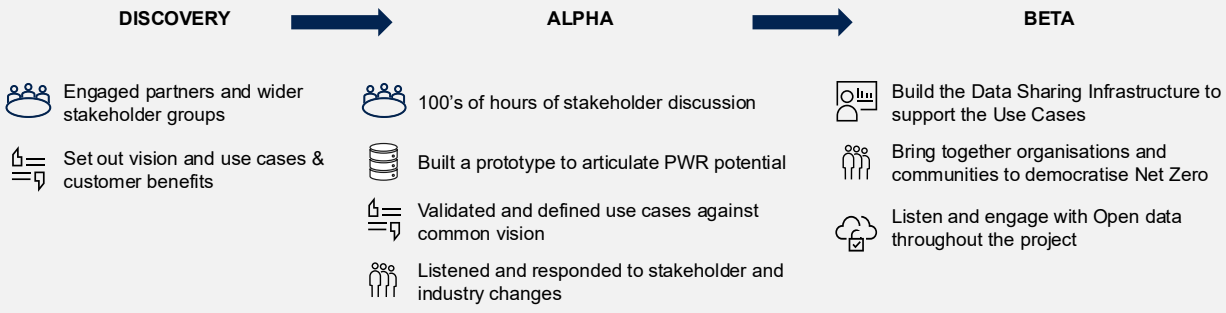
Pweru Cymru yn adnewyddol (Powering Wales Renewably, PWR) brings together stakeholders across the Welsh energy system to accelerate Wales' transition to Net Zero power.

The Beta phase of PWR will integrate datasets and digital technologies to create a digital twin of Wales' energy transmission and distribution systems - this digital twin will serve as a common interface for a range of stakeholders, improving the locational visibility of system challenges and the status of the whole energy system. WWU will provide critical information on the gas distribution network across Wales, showing network location along with capacity, large connections and sharing insight on how low carbon gases can be generated and used in the gas network.

The current Beta phase builds on previous phases: the Discovery phase - completed in 2023 - established stakeholder priorities and needs, and the Alpha phase - which finished in 2024 – built a prototype to articulate the potential of PWR. The project also integrates learnings from projects like **FALCON**, **DINO**, and **NESO's Virtual Energy System**.

The pilot system exceeds the state-of-the-art map overlays and generalised heat maps by locationally linking multiple datasets to a fully connected intelligent energy network model, allowing for better data analysis across a combined transmission and distribution network model.

Progress: The project builds on the progress in the previous SIF phases.



Benefits:

Technology, Commercial and Integration Level improvements:

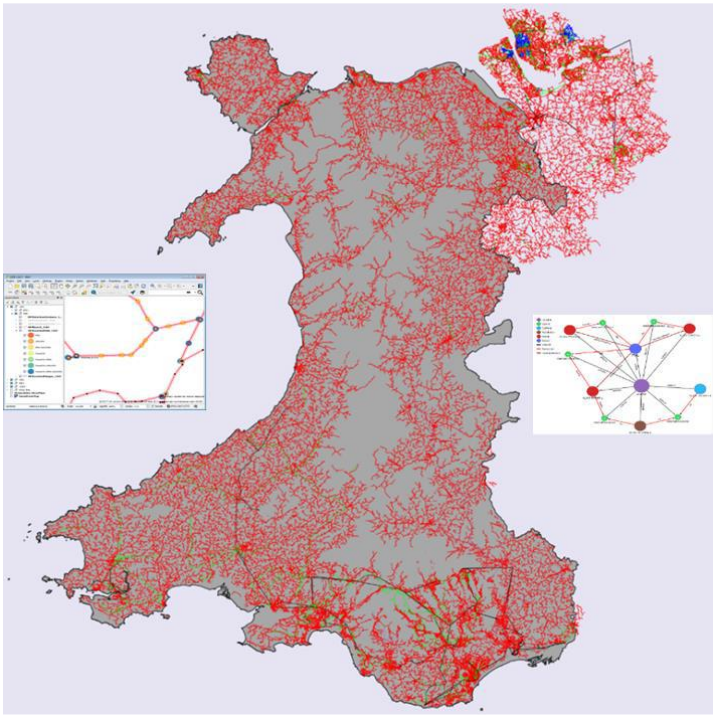
	End of Alpha	Target in Beta
TRL	5	8 - Integration of multiple systems and data sources demonstrated at scale
IRL	4	7 - Prove the integration between systems and interoperability
CRL	5	8 - Agreement of commercialisation strategy, scale-up approach and business model

Financial benefits:

- The network portfolio can be better coordinated, leading to cost savings in operation, when all network operator requirements for energy and capacity flexibility are visible.
- PWR will provide an informed, easily adaptable basis for investment across the energy system.
- Through PWR, more of the existing and new network capacity could be utilised, and this could save costs for users of the network services.

Environmental benefits:

The additional renewable generation achieved through the project will be key to displacing fossil fuel use.



"Visibility and understanding of the whole energy system is essential to deliver effective and efficient decisions around Wales' future energy system. Powering Wales Renewably will support better coordination, as well as help to connect more renewables, and could save up to 2m tonnes in CO2 emissions."

- Ben Carwardine, Project Manager

Flexibility and market evolution

Developing market-based solutions to increase the flexibility and efficiency of the energy system, accelerating the adoption of low carbon solutions.

The theme of **flexibility and market evolution** also focuses on new network demands; work under this heading is important for accelerating the uptake of low carbon technologies and increasing consumer participation in the energy transition. This is particularly important given the new network responsibilities focused on system operation, associated with the launch of NESO.

An example of progress this year against this theme has been the exploration of the potential for gas networks to repurpose existing assets for flexible zero carbon heating solutions in the Heat Network Transition Study project, which also evaluates alternative options where repurposing is not feasible. Valuable lessons have been learned regarding how gas networks can support the transition to low-carbon heating while ensuring commercial sustainability.

Net Zero and the energy system transition

Facilitating and accelerating the UK's transition to Net Zero greenhouse gas emissions and beyond to an inclusive, fully sustainable energy system.

"Biomethane is the unsung hero in energy system decarbonisation and we want to focus our efforts on maximising the capacity of these sites, as well as increasing future connections. The smart pressure control project being progressed in one area of our network, could result in an additional 11 million scm a year of biomethane, equivalent to 10,000 homes being heated. Further roll out will achieve wider Net Zero benefits from biomethane"

Helen Fitzgerald, Project Manager for Smart Pressure Control

Net Zero and the energy system transition is a core focus for most innovation projects, enabling gas networks to meet their own decarbonisation objectives and support the decarbonisation of their customers.

This theme continues to grow in importance as networks work towards Net Zero targets, with work in this space enabling networks to meet the ambitious targets set out in the government's Net Zero Strategy[6]. Innovation to enable the successful operation of future hydrogen networks has been a focus, with National Gas' Hydrogen Site Safety Case Programme and NGN's Scaling Hydrogen with Nuclear Energy (SHyNE) looking to understand hydrogen networks' safety and scaling challenges respectively. SGN's Hydrogen in Multi-Occupancy Buildings (MOBs), now complete, examined the decarbonisation challenge of transitioning MOBs to hydrogen in a multi-phase project, with each stage building on previous learnings. Findings included recommendations on standards related to gas in buildings, draft management procedures and an understanding of the feasibility of MOBs' transition to hydrogen.

[6] https://www.gov.uk/government/publications/net-zero-strategy

The Smart Pressure Control trials are also a key opportunity to prepare the gas networks for the adoption of biomethane as part of a low-carbon energy network. WWU have rolled out trials and installed smart technology at biomethane sites in 2024/25 that could result in over 10,000 more homes heated with biomethane thanks to increased injection capacity, while other networks will look to follow suit moving into the 2025/26 regulatory year. WWU is working to use solar/battery-powered motorised actuators, integrating with its SCADA (Supervisory Control and Data Aquisition) technology, managing system pressures in response to exit and entry requirements. This represents a significant improvement on manual adjustments and will support biomethane sites to maximise their export capacity. It also reduces the need for engineer call-outs and could save costs for customers.

Objective 3: Maintaining network resilience and safety

The resilience of the gas network is foundational to its ability to meet the needs of the consumers and other network users. The goal of building a resilient network is to minimise network outages - improving the grid's ability to anticipate, withstand, and recover from disruptions, whether natural (e.g. flooding or other extreme weather), technical (e.g. pipeline corrosion or valve malfunction) or human-made (e.g. cyber-attacks or conflict leading to supply chain issues). Safety is also central to gas network innovation – all projects must be delivered safely, considering the wellbeing of both consumers and those who work to operate the networks' physical infrastructure. This must continue to be a central focus as gas networks' role in the energy system evolves and the blend of gas they carry changes.

Maintaining network resilience

> "We've developed a significant portfolio of projects to understand the implication of hydrogen blends on the National Transmission System (NTS). This portfolio is referred to as the Hydrogen in the NTS (HyNTS) programme."
>
> Corinna Burger, Head of Innovation, National Gas

The importance of network reliability and resilience remains unchanged under a shift of the blend of networked gas towards hydrogen. National Gas' HyNTS programme, discussed under Objective 2, assesses the implication of hydrogen blends on the NTS and how to use the gas to ensure a resilient Net Zero transition.

Physical deterioration of network assets is a major contributor to system faults and the impact of hydrogen on this process is likely to be different to that of methane. Multiple projects within the HyNTS programme address this issue – for example, the HyNTS Corrosion project examines the failure modes of pipeline coatings which prevent corrosion for hydrogen networks.

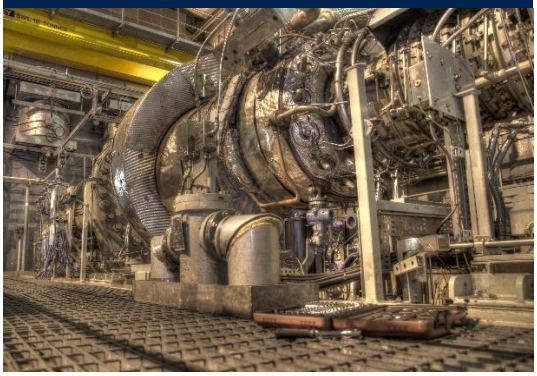
Improving network safety

Network safety is intrinsically linked to resilience; both can be endangered by network faults and incur financial costs for networks. However, while problems with network resilience result in network outages, safety issues can lead to injury or worse. One notable project which aims to revolutionise safety in gas networks is the Predictive Safety Interactions (PSI) – Beta project. The project – a partnership between SGN, Cadent, NGT and NGN – is another example of cross-network collaboration in innovation.

As networks look to adapt and repurpose their infrastructure to support the growing role of hydrogen in the energy system, important concerns have arisen regarding the safety of carrying hydrogen in the gas network, particularly due to its greater flammability relative to methane gas. National Gas Transmission's Hydrogen Site Safety Systems project – part of the HyNTS programme – examines the feasibility of addressing these issues by repurposing existing safety systems.

Hydrogen Site Safety Systems

Project ID:	NIA_NGT0265
Budget:	£252,600
Networks:	NGT
Duration:	Jun 2025 – Oct 2025
Status:	Live
Funding:	NIA



"This project marks an important step in ensuring our infrastructure and operational approaches are ready for hydrogen blending. By understanding how our fire and gas systems respond to hydrogen, we're not only safeguarding our assets and people, but also enabling a safe and scalable transition to a low-carbon energy future."

- Alistair Carvell, Hydrogen Innovation Engineer, National Gas

Overview:

This project will examine the suitability of existing Fire and Gas (F&G) detection and suppression systems for use with hydrogen blends of up to 20%. These systems comprise: fire detection, fire suppression, gas detection, and associated control systems. They are found in compressor cabs and at network terminals.

Through CFD modelling, three representative F&G systems will be individually assessed for compatibility with blends and will then be used as examples to make wider inferences on the suitability of other F&G systems on the network. Where assets or control systems are not suitable, this project will not design a new system but recommend where changes should be made and demonstrate how those changes safely manage risk – including cost estimation for upgrade or retrofit.

Benefits:

This project will provide a baseline understanding of the readiness of existing fire & gas (F&G) suppression and detection systems, found within compressor enclosures and at gas terminals, to remain effective for use against natural gas/hydrogen blends.

It will identify the blend concentration at which F&G system changes will be required to maintain current safety levels.

This project ensures key network safety systems will remain appropriate for future gas blend scenarios.

Learnings:

The H2 Site Safety Systems project assesses whether existing fire and gas detection systems across the National Transmission System are suitable for hydrogen blends up to 20%.

Following an evaluation of the legacy and modern compressor enclosures and the Bacton Terminal, the project identified our overall F&G system suitability and has recommended the changes required.

Next steps: This research will be critical for enabling the safe transition to hydrogen blending and supporting the decarbonisation of gas infrastructure on the path to Net Zero.

Predictive Safety Interventions (PSI) – Beta

Project ID:	10068173
Budget:	£1,189,696
Networks:	SGN (lead network), Cadent, NGT, NGN
Duration:	Aug 2023 – Feb 2025
Status:	Live
Funding:	SIF

Benefits:

Savings could result from reduction in lost-time injuries and the reduced cost to capture data on indicator

Overview:

This project uses machine learning to predict and prevent safety incidents before they occur, creating a predictive safety model for the gas sector. This model identifies site hazards automatically and prompts engineers to re-evaluate risks during the job as conditions change.

According to HSE annually released statistics, at least 10,000 working days were lost to injury in the wider utility sector in FY22, with the estimated cost of fatal and non-fatal injuries standing at more than £160m.

PSI has a direct target to prevent the occurrences of fatal and non-fatal injuries, which will reduce the cost of operating energy networks as well as the obvious wider societal benefits

Building on a successful Alpha phase which validated proof of concept of the machine learning model, the Beta phase enhances real-time risk scoring by integrating diverse data sources like weather, traffic, and human factors. It delivers tailored safety interventions to fieldworkers and managers, improving site safety and operational efficiency.

PSI is a high-TRL, large-scale Beta project, and so is poised to scale nationwide and even globally upon completion, bringing safety and operational cost improvements.

Explore more about the project through the project video

Innovation Themes

Connected to the objective of network resilience are the themes of "optimised assets and practices", "supporting consumers in vulnerable situations", and "whole energy system" – below, we identify projects from 2024/25 which have done work developing those themes.

Optimised assets and practices projects look to deliver solutions efficiently whilst maintaining a focus on reliability and security of supply – core network responsibilities which will continue to be important given the increasing variety and flexibility of network demands, and external pressures and threats to supply.

The optimisation of network assets remains a strategic objective for all networks, central to ensuring they can meet today's demands while preparing for future challenges. Each network continues to explore new technologies and techniques to enhance operational efficiency and safety, reinforcing their shared commitment to maintaining safe and resilient systems.

Many of these projects overlap with other themes, the key unifier being that they achieve their goals largely through operational improvements of existing infrastructure. For example, NGN's Reducing Gas Emissions During Pipeline Commissioning project aims to meet Net Zero and climate goals through targeted changes to existing purging procedures – reducing the quantity of natural gas vented during commissioning operations by up to 80%. WWU's Accelerating Progress project also targets emissions reduction at each stage of the existing gas distribution value chain, identifying mechanisms to do this and developing a framework to analyse costs and benefits associated with these options.

Accelerating Progress

Project ID:	NIA_WWU_02_68
Budget:	£125,773
Networks:	
Duration:	Nov 2024 – Feb 2025
Status:	Complete
Funding:	NIA

9MP Toby Perkins keynote speech at the launch of the Accelerating Progress report in the House of Lords

10Toby Perkins MP, Josh Newbury MP and FEN CEO James Earl at the launch of the Accelerating Progress report in the House of Lords

Overview:

This project explored the potential measures for cutting emissions from gas transmission, distribution and usage that could close the gap between the projected emissions and the targeted reductions needed to achieve net zero by 2050.

The scale and cost-effectiveness of the emissions saved from effecting each identified abatement option were assessed. The study also identified the policy and regulation needed to facilitate the proposed abatement options and suggested further areas to be investigated to support the UK in reaching the emissions reduction goals.

Progress:

The results from the report were published on the IGEM FEN website and were shared through the parliamentary Group for Energy Studies' Winter Warmer event in Westminster in early 2025.

Benefits:

- If the measures that the study identified are carried out, up to 23% of the gap to meeting the carbon budget six emissions goals (2033-2037) for UK industry and buildings.
- These decarbonisation measures could also encourage energy system flexibility, while maintaining its robustness.

Learnings and Next Steps:

WWU is still building on learnings from other network innovation work to understand and deliver the measures needed to accelerate progress towards decarbonisation – some abatement options require more research into their technical feasibility, while the implementation of others – such as hydrogen blending – need to be aligned with policy.

"We've identified potential measures for cutting emissions from gas transmission, distribution and usage through this project. If implemented, the recommendations could tackle almost a quarter of the emissions which need to be cut from UK industry and buildings to meet carbon budgets in the mid-2030s, as well as allowing for greater system flexibility and customer choice."

- Matthew Hindle, Head of Net Zero and Sustainability, WWU

Supporting consumers in vulnerable situations is an important consideration across all innovation projects - RIIO-2-funded projects use a vulnerability assessment tool to determine how they might affect vulnerable consumers, allowing networks to identify and mitigate against potential negative impacts.

Consumers are at the heart of networks' innovation, and protecting those at risk of fuel poverty and network outages is more important than ever, as the energy transition risks leaving behind some of those who need the most support. These projects often result in wider societal benefits than direct financial or carbon savings.

Some projects innovate specifically with vulnerable consumers in mind; Cadent's Finding the Hidden Vulnerable project centres on validating and deploying a model to identify customers in vulnerable situations who are missing out on particular protections in the event of supply interruptions. It can then be ensured that these customers receive the support they need in this event.

SGN's Accessible CO alarm project looks to protect vulnerable consumers from a different danger – that of carbon monoxide poisoning. The project is expected to deliver a fully developed and tested prototype. Insights generated could pave the way for cross-network adoption, creating broader societal benefits and improving the industry's reputation for innovation and social responsibility.

Project Helix

Project ID:	NIA_NGN_359
Budget:	£100,100
Networks:	NGN (lead network), Cadent, NGN
Duration:	May 2022 – Mar 2024
Status:	Live
Funding:	NIA

Overview:

Carbon monoxide (CO) poisoning is responsible for roughly 40 deaths and 4,000 A&E visits every year in the UK. Alarms notifying the gas' presence are usually wall-mounted or portable. However, despite a few advances in the industry, there have never been wearable carbon monoxide detectors - until now.

In partnership with Newcastle-based wearable medical technology experts Affotek, NGN launched Project Helix, an R&D venture to develop the first wristwatch to detect carbon monoxide. This cutting-edge prototype has been designed with scientists from Newcastle University to protect the wearer from the dangers associated with CO via wearable technology. The project team engaged with the NHC IPIP communities and the CO Research Trust to understand the effects arising from CO inhalation and set the right parameters for detection.

The device uses sensors to detect CO concentrations around its wearer, while monitoring other vital functions such as heart rate, blood pressure, respiratory rate and blood oxygen level. It links to a mobile phone app, which alerts the wearer to the life-threatening gas. The watch can detect CO as low as 7 PPM (parts per million), giving a much earlier indication of CO in any environment. This sensitivity is particularly important for pregnant mothers, as even low levels of CO can damage their unborn child - wall-mounted and portable CO alarms typically only detect CO at concentrations of 40-50 PPM over an eight-hour period, and 400 PPM for 4 to 15 minutes.

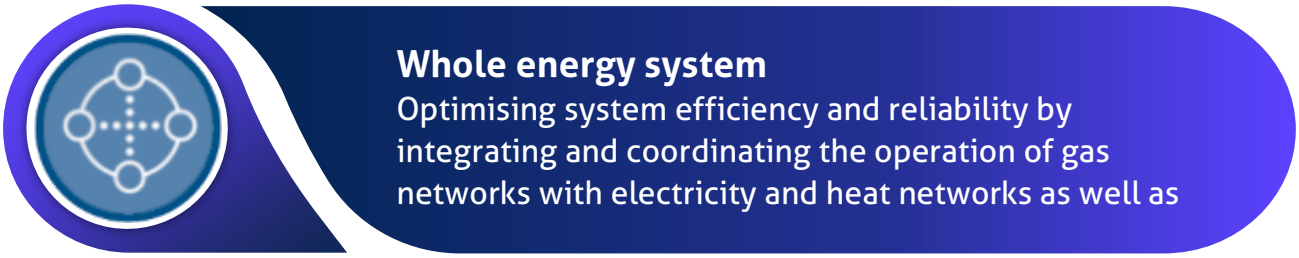
Learnings and Next Steps:

The prototype will be developed further to provide vulnerable customers with increased protections. Field trials are now underway on the global-first product with the aim of bringing it to market in the next 12 months. The project team could build an additional 50 devices to broaden the user testing with the Internet of Caring Things.

Once the device has been adequately tested, gas networks will be able to deploy it at scale to protect all their customers, especially those that may be at particular risk to CO poisoning.

Benefits:

- Reduces cases of CO poisoning through earlier and more effective detection, preventing death, disability and poor health amongst its users.
- Eliminates risks associated with current CO detectors, such as customers not installing their CO alarm per manufacturer's instructions or false alarms.
- Detect CO when the wearer is out in potential higher risk CO situations – such as when driving, cycling, or taking part in outdoor activities on roads where air quality is affected by various emissions.
- Increases mental and physical wellbeing from the reassurance of the monitor.
- Improves public awareness of the health risks linked to CO poisoning.



The **whole energy system transition** theme stresses the importance of broader thinking and coordination across networks. Collaborating across network types, value chains, and with non-network stakeholders will help to deliver innovation objectives as efficiently as possible and at the lowest possible cost to consumers. As the UK continues its decarbonisation journey, interactions across the energy system become increasingly important. Meeting future demands will require energy networks to collaborate closely with a broader range of partners in exploring decarbonisation pathways. This collaborative need aligns with the shift towards greater responsibilities for distribution networks as they take on a broader range of system operation responsibilities.

Gas networks specifically will need to reassess their role within the future of the country's energy system, and are considering how existing assets can best be utilised. SGN's Carbon Networks and Decentralised System Resilience projects are both early TRL studies delivering assessments of some potential future roles of the gas networks. The Carbon Networks project looks at possible alignments with adjacent markets such as CCUS, while the Decentralised System Resilience project investigates the opportunities for gas infrastructure to support storage and balancing in a decentralised UK energy system.

At the other end of the TRL spectrum, NGN's Navigator project, which is near BAU deployment, is developing a Whole Energy Systems Pathway tool, which will enable regional energy system planning capability to inform nationwide, regional and local planners. This planning capability is crucial – as National Grid ESO transitions to NESO and takes on the role of Regional Energy Strategic Planner, the focus on the alignment of gas network planning and Local Area Energy Plans will increase, requiring consideration of the balance of all energy vectors.

Stakeholder Engagement for Innovation

Approach

Networks follow a collective and strategic approach to collaborate with stakeholders and build partnerships through their innovation work. Underpinning the strategic approach to stakeholder engagement, energy networks are dedicated to the principle of collaboration, and to making every contact with stakeholders count. Stakeholder engagement can highlight issues related to future energy system operation that may not yet be identified or experienced, and energy network engagement will seek continual feedback from a diverse array of stakeholder groups.

To enable ongoing interaction and ensure that innovation projects respond to industry challenges and stakeholder feedback, energy networks work with stakeholders to test innovation proposals and issue challenge statements. Information gained from engagement facilitates positive outcomes within the industry and learning and knowledge dissemination.

To incorporate the views of stakeholders throughout the innovation process; gas networks identify four main areas of focus:

- Active engagement and ensuring clarity regarding the key strategic challenges the industry is facing
- The approach to idea generation, and providing access for third parties to engage and undertake innovation projects
- The approach to ensuring clear and consistent visibility and reporting of the innovation portfolios across the energy industry
- The approach to knowledge dissemination and communicating the benefits delivered through innovation projects.

This section details that approach and provides examples of successful stakeholder engagement undertaken throughout 2024/25.

Who participates in innovation?

Gas networks collaborate with a wide range of experts and stakeholders across their project portfolios, helping to ensure projects can draw on deep expertise and incorporate a diverse set of perspectives, as summarised in the image below[3].

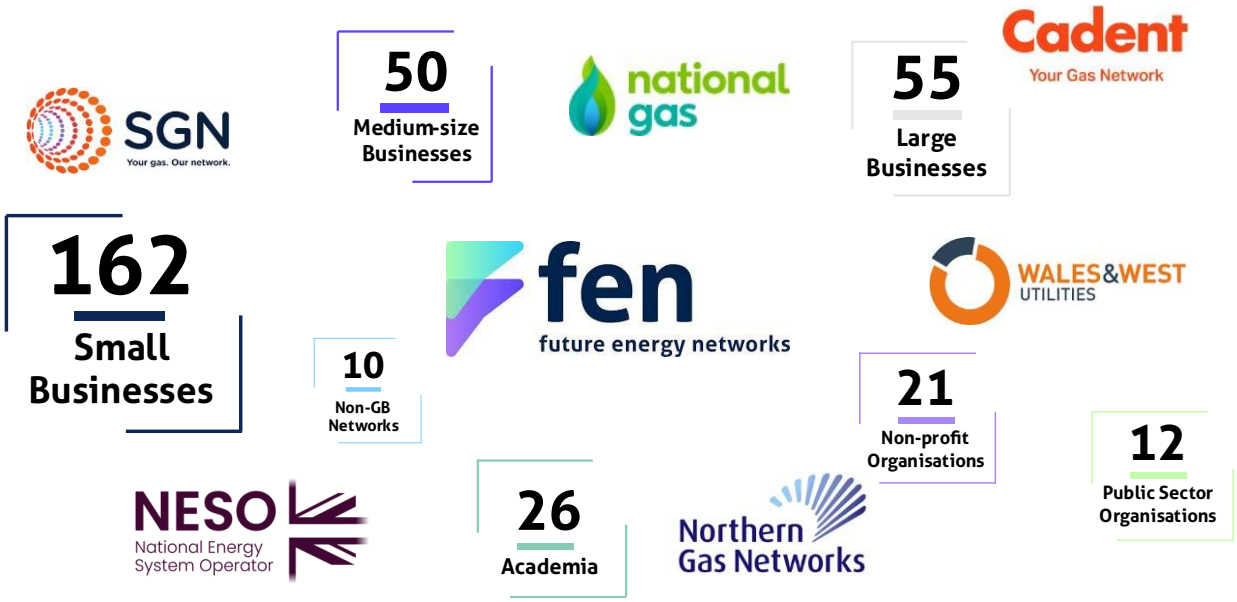


Figure 11. GB energy networks and their innovation partners in 2024/25

Collaborative initiatives in 2024/25

Beyond project work, numerous events and initiatives have fostered consistent industry-wide collaboration. These provide opportunities for dissemination of learning – both during and after completion of projects – amongst the GB Gas Networks, direct stakeholders and wider industry sectors and bodies, ensuring that outcomes are shared to maximise the benefit for customers – some examples are provided below.

Figure 12: Excerpt of 2024/2025 engagement

Energy Innovation Summit

The Energy Innovation Summit has long been the ENA's flagship knowledge dissemination event, providing a platform for energy networks to share insights, engage directly with UK energy network stakeholders, and showcase progress on regulator-funded innovation projects. In parallel with the organisational changes associated with ENA and FEN publishing individual innovation reports, the gas networks have evolved their engagement strategy opting for a more targeted presence at the Summit, broadening their reach by disseminating project outcomes across a range of complementary third-party events. By engaging through forums such as Utility Week Live and Innovation Zero, alongside their contributions to the Summit the Gas Networks sought to reach a wider and more diverse audience. This approach allowed them to align project dissemination with stakeholder interests across multiple platforms, while still supporting collaboration and knowledge exchange within the broader innovation ecosystem.

The result of these efforts was an expanded portfolio of project partners for this year and an exciting pipeline of innovation projects to be rolled out in the next financial year.

Innovation Zero

Innovation Zero is a UK government-backed international congress, the 2024/25 edition of which took place in April-May 2024. The event attracted experts across a wide range of sectors, including climate change mitigation, cleantech innovation and implementation of low carbon solutions. Delegates from all UK gas networks attended and ran a shared stand, showcasing their innovative solutions to an audience of over 10,000 innovators, policymakers, investors and corporate leaders and demonstrating the collective commitment to reaching Net Zero.

FEN Energy Innovation Forum

The gas networks will continue to attend industry led public energy innovation events and fora several times per year. These events are normally based around a theme, with presentations on a range of projects from across the energy networks.

Basecamp 2025

Gas and electricity networks are asked to share some of the specific technical challenges they are facing, both in the short-term and as progress is made towards a Net Zero future. Challenges at the 2025 event were centred around three themes:

- Building Better, Faster and Safer: Modernising the design of planning, procurement and construction projects to deliver better, faster and more innovatively.
- Decarbonising Network Operations: Considering the requirements of Net Zero commitments in every stage of project lifecycles, to reduce the emissions associated with present and future network operations.
- Maximising Use of Existing Infrastructure: Making the most of the networks' current infrastructure, to reduce the consumer cost and environmental impact associated with new construction projects.

For Basecamp 2025, the Gas Networks adopted a more focused approach, prioritising the sharing of specific technical challenges and contributing to targeted discussions around the three core themes of the programme. This decision reflected a strategic choice to engage where their input would add the greatest value, while allowing space for a broader range of voices and ideas to surface. By stepping back from a major showcase presence, the Gas Networks aimed to encourage collaboration, highlight practical challenges, and ensure that the outcomes of Basecamp remained directly relevant to progressing innovation towards Net Zero.

Outputs of collaboration

Collaboration between networks and across network types is also critical in making sure innovation considers impacts to the whole energy system. This past year gas networks have launched 18 **collaborative projects** (with more than one network operator providing input and / or funding).

Cadent's Digital Platform for Leakage Analytics exemplifies gas networks collaborating to address challenges under SIF's whole system integration and data and digitalisation innovation areas, while simultaneously addressing a range of user needs. It is currently in its Beta phase. The project is supported by all of GB's GDNs and National Gas Transmission (NGT), and aims to improve data monitoring and insights, leading to better efficiency and resilience of the networks. The project will enable knowledge dissemination with regulatory bodies, GDNs and customer groups. Key project benefits include reduced gas emissions, cost savings across the network and safety improvements – with leaks followed by immediate action.

The Intelligent Gas Grid project showcases collaborative efforts between multiple gas networks and the private sector. The project refines AI and machine learning techniques for real-time pressure management and predictive maintenance. This reduces gas escapes, and improves efficiency of mains replacements, in turn leading to cost benefits for consumers. The Beta phase of the project involves technology scale-up to enhance network reliability by automating pressure adjustments and reducing methane leaks. It builds on insights from the Alpha phase, where the focus was on proving the concept through targeted research and operational data collection.

The **Hydrogen Heating Programme (HHP)**, led by the Department for Energy Security and Net Zero (DESNZ), is a landmark initiative aimed at understanding whether hydrogen could safely and practically play a role in heating homes and businesses as the UK moves toward Net Zero. The programme aims to develop the evidence base the Health and Safety Executive (HSE) would need to make an independent judgment on the safety of hydrogen heating.

HSE set out more than 130 specific pieces of evidence required, covering every aspect from technical network adaptations and appliance conversions to consumer behaviour and operational safety. HHP's trials and demonstrations were carefully designed to address each of these requirements, producing a rich and detailed evidence set that would give HSE the insight it needed to assess whether hydrogen could be safely used at scale. Gas networks have collaborated extensively to deliver evidence that could demonstrate the safe and long-term transition of gas networks as a potential future solution for home heating. The evidence was generated through projects such as the EUSE – Hazardous Areas Within Building from WWU.

This represents a considerable body of knowledge which will provide government, regulators, and networks with the insight and confidence to make informed decisions on the future of hydrogen in the UK's energy system. Projects have already started to build on this body of work, for example, Cadent's Understanding the value of remote detectors project aims to further supplement this evidence base with a behavioural assessment of how consumers value remote hydrogen detectors.

All five gas networks and FEN are founding members of the **Green Gas Taskforce (GGT),** which was launched in April 2025. The GGT is a collaboration between thirteen of the largest biomethane generators, shippers and traders in GB, the British gas networks and four significant industry groups. The taskforce will drive forward the GB biomethane industry by generating new evidence over the next two years highlighting the potential for its use to deliver UK energy system goals of decarbonisation and energy security.

Figure 13: Green Gas Taskforce members

Intelligent Gas Grid – Beta

Project ID:	10063754
Budget:	£6,304,121
Networks:	SGN (Lead Network), Cadent, DNV, National Gas Transmission, NGN, Utonomy
Duration:	Aug 2023 – Aug 2026
Status:	Live
Funding:	SIF

Overview:

The Intelligent Gas Grid (IGG) project looks at understanding the potential network benefits from using data driven algorithms and decision making (Artificial Intelligence (AI) and/or Machine Learning (ML)) to control the gas network autonomously and intelligently. This project builds on learning from an earlier NIA project, Pressure Control & Management (PC&M), which saw the successful delivery of Utonomy's Remote Control Pressure Management Electronic Actuator System.

Problem definition:

IGG has identified three problems that need to be resolved in gas networks:

- Leakage reduction system is problematic because low pressures create multiple alarms
- Anomaly detection, where the current practice is manual and reactionary. Governor faults are often investigated by the network owner after downstream knock-on effects have occurred.
- Biomethane injection adjustments are manual, costly, and time-consuming, and the timing of changes is sensitive to unseasonal weather in shoulder months.

Solution:

This project aims to explore potential solutions for the network by integrating AI/ML autonomous control with Utonomy's remote control pressure management technology by:

- Enhanced network performance and pressure management to reduce methane emissions.
- Anomaly detection for early identification and diagnosis of networks' faults like water ingress, gas leaks, and asset malfunctions.
- Biomethane injection, allowing for efficient feed-in of biomethane plants to the network.

Overall, the integration of AI/ML technology with Utonomy's remote control pressure management system holds promise for enhancing the efficiency, sustainability, and reliability of the UK gas network.

Benefits

Smarter, autonomous operation of gas network regulators:

- Reduces leaks, and the associated fugitive methane
- Simplifies network operation
- Increases the biomethane injection capacity of the network

Together with the automatic fault reporting of the smarter gas grid, these will also reduce costs and increase the sustainability of the network.

Learn more: Intelligent Gas Grid.

Next Steps

Opportunities Ahead

Over 2024/25, gas network innovation has delivered progress across all outcome areas and strategic themes, with a particularly strong focus on green gases. The announcement of the creation of the Green Gas Taskforce in April 2025 is indicative of the innovation opportunity presented by the energy transition - bringing together the five GB gas networks, biomethane producers, shippers, and industry groups. The Taskforce is advocating for the role of biomethane and other green gases in achieving Net Zero, supporting energy security, and expanding the UK bioeconomy, and outputs from the Taskforce will feed into and demonstrate the value of innovation projects under this innovation theme.

At the same time, networks are aligning their innovation efforts with broader system duties, such as those outlined in National Gas' Roles and Responsibilities, which take a whole-system view of progress. The most recent publication of the Energy Networks Innovation Strategy (published by ENA, but adopted by FEN) reinforces this approach. It provides a unified framework to innovate in ways that support the UK's low-carbon transition and deliver value to customers.

The next price control period for gas transmission and distribution networks, RIIO-3, will begin in April 2026, with draft determinations announced by Ofgem in July 2025. Gas distribution could be allocated a £46m Network Innovation Allowance (NIA), while gas transmission could have an allocation of over £11m of NIA. All network and system operators will have access to portions of a Strategic Innovation Fund (SIF) totalling over £500m.

As RIIO-2 progresses, projects are becoming increasingly iterative, building on learning from previous projects over extended periods of time and across networks and funding streams. For example, Cadent's Air (oxygen) ingress in isolated installations project, funded through NIA, has paved the way for two further air ingress-related innovation projects: Air Ingress in Multi Occupancy Buildings (MOBs) and Domestic Air Ingress Mitigations. These subsequent projects, while still operated by Cadent as the lead network, are also collaborations with WWU and, in the case of the former, SGN.

Future projects will also continue this trajectory to ensure that learnings from the past year are taken forward, moving up the Technology Readiness Level (TRL) scale and closer to BAU implementation.

Key Learnings

During 2024/25, gas networks registered 48 projects and completed a further 56. As these projects progress and many end, networks are increasingly looking to deploy the developed solutions and their learnings into BAU. However, this process is not always simple or straightforward and can bring about its own set of challenges – networks face limitations and high-level strategic changes; innovation takes time, and the process is not always linear; innovation does not always lead directly to a BAU rollout; and some projects focus on creating evidence or testing future feasibility and so are developed without the intention of being rolled out into BAU as they support the wider learning and knowledge required to transform the network. A summary of these challenges and the lessons learned is presented below in Figure 14.

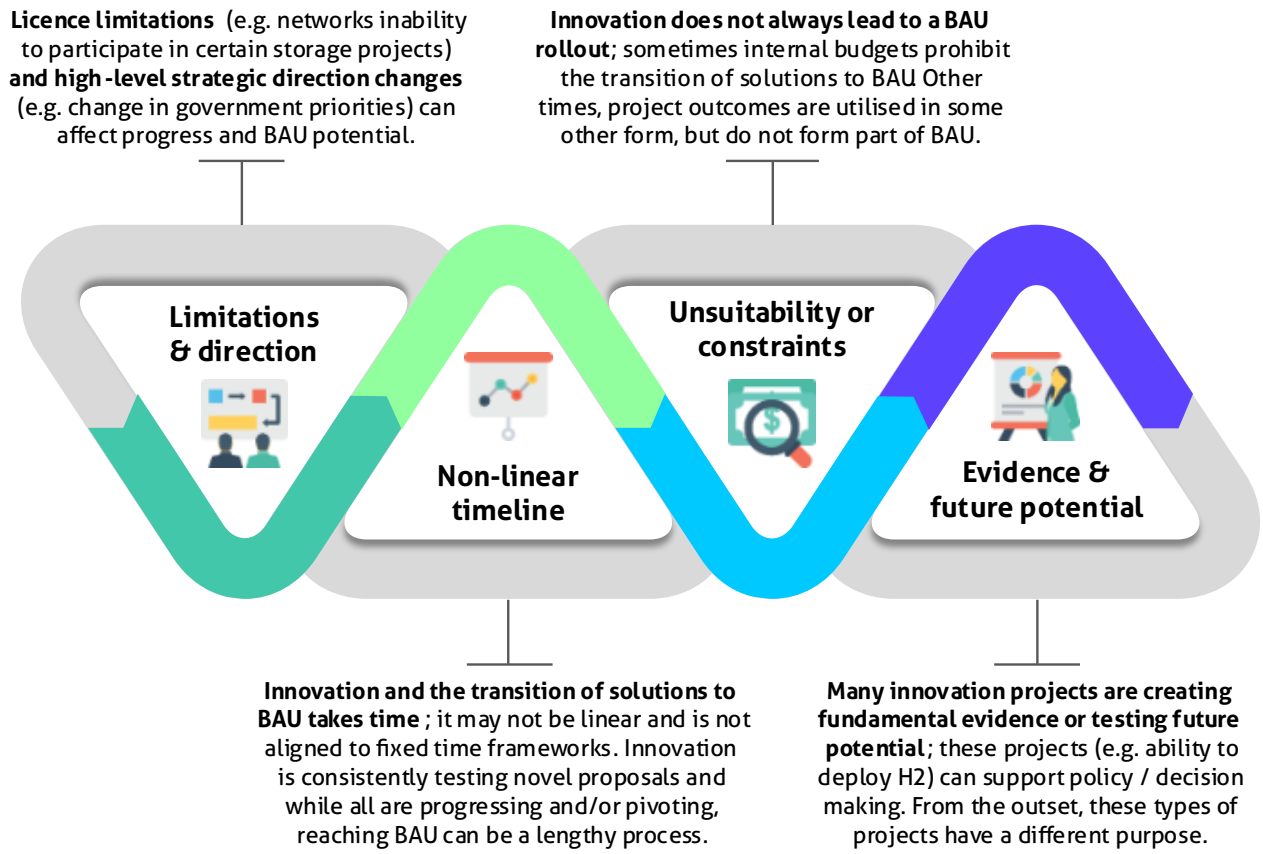


Figure 14: BAU challenges and lessons

Recommended Actions

In line with the innovation risks and challenges, networks have reflected on the key enablers and support needed for integrating the outcomes from innovation into BAU. Enablers centre around the value of communication and planning throughout a project. These include communication and engagement across their businesses, to make sure that all staff are invested in successful deployment. Making this communication effective requires a well-articulated analysis of benefits to show other parts of the business the value of proposed changes. This value can be further articulated through a plan for deployment which can be referred to throughout the solution development process and alignment of innovation team strategy with the wider business strategy.

Some networks also feel that additional funding earmarked for deploying innovative work into BAU would help overcome the resourcing, policy and organisational practice hurdles to integrating these solutions into everyday operations. To address this, Ofgem has introduced a beta version of the Energy Regulation Sandbox, which helps innovators trial new propositions without some of the usual rules applying, and are also planning to launch the Future Regulation Sandbox, an innovative policy instrument to test and trial changes to the energy rulebook in a controlled environment before implementing them. This initiative could help mitigate some of the regulatory barriers to innovation. However, the specifics of deployment are often outside of the scope of innovation projects, and networks still struggle to quickly assemble the necessary resources. Additional policy support through relaxed licence obligations or the ability to use a more simplified/agile policy process also emerged as an important avenue to boost BAU deployment.

The networks have also identified support from industry stakeholders which would help in this process. Building on the focus on communication and internal buy-in, networks identified a need for a consistent methodology to account for non-financial project benefits. It is often difficult for networks to articulate the environmental and knowledge benefits of their innovation work and justify the return on investment for

these projects to both senior leadership and the wider energy industry. Compounding this challenge is the high proportion of low-TRL projects, which are critical for pushing innovation forward, but for which quantification of benefits is challenging, due to their experimental nature and uncertain outcomes. ENA will also be looking to ensure future updates and improvements to the IMF feed in to and align with this report.

Appendix I. Network overview

Gas Distribution and Transmission Networks

As this report is focused on RIIO-2 funded innovation over the regulatory year 2024/25 (April 2024 to April 2025), it is focused on the key innovation progress by the gas and electricity networks in the third year of the RIIO-2 period. Unlike last year's FY24 report, the projects initiated by the electricity and gas networks are reported separately and only those involving the gas networks are reflected in key reporting metrics (such as the balanced scorecard) as well as in the case studies and projects linked throughout the report.

Each network has prepared an individual innovation summary for 2024/25 (linked in the table below) and the insights from these individual reports have been used to create this overarching summary report. The networks have also contributed to this report through engagement in workshops to scope the narrative and discuss challenges across network types.

Network Type	FEN Network Member
Gas Distribution	Wales and West Utilities
	NGN
	Cadent
	SGN
Gas Transmission	National Gas

About FEN

Future Energy Networks (FEN) is a membership organisation representing those in the energy industry seeking to understand and enact the changes needed to deliver the energy networks of the future. FEN's members include the owner and operator of the GB gas transmission network, National Gas and the four Gas Distribution Networks (GDNs) – Cadent, Northern Gas Networks, SGN and Wales & West Utilities, as well as the 5 companies transporting gas across Northern Ireland: Evolve, Gas Networks Ireland, Kinecx Energy, Mutual Energy and Phoenix Energy.

About ERM

This report was written by Environmental Resources Management (ERM) in partnership with FEN and the gas networks. ERM is a leading sustainability consultancy focused on helping clients identify, manage, and exploit the innovation challenges and opportunities presented by the energy transition.

Appendix II. Acronyms

Acronyms	Description
AI	Artificial Intelligence
BAU	Business As Usual
CCUS	Carbon Capture, Utilisation and Storage
CO	Carbon Monoxide
DESNZ	Department for Energy Security and Net Zero
ENA	Energy Networks Association
FEN	Future Energy Networks
GB	Great Britain
HHP	Hydrogen Heating Programme
HSE	Health and Safety Executive
IGEM	Institution of Gas Engineers and Managers
IMF	Innovation Measurement Framework
LAEPs	Local Area Energy Plans
MOB	Multi-Occupancy Buildings
NESO	National Energy System Operator
NIA	Network Innovation Allowance
NTS	National Transmission System
Ofgem	Office of Gas and Electricity Markets
PPM	Parts Per Million
RIIO	Revenue = Incentives + Innovation + Outputs
SCADA	Supervisory Control and Data Acquisition
SIF	Strategic Innovation Fund
SWIC	South Wales Industrial Cluster
TRL	Technological Readiness Level
UKRI	UK Research and Innovation

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