Innovation Strategy

December 2024

Section A Executive Summary

1 One third of the UK's energy demand is supplied by natural gas and at times gas provides 70% of the UK's daily energy needs. We deliver approximately 140 TWh per annum across our customer base of six million, of which 40% is supplied to industrial and commercial end users, including embedded generation. Our gas network plays a vital role in providing an affordable, secure and reliable source of energy to our consumers. We recognise the need to decarbonise and reduce Great Britain's dependence on fossil fuels and support the UK and Scottish Governments' legal commitments to reduce greenhouse gas emissions by 2050 and 2045 respectively. We believe the gas network has an important role in delivering energy in the transition to net zero.

2 Since 2010, we have been pioneering the development of zero carbon energy, delivering the first biomethane entry plant, taking green gas from waste feedstock and injecting it into the gas network. By 2026 we aim to have the equivalent of 450,000 homes using biomethane with more than 42 plants connected to our network. By the end of GD3 we have a greater ambition of enabling the equivalent of greening one million of our domestic customers.

3 In addition, we have been leading the development of the evidence for a hydrogen transition across a range of projects through GD2, including our H100 Fife and Local Transmission System (LTS) Futures demonstrations, and our multi occupancy buildings (MOBs) study, providing critical evidence to support a Government heat policy decision in 2026.

4 We believe consumers should be at the heart of the UK's energy transition and engaging with both domestic and business consumers to deliver decarbonisation is critical to success. Our GD3 innovation strategy is focused on ensuring we provide a safe, resilient network and an efficient service to consumers today and in the future whilst we transition to a low carbon network over the long-term. We acknowledge that there is no single solution for the decarbonisation of heat. A mix of technologies, including heat pumps, heat networks and green gas, will all play important roles. Taking a whole system approach to support energy security and delivering the optimum outcome for consumers is essential.

5 We have set out an ambitious £50.9m[1] plan, which is in line with our investment in GD2, to sustain the trajectory to net zero whilst maintaining a network which will benefit consumers now and, in the future, and is aligned with Ofgem's Sector Specific Methodology Decision (SSMD)[2]. Specifically, our commitment to innovation and the proposed funding will enable us to focus on three key areas which are underpinned by understanding our consumers' needs:

- **Today's network:** Deliver BAU innovation and adopt new technologies that enable us to be more efficient through, for example, building on keyhole repair techniques, enhancing safety with projects such as real-time risk assessments, and increasing sustainability through zero emission construction. Key to this is developing a detailed understanding of and responding to the changing needs of our consumers, especially those in vulnerability, through the transition to net zero.
- **Network transition:** Establish a whole system approach to the energy system transition with new regional engagement and interface functions to support the National Energy System Operator (NESO) and local authorities. Greening the network through maximising biomethane injection, converting two of our Scottish Independent Undertakings (SIUs) to biomethane and developing hydrogen blending, in support of the UK Government's decision. Develop a major programme of optioneering and delivery of MOB decarbonisation through a whole system approach. In addition, we plan to develop a potentially world-leading blending project in Edinburgh, building on our LTS project.
- **Future network:** Support decarbonisation of the whole energy system through effective and productive repurposing of our assets, moving away from natural gas transportation. Understand the

[1] Note – all monetary figures in this Appendix have been rounded to one decimal place for consistency.
[2] Ofgem SSMD: https://www.ofgem.gov.uk/decision/riio-3-sector-specific-methodology-decision-gas-distribution-gas-transmission-and-electricity-transmission-sectors

impact of network decommissioning on our customers, network operation, policy and regulatory frameworks as part of a credible plan for a viable net zero transition.

6 Table 1 below sets out our funding request for each strategic area in our plan against the regulatory mechanisms outlined in the SSMD Network Innovation Allowance (NIA), Carryover NIA (CNIA), Net Zero and Reopener Development (NZARD) and internal investment (Totex).

Table 1: GD3 funding proposal by strategic area and mechanism

Strategic innovation area	Funding mechanism (£m)				
	Totex	NIA	CNIA	NZARD	Total
Understanding our consumers' needs	1.4	0.2	-	-	1.6
Today's network	3.6	1.3	-	-	4.9
Network transition	6.4	19.3	6.8	1.6	34.0
Future network	0.4	10.0	-	-	10.4
Totals	11.8	30.7	6.8	1.6	50.9

Source: SGN Future of Energy Directorate estimate (based on 2024 prices)

7 Investing in innovation is critical to achieving a clean, resilient and affordable GB energy system that consumers will support. We have undertaken an extensive programme of stakeholder engagement to better understand our customers' and stakeholders' priorities. The funding to support our activities within our innovation strategy would suggest an annual household bill impact of £1.40, which is within the acceptable levels of bill variance that we have tested with customers. Without this investment there is a risk that the energy system remains siloed, preventing effective coordination of a transition to net zero and potentially creating sub-optimal outcomes for consumers where networks become less resilient and more costly.

Introduction

8 The whole energy system is seeing unprecedented change, with often-competing tenets that require continuous balancing and careful navigation in pursuit of a decarbonised energy system. We recognise the critical importance of decarbonisation and are committed to playing an integral role in providing clean energy solutions that will achieve net zero emissions. This has been reinforced by our stakeholders, who have told us that their priorities are a secure and resilient energy supply, infrastructure fit for a low-cost net zero transition, a high-quality service and system efficiency.

9 We have set out a highly ambitious £50.9m plan to sustain the trajectory to net zero, whilst maintaining a network which will benefit consumers now and in the future. We believe this is the required level of investment to deliver a strategy based on critical research and development, and demonstration to underpin customer, market, and government decisions on the future of energy supplies. We are also proposing to deliver benefits from proven technologies and solutions to ensure our network is safe, reliable and resilient in a just transition to a net zero future.

10 The gas networks will continue to largely operate as they do today throughout the GD3 period. Existing customers will still require energy for their homes and businesses using natural gas, transported through our assets. Therefore, we need to remain focused on delivering innovation that provides a safe, secure, efficient and quality service in our core business operations for our consumers.

11 As part of the shift to net zero to meet the UK and Scottish Governments' legal commitments to reduce greenhouse gas emissions by 2050 and 2045 respectively, demand for unabated natural gas and other fossil fuels must be phased out and replaced by low carbon and ultimately renewable energy sources.

12 In doing so, it is important to recognise that regional characteristics will drive solutions and technology adoption, requiring whole system thinking. Our Scotland and southern networks have different attributes and policy environments which will likely impact the decarbonisation pathway, which remains highly

uncertain in the context of heat. We also need to understand the influence of wider European ambitions for decarbonisation on the GB energy system, such as blending hydrogen with natural gas.

13 We will focus our delivery in GD3 in the regions that will provide the most impact in the transition to net zero through the early adoption of low carbon technologies and those sectors of the economy that will help deliver a just transition to net zero, such as industrial and commercial consumers. Engaging with consumers and stakeholders such as local authorities, Local Area Energy Plans (LAEPs) and the new National Energy System Operator (NESO) in the development of Regional Energy System Plans (RESPs) will be critical in guiding us towards whole system solutions.

14 Our innovation strategy covers three key areas, underpinned by understanding our consumers' needs:

- Today's network;
- Network transition; and
- Future network.

15 Each area has a dedicated section in this strategy document, stating our key GD3 objectives, our funding request to deliver these and our commitments. We also explain how our customers and key stakeholders have shaped our plan and in what way their priorities have influenced how and when we will deliver against our commitments and key outputs.

16 We set out in Figure 1 below our key commitments and outcomes under our innovation strategy areas, outlining a high-level overview of the areas of focus, aligning with the wider SGN outcomes for GD3. These support Ofgem's four consumer priorities, set out in the SSMD documents. Each area – today's network, network transition and future network – is underpinned and influenced by the most critical: understanding our consumers' needs.

Figure 1: Innovation strategy commitments and outcomes for GD3

Understanding our consumers' needs

Understand our consumers' needs and preferences in greater depth and breadth.

Maintain strong relationships to support decarbonisation, whilst our assets preserve energy security.

Today's network	Network transition	Future network
Responsible investment in research & development that benefits all. • We are more efficient, safe, resilient, and sustainable. • We understand the nature of vulnerability, responding to our customers' needs. • Our customers' energy is decarbonised through a whole systems approach.	**A coordinated whole system approach, delivering carbon reductions for our consumers now.** • Maximise biomethane, greening energy supplies. • Verify, validate, and demonstrate hydrogen blending. • Coordinate decarbonisation solutions for multi occupancy buildings. • Collaborate for a whole system approach to decarbonise the energy system.	**Supporting a low carbon energy transition, a key component of a system transformation.** • Repurpose our assets, supporting the energy system transition. • Understand the impact of network decommissioning for our customers.

17 Our strategic areas and underlying commitments will ensure our customers are at the heart of the decisions we make. We see the delivery of benefits to consumers in several ways:

- Delivering a network that is secure and resilient through operational innovation, providing system efficiency and long-term value for money to consumers;

- Ensuring our networks are fit for the here and now, delivering a high-quality, reliable service to consumers, especially those in vulnerable situations;
- Delivering carbon reductions for consumers through green gases, biomethane now and hydrogen blending in the future, whilst ensuring our networks enable a low-cost transition to net zero; and
- Taking a whole system approach in the transition to net zero, ensuring investment in our networks is made where and when required to support local needs, delivering security of supply and resilience to consumers.

18 The benefits described above can only be realised through the delivery of the essential innovation programme we need to carry out in GD3. We will achieve this through a balanced, coordinated and collaborative approach towards 'no regret', regulatory innovation funding, alongside Totex investment, working with other network operators, other parts of the energy sector and SMEs. Together, this will deliver a resilient network facilitating carbon reduction benefits and value for money to consumers, whilst recognising the impact this can have on bill payers, especially those who are vulnerable.

19 The funding we require from Ofgem to deliver our innovation strategy across GD3 totals £50.9m. The breakdown of this is detailed in Table 2 below against each strategic area. We will deliver our commitments under the strategic areas shown in Figure 1 through the regulatory mechanisms outlined in the SSMD, Network Innovation Allowance (NIA), Carryover NIA (CNIA), Net Zero and Reopener Development (NZARD) and internal investment (Totex). These will allow us the flexibility to deliver solutions which exist now, or we anticipate we will face in the future.

Table 2: GD3 funding proposal by strategic area and mechanism

Strategic innovation area	Funding type	Amount (£m)
Understanding our consumers' needs	Totex	1.4
	NIA	0.2
Today's network	Totex	3.6
	NIA	1.3
Network transition	Totex	6.4
	NIA	19.3
	NZARD	1.6
	CNIA	6.8
Future network	Totex	0.4
	NIA	10.0
Total		50.9

Source: SGN Future of Energy Directorate estimate (based on 2024 prices)

20 Table 2 provides the overall funding request for GD3, whilst Table 3 below indicates the anticipated annual spend for each mechanism over the period.

Table 3: Summary of GD3 annual regulatory funding proposal

Funding source	Funding (£m)					
	2026/2027	2027/2028	2028/2029	2029/2030	2030/2031	Total
NIA	7.4	7.5	6.5	4.9	4.6	30.7

CNIA	3.7	3.1	-	-	-	6.8
NZARD	1.2	0.4	-	-	-	1.6
Totex	2.1	2.7	2.6	2.2	2.2	11.8
Totals	14.4	13.7	9.0	7.0	6.7	50.9

Source: SGN Future of Energy Directorate estimate (based on 2024 prices)

21 Table 3 sets out our annual regulatory innovation funding request by funding source. Our expectation is that the proposed funding mechanisms in GD3 will have parity to those in GD2, with comparable processes to access this funding.

22 The delivery of our innovation strategy using these mechanisms will have a direct impact on gas consumers' bills, with the potential to add £1.40 annually to households. Whilst not an insignificant amount, there is justification if we are to continue to ensure an efficient, safe and secure network and progress a whole energy system transition to meet the net zero ambitions set by the Scottish and UK governments.

23 In addition to the above regulated funding mechanisms, we will look to utilise the Strategic Innovation Fund (SIF) and other external sources of financial stimulus such as Transport for London's Lane Rental innovation scheme, making projects that are inherently risky in nature fairer to the bill payer. It is essential therefore that SIF themes are broadened and inclusive of gas networks, and that the themes remain stable throughout the GD3 period to enable our supply chain partners and innovators time to develop ideas. As shown in our projected funding below, SIF is a significant part of our overall innovation support. We also intend to access reopener mechanisms such as the Net Zero Pre-Construction Work and Small Net Zero Projects (NZASP) during the period to fund higher value projects where they bring benefits to gas consumers as part of the whole energy system transition. We give separate indicative values for these different funding sources below, totalling £68.7m, based on 2024 prices:

- SIF £25.0m;
- External support £7.7m; and
- NZASP £36.0m.

24 Transitioning the economy to net zero in an affordable, secure and fair way presents perhaps one of the most complex and multifaceted challenges the UK has ever faced. The shift to net zero will take several decades to deliver and natural gas, and the natural gas networks, will play a critical role in this transition and in the future as repurposed assets.

25 Notwithstanding the outcome of the decision on hydrogen for domestic heating following the heat policy review in 2026, hydrogen, and other green gases such as biomethane, will have a key role to play in the net zero economy of the future. The investment in each of our strategic innovation areas will bring benefits that are essential for a secure, resilient, and efficient gas network for today's consumers and one fit for the future in the transition to net zero.

26 Failure to invest in innovation, even under a scenario where there is a declining need for gas, could result in an energy system that remains siloed, preventing effective coordination of a transition to net zero and thereby putting consumers at risk from a gas network that becomes less resilient and more costly.

Section B Our innovation strategy

27 One-third of the UK's energy demand is supplied by natural gas and at times gas provides 70% of the UK's daily energy needs. We are forecast to deliver approximately 140 TWh[3] across six million consumers in

[3] https://www.sgn.co.uk/sites/default/files/media-entities/documents/2023-10/SGN-LTDS-2023.pdf

2024, of which 40% is supplied to industrial and commercial customers, including embedded generation. The gas network plays a vital whole system role in providing an affordable, secure and reliable source of energy to our consumers.

28 During the GD3 period we need to remain focused on delivering innovation that provides a safe, efficient, and quality service in our core business operations for consumers. We understand gas networks will continue to largely operate as they do today and our customers will still require energy for their homes and businesses using natural gas, transported through our assets.

29 We also recognise the importance of our consumers in the energy system transition and consumer engagement will play a critical part in delivering decarbonisation and meeting the UK and Scottish governments' net zero targets. This is the fundamental cornerstone across our strategic areas outlined at the start of this Appendix and has defined our strategy based on our current understanding of consumer needs. We believe consumers should be at the heart of the energy transition and engaging with both domestic and business consumers to deliver decarbonisation is critical to success.

30 Equally, there is no single solution for the decarbonisation of heat and a mix of technologies, including heat pumps, heat networks, hybrid systems and green gas, will all play an important role in taking forward a whole system approach to support energy security and delivering best value for money to our consumers.

31 Since 2010, we have been pioneering the development of zero carbon energy and built the first biomethane injection plant, taking green gas from waste and injecting it into our network. By 2026 we aim to deliver biomethane to the equivalent of 450,000 homes, with 42 plants currently connected to our network. In addition, we have been leading the development of the hydrogen transition through our H100 Fife and LTS Futures projects, providing critical evidence to support government policy.

32 Facilitating a whole system approach to decarbonisation plays a key part in our innovation plans. This needs to focus on the improved coordination between network companies, system operators, local authorities, and the wider stakeholder community as part of the transition to net zero. This will ensure a range of options are available to deliver low carbon energy to consumers whilst continuing to develop, maintain and understand the consequential impacts for the energy networks.

33 Our GD3 innovation strategy is focused on ensuring our networks are developed for the safe, reliable and efficient delivery of the energy our consumers need, whilst advancing the energy system transition to address the priorities of net zero over the long-term.

34 Crucial to our innovation strategy is clear programme and project governance. During GD2 we implemented an industry-aligned programme and project-control framework to ensure projects brought forward are appraised through our governance process, to make certain they will deliver benefits for consumers and shareholders, do not encompass any duplication, have the appropriate ongoing financial risk management controls in place and can progress, where appropriate, to be implemented in BAU activities.

35 We assume that the governance associated with CNIA and NIA will remain the same in GD3 as we have seen in GD2 as well as the structure and level risk that networks will need to take on against their allowance.

36 Monitoring projects as they advance through our stage gate process is a key element of our plan, ensuring work packages conclude their outcomes and that these are disseminated, with feedback on any lessons learnt. Our control framework will be carried forward into GD3 as standard working practice as part of our innovation strategy and is critical in fulfilling our and Ofgem's commitments to consumers over the period.

37 Within this document we set out in detail our plan and how we intend to deliver the objectives for each commitment under each of our strategic areas we show in Figure 1 above. This Appendix is structured to allow the reader to gain insight into why investing in our innovation strategy delivers benefits for consumers today, during the transition to net zero and our future customers in a net zero world.

Section C GD2, delivering for our customers

38 In GD2 we have seen a seismic shift in engagement with our customers and stakeholders. This is now a far more significant aspect of our business, reflecting the level of change in stakeholder expectation, emerging technologies, and the introduction of government policies on energy and heat. Leading into GD2, our stakeholders asked us to do more and at a faster pace. This required the provision of the means to facilitate the exploration of solutions they want both now and, in the future, to solve the challenge of decarbonisation whilst protecting our customers.

39 Within the GD2 timeframe we, the wider gas industry, and the whole of the GB energy system have seen unprecedented change. Green gases such as biomethane, which can be introduced into the network as a blend, have increased year on year. Renewable power generation, particularly wind generation, has seen significant growth in capacity, with the expectation that renewables will deliver the majority of GB's power in the future.

40 We have completed groundbreaking projects during the GD2 period to advance the energy system transition and increase the operational efficiency of our business to maintain a safe, resilient network that reduces our environmental impact and puts consumers at the forefront of our day-to-day activities. Many of these projects have been collaborations with the other gas networks, highlighting the importance of working together to deliver credible solutions. Some of our industry-leading projects are described below.

H100 Fife[4]

41 We continue to progress our world-first 100% green hydrogen trial, H100 Fife, which aims to deliver a 'first of a kind' 100% hydrogen demonstration of an end-to-end energy system, to evidence the role that hydrogen can play in decarbonising heat, using the gas network. Figure 2 below shows an image of progress of the hydrogen production, storage and demonstration homes on site as of summer 2024.

Figure 2: H100 Fife hydrogen production and storage site

Source: SGN H100 Fife

LTS Futures[5]

[4] https://www.sgn.co.uk/H100Fife
[5] https://www.sgn.co.uk/about-us/future-of-gas/lts-futures-0

42 Our GD2 LTS Futures project will show there is a critical role for the LTS in the net zero landscape. The project will demonstrate that the LTS can be repurposed and uprated, providing a safe and cost-effective opportunity to deliver hydrogen for power, industry, heat and transport utilisation.

Hydrogen system transformation[6]

43 Spearheading our system transformation programme, our scoping and feasibility projects Aberdeen Vision, H2 Caledonia in Scotland and H2 Connect in our southern England network, have carried out detailed and highly innovative route optioneering of new hydrogen transmission pipeline corridors. We will look to progress these critical pieces of hydrogen infrastructure development for a system transformation through the UK Government's Hydrogen Transportation Business Model, to initially decarbonise industrial and commercial consumers.

Operational safety, resilience, efficiency and sustainability

44 As a top priority for every part of our organisation, safety is embedded within our culture. Our flagship SIF-funded project, Predictive Safety Interventions, is enabling risk assessments that consider dynamic information, whilst the operational efficiency and management of our network has been advanced by the deployment of keyhole technologies such as Core and Vac (see Figure 3 below).

45 These activities also aid a wider range of areas including sustainability by reducing waste and spoil from street-works. We have pushed ahead with other technologies that help reduce methane leaks such as the advanced leakage solution from Picarro[7], a mobile leak detection analyser we have trialled in collaboration with other networks. We have been creative in obtaining funding for our operational safety and efficiency-focused innovation activities as NIA was no longer accessible for this type of innovation and we have successfully accessed external funding such as Transport for London's Lane Rental innovation schemes.

Figure 3: Core & Vac technology in use today

Source: SGN Future of Energy Directorate

46 We have also worked with the other gas networks, stakeholders and partners, including the Department for Energy Security and Net Zero (DESNZ) and the Health and Safety Executive (HSE), to develop the Comprehensive Formal Assessment for conversion of the gas network to 100% hydrogen, working towards the Hydrogen Heat Policy (HHP) decision in 2026. A positive outcome from the HHP decision will provide consumers with choice in the provision of their energy and the ability to decarbonise hard to abate sectors such as industrial and commercial customers.

[6] https://www.sgn.co.uk/news/sgn-and-ngt-accelerate-hydrogen-plans-scotland-and-southern-england
[7] https://www.picarro.com/gas/solutions/advanced_leak_survey

Section D Stakeholder engagement

47 Our customers are concerned about the environment but at the same time expect a safe, resilient, and convenient supply of energy at an affordable cost. Getting it right for our customers and understanding their needs is a key challenge. Many solutions cause significant disruption or require concessions in how energy is used. There is a need to evidence the impact of potential decarbonisation and operational solutions for our customers, where we need to be responsive to emerging technologies and provide options and explanation in a meaningful way. Finally, we need a means of facilitating our customer wants and needs, both now and in the future.

48 In shaping our innovation strategy for GD3 we embarked on a programme of research and engagement with a representative group of our customers to understand what they consider to be the priorities we should focus on, so ensuring our Business Plan is going in the right direction.

49 During these sessions we explored our customers' views about three priorities, assessing the extent to which our customers felt our plans in each priority were going in the right direction, and/or are showing the right level of ambition:

- Improving SGN's environmental performance;
- Supporting our customers in vulnerable circumstances; and
- Decarbonising the future energy system.

50 We engaged extensively with three key audience groups, some of whom were informed and had taken part in prior phases of our research, and others who were entirely new to the research programme:

- Our domestic gas customers;
- SMEs; and
- Our future energy customers.

51 Focusing on our efforts to decarbonise the future energy system, participants appreciated it is a huge challenge to find an alternative to natural gas, and some want to see immediate action. Our whole system approach resonated with many, and participants felt biomethane and hydrogen blending could be 'quick wins' to delivering immediate impact for consumers, with the potential to play on the strengths of each region to drive solutions.

> I like Biomethane because it feels natural, like you are recycling waste in a way.
>
> **Informed, Domestic Gas Customers, Southern**

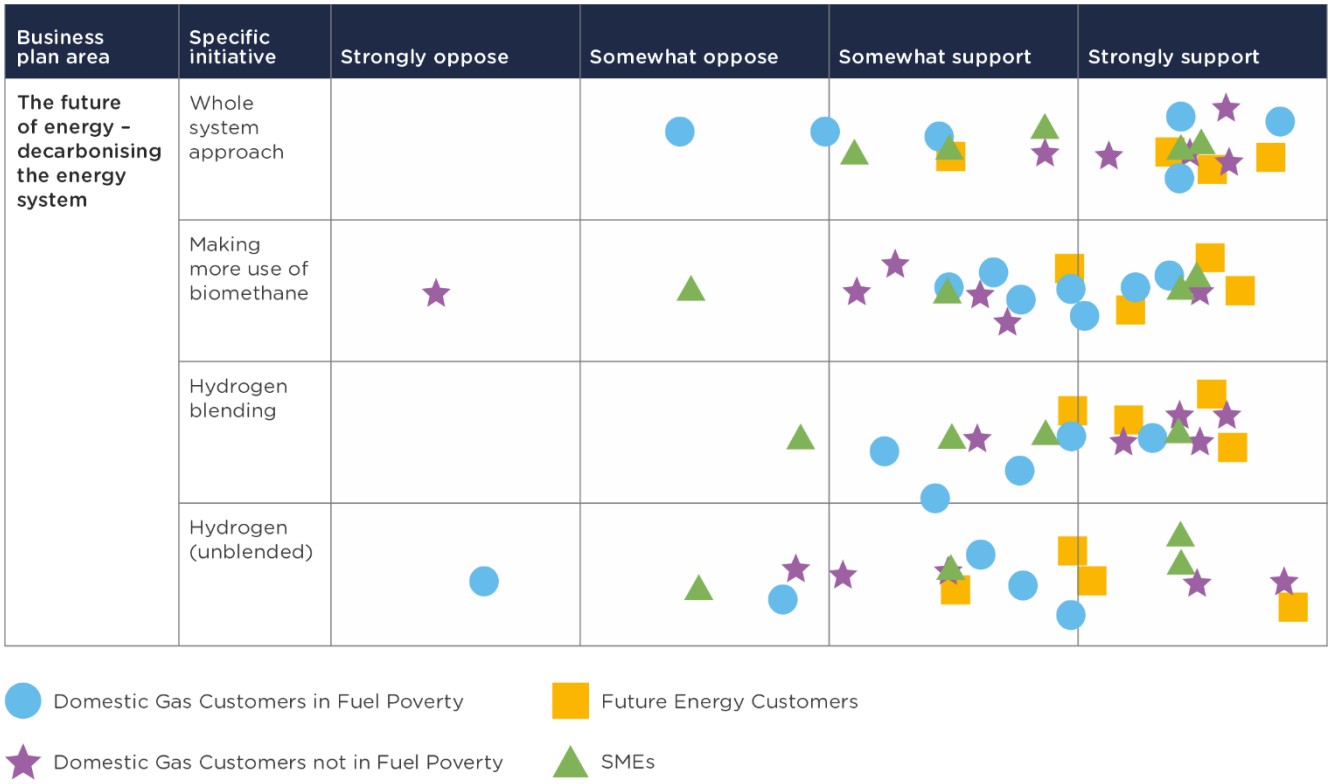
> It's good to see that they are looking at a mix of solutions. This means they can act now and look into the future too.
>
> **Informed, Scotland, Future Energy Customers**

> It's positive to have a whole system approach. If you're in London your requirements will be different to the Highlands. But you do get a postcode lottery of what you're able to access and what it will cost?
>
> **New, SME, Scotland**

52 There was some caution about committing fully to unblended hydrogen while policy is still not decided and the level of investment required is uncertain, although participants were open to us continuing to trial and explore it as a potential energy solution.

53 At the end of the research with this customer group, participants were in strong support of our plans to decarbonise the energy system – particularly taking a whole system approach – and hydrogen blending, as illustrated in Figure 4 below. It should be noted this was qualitative research and the focus was less about quantification than about understanding underlying issues, experiences and motivations, where the answers provided can be seen as strongly indicative of customer views. The methodology was deliberative focus groups, so the symbols in Figure 4 represent groups of customers by type rather than individual customers.

Figure 4: Consumer research outcomes[8]



Source: SGN

54 We also undertook research, in the form of interviews, with our large industrial and commercial customers, providing us with an understanding of their:

- Current and future gas use;
- Decarbonisation plans; and
- Engagement with SGN.

55 The indicative sample size across our Scotland and southern England networks provided an insight to how these organisations, representing more than over 4TWh of gas demand from our network, manage their current gas supply and how they transition to a net zero future.

56 A summary of the findings is shown in Table 4 under each of the areas mentioned above.

Table 4: Summary of findings from industrial and commercial customer research

Current and future gas use	Decarbonisation	Engagement with SGN
Space heating and direct process heat are the main customer activities.	Driving energy efficiency is the most widespread route to reduce carbon footprint. However, half say their main route to decarbonisation is switching from natural gas to electric or carbon-neutral fuels.	Most are aware of SGN, but the level of knowledge is mixed.
Use varies across the year and time of day for many, driven by	The main challenges around decarbonisation are financial, but	Customers ideally want more information, collaboration and

[8] 333 – SGN Phase D Deliberative Research to Shape the Plan, Jul 24 (Sample size: 103)

external factors such as the weather, demand and energy pricing.	other factors include insufficient development of alternatives or guidance from government or regulators.	leadership from SGN, as well as practical efficiencies such as keeping network running costs low.
A constant gas supply is business-critical for many. Half would feel a major impact within 1-hour if gas supply were interrupted unexpectedly.	Customers feel that the drive to reduce gas use should and will lie with businesses, with government and regulators also expected to play a role.	
Three-fifths do not expect their gas use to change in the next year, but more than half expect it to reduce in 5 years and around two-thirds in 10 years.	Technical solutions exist to replace the use of natural gas for two-thirds of businesses, but the costs make these unviable for most.	

Source: 368 – SGN Large Industrial and Commercial Gas Users research

57 The findings from this research have helped us understand the challenges that our industrial and commercial customers face now and will do in the future. We have taken this feedback on board in the development of our plans for GD3, especially where customers want more leadership and collaboration from us to help guide them in the transition to net zero.

Shaping our plans together

58 Alongside our research with our customers, we updated 143 stakeholders at our Shaping our Plans Together[9] sessions in Edinburgh and London (Figure 5), where we also sought input on the proposals to be included in the priority areas of vulnerability, environment and future of energy. Ninety-nine organisations were represented at these events, including industry, service providers, local government and the third sector. Members from our Independent Stakeholder Group (ISG) were also present.

Figure 5: Shaping our Plans Together, London event

Source: SGN

59 Following an explanatory presentation and Q&A session, participants were asked to discuss a range of topics in groups before answering poll questions. Some of the key recommendations from stakeholders arising from this are shown below:

[9] 317 – SGN Stage 3 Stakeholder Engagement Event on Shaping our Plans Together, May 24

- Focus on long-term benefits;
- Develop the whole system approach;
- Advocate for appropriate strategy and policy;
- Regionalise approaches;
- Implement innovative technology; and
- Invest where it will make the most impact.

60 The feedback from the research and our stakeholder workshops has shaped our proposal for funding in GD3. Based on stakeholder feedback, we are proposing:

- Continued research and development for projects that support the decarbonisation pathway.
- Ensure a collaborative, whole system approach is undertaken for the energy system transition, recognising a mix of energy solutions are required, allied to regional characteristics.
- Deliver more biomethane as a 'natural' solution and introduce hydrogen blending into the network as two areas of 'no regrets' action.
- Consider and understand the needs of consumers across different sectors, as they require to be informed and educated in the transition to net zero.
- Focus innovation on operational improvements and technology for an efficient network, helping to reduce consumers' bills.

Engagement with the ISG/stakeholder influence on this plan

61 Throughout the development of this Innovation Strategy Appendix to our Business Plan we have been grateful for the comments and challenges received from our ISG and the wider group of stakeholders we have engaged with. Specifically, the comments received on the draft Appendix have made us refine the content of this section, adding clarity and relevance where necessary.

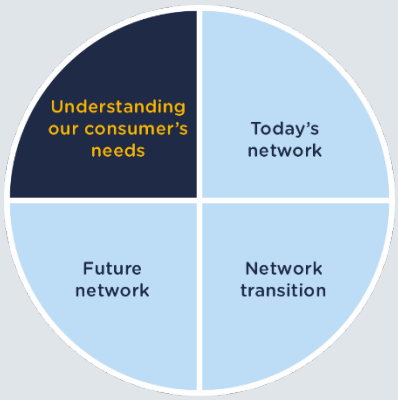
62 The importance of working together to develop and provide understanding for this Appendix to the plan was highlighted through the engagement that took place at our research sessions, our Shaping our Plan Together events and ISG deep dives into specific aspects. The discussions that took place at these sessions have allowed the development of the plan, aligning our outputs with stakeholder expectations.

63 We have undertaken an extensive programme of engagement throughout the development of our GD3 Business Plan to better understand our customers' and stakeholders' priorities and reflect their views as we develop our proposals. Further details on our engagement programme can be found in our SGN-GD3-BP-00 Business Plan, Chapter 2: Customer and stakeholder priorities and Appendix SGN-GD3-SD-12 RIIO 3 Stakeholder and Engagement Log.

64 In the following sections we now provide greater detail under each area of our innovation strategy.

Section E Understanding our consumers' needs

Table 5: Summary of our key commitment, objectives and funding

Key commitment	Understand our consumers' needs and preferences in greater depth and breadth		
Our objectives	Funding Type	Amount (£m)	
Mature our engagement and understanding of our consumers and network users. This will allow us to maintain strong relationships that support their forecasting and decarbonisation plans, whilst using our assets to preserve their energy security.	Totex	1.4	
	NIA	0.2	
	Total	1.6	

Source: SGN Future of Energy Directorate estimate (based on 2024 prices)

65 Table 5 above summarises our key commitment, objectives and funding request by mechanism under our 'understanding our consumers' needs' area. We provide further details within this section of our plan.

66 We recognise the importance of our consumers in the energy transition and consumer engagement will be critical in delivering decarbonisation and meeting the UK and Scottish Governments' net zero targets. We have experienced this through the critical demonstration projects we are delivering in GD2, such as H100 Fife, where we have undertaken a comprehensive engagement campaign that includes research to understand perceptions towards hydrogen and energy change more broadly as part of the recruitment of customers who will, in late 2025, be transitioning from natural gas to green hydrogen.

67 Whilst we have made progress over the GD2 period in engaging with our consumers, gas network operators still have limited direct interactions with them and the customer relationship has been largely with energy suppliers (except where operational issues may arise, such as planned works or gas outages). In future, it will be important for us to better understand our customers and use this knowledge to deliver efficient network investment plans in the context of increasing alternative technology deployment such as heat networks, heat pumps or hybrid systems across our network areas. Increased engagement will be critical in enabling us to continue to deliver a safe, affordable and secure energy transition for our consumers, especially those in vulnerable situations.

68 In GD2 we have started to better understand in greater detail the breakdown of our approximately six million consumers. From a network perspective, our consumer modelling tool has provided greater insight to inform consumer 'switching' to develop strategies for the transition to net zero. Further details of this are provided in our case study below. Figure 6 illustrates the increased focus we are placing in this area with some of the work we are undertaking in GD2 and will continue in GD3.

Figure 6: Increased focus in GD2 on customer segmentation and engagement to develop net zero solutions

I&C Demand (40% of demand, 120k customers)			Domestic Demand (60% of demand, 5.9m customers)		
Industrial	**Commercial**	**Power**	**Consumers**	**MOBs**	**SIUs**
 Customers: 15k	 Customers: 105k	 Customers: 40	 Customers: 4.6m	 Customers: 1.3m	 Customers: 10k
Customer Segmentation & Engagement			Customer Transition Modelling	Network Model for District Heat	Biomethane for SIUs
▪ Half of industrial emissions outside of industrial clusters and where some industries have challenges to electrify processes ▪ 105k commercial consumers represent 30TWh of demand (22% of total demand), used mostly for heating/cooking ▪ Gas peaking plants play critical role in providing dispatchable power into balancing market (c2GW capacity on our network)			▪ Phase 2 of customer modelling underway to identify whole system approach to energy system transition ▪ Study developed to consider MOBs decarbonisation through heat network deployment and opportunity for gas network ▪ Design phase mobilised and work to develop business case for GD3 to support decarbonisation of c5k customers in 2 SIUs		

Source: SGN Future of Energy Directorate

Consumer modelling case study – Dundee City Council

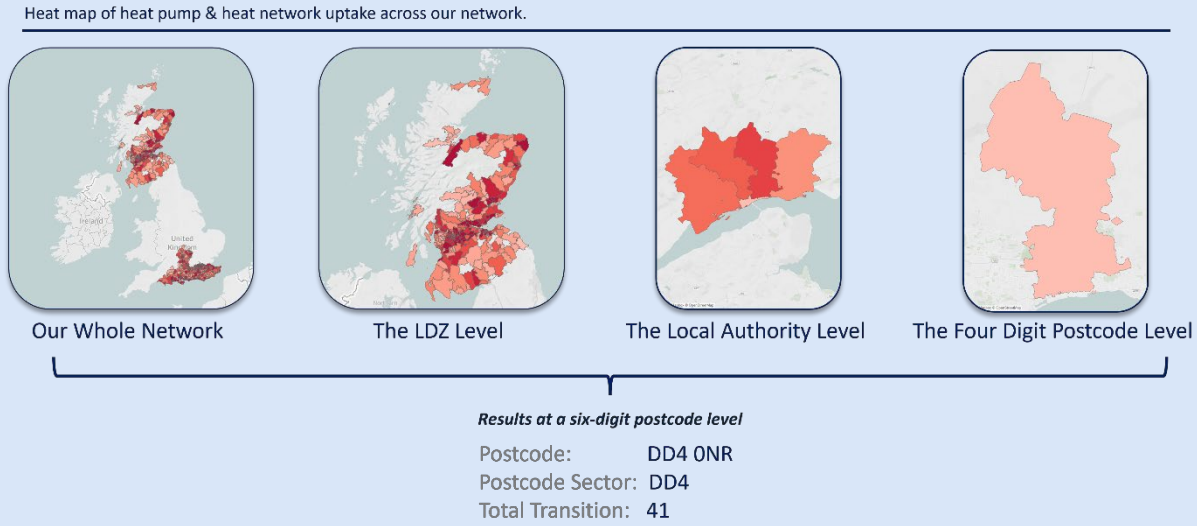
Our consumer modelling tool contains a wealth of data to provide insight to local authorities to assist with their local area planning. The domestic infrastructure section contains detailed property information which includes type, Energy Performance Certificate (EPC) rating, heating technology and tenure. This data can be visualised at a granular level, potentially highlighting areas where the decarbonisation of heat will be more challenging based on the infrastructure present.

Analysis revealed that 10% of properties in our footprint are net zero ready, whilst 14% would struggle to retrofit low-carbon alternative heating solutions. This is due to different factors, including property size and type, energy efficiency levels not achieved, or if the owner is unable to afford an alternative.

The model's future trajectories findings build on the data with the addition of consumer segmentation. We surveyed 1,043 decision-makers to determine how different consumers make home heating technology choices, helping us to understand the propensity to switch away from gas boilers. This allows us to forecast the transition to low-carbon heating technologies out to 2040, based on property suitability, consumer behaviour and potential retrofit costs.

Several trajectory narratives were created to enable the exploration of different economic realities, policy environments and technological advancements and how these impact the rate of transition. Analysis of the central scenario indicates that 63% of our current gas connections will remain in 2040. The transition can be forecast at various levels of detail, from whole network to a six-digit postcode (Figure 7).

Figure 7: Heat map of heat pump and heat network uptake at various levels of granularity



Source: SGN Future of Energy Directorate consumer modelling tool

Dundee City Council

Dundee City Council (DCC) is one of the first local authorities to publish a Local Area Energy Plan (LAEP)[10], which sets out a vision for a zero-carbon energy system for the city. As a member of the Dundee Climate Leadership Group[11], we helped shape the outputs of the LAEP and worked with the other group members to develop a sustainable whole system plan.

A comparison of the outputs from our consumer modelling tool and DCC's LAEP was carried out to understand their alignment. Our model compared well with the statistics published by DCC as shown in Table 6. This can provide confidence to local authorities that the data within the model is accurate and reliable.

[10] https://www.dundeecity.gov.uk/minutes/article?articlekey=94772
[11] https://www.sustainabledundee.co.uk/about-us/dundee-climate-leadership-group

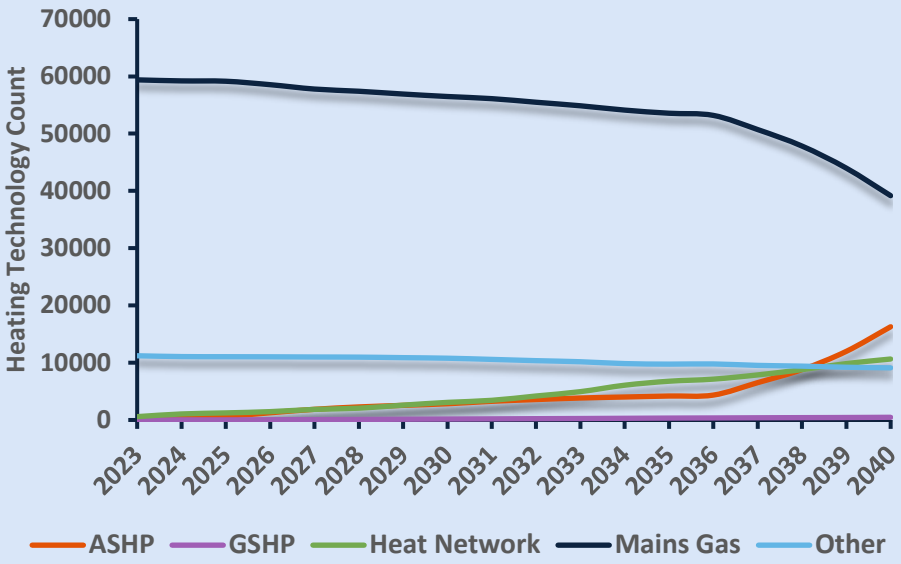
Table 6: Comparison between statistics published in DCC's LAEP and consumer modelling

Attribute	Dundee LAEP	SGN consumer model
Heating technology type	Gas network supplies 87% of homes in Dundee	Mains gas boiler – 81% of properties
EPC rating	Approximately half of domestic properties in Dundee have EPC ratings of D-G	EPC D-G – 46% of domestic properties
Tenure type	The percentages of social homes (31%) and privately rented homes (18%) are higher than national average	Social homes – 28% Private rental – 18%
Property type	Majority of homes in Dundee are flats (53%)	Flats – 57%

Source: DCC LAEP and SGN Future of Energy Directorate consumer modelling tool

The central case projection for the change in heating technology out to 2040 for DCC is shown in Figure 8. It shows a steady decline in gas boilers until 2036, when the transition accelerates. This is met by a rise in air source heat pumps (ASHP) and connections to heat networks. The increase in ASHP installations from 2036 is due to a refresh of the government's heat pump subsidy within the model.

Figure 8: Change in heating technology between 2023 and 2040 for DCC



Source: SGN Future of Energy Directorate consumer modelling tool

Property density and high demand in Dundee make it a prime location for heat networks, with DCC identifying five prioritised zones in its Local Heat and Energy Efficiency Strategy[12]. This is reflected in the model's results, with the number of properties connected to a heat network rising from circa600 in 2023 to circa 10,500 in 2040.

Overall, the central case forecasts that 66% of the current gas connections will remain in DCC in 2040.

[12] https://www.dundeecity.gov.uk/sustainable-dundee/dundee-local-heat-and-energy-efficiency-strategy

69 It is not only domestic consumers who require a more informed approach in the transition to net zero, with approximately 40% of gas demand out of 140TWh being consumed by industrial and commercial users across our networks. This was supported through our industrial and commercial research, highlighted in Section D above.

70 The economic benefits of having a resilient and secure energy system need to be in place for these critical customers to ensure a robust economy for the UK. There is a significant lack of technical information on industrial and commercial downstream installations and customer knowledge and understanding related to decarbonisation plans. There is a need to better understand the key factors that will determine the direction of industrial and commercial decarbonisation.

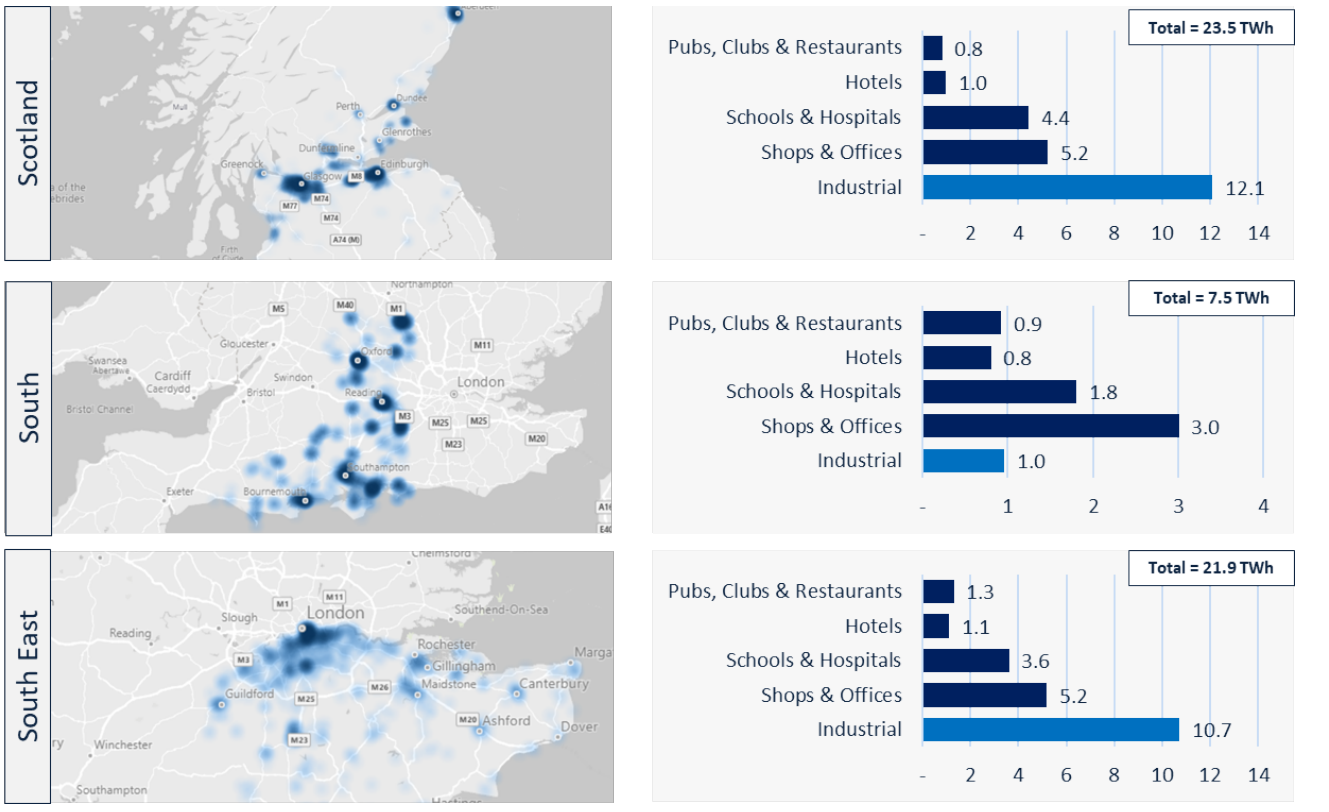
Understanding our consumers' needs, our GD3 objectives

71 The fundamental cornerstone of our innovation strategy is to understand our consumers' needs and preferences in greater depth and breadth to facilitate the energy system transition. We will do this by developing a more insightful level of consumer segmentation through a data-led approach and increased engagement to support consumers through the transition to net zero.

72 We plan to build on our consumer modelling tool with observed data, trends, changes in costs and energy policy to support an informed view of decarbonisation and its implications across our network. This will be augmented with additional data sets that may be relevant and provide further insights (e.g. electrification capacity).

73 Segmentation of our industrial and commercial user base is a further key element to this. Initial work to understand specific characteristics of industrial and commercial consumers is complete, as illustrated in Figure 9 below. We plan to build on this throughout GD3 with increased levels of targeted engagement to better understand these important end users' plans for decarbonisation.

Figure 9: Industrial and commercial demand density and segment analysis by Local Distribution Zone



Source: SGN Future of Energy Directorate

74 This will align with regional ambitions for the decarbonisation of industry and help meet Government strategies such as the recently published Green Industrial Strategy[13] by the Scottish Government. The Green Industrial Strategy sets out a mission to ensure that Scotland realises the maximum possible economic benefit from the opportunities created by the global transition to net zero. There are five key areas which Scotland is initially well placed to develop:

- Maximising Scotland's wind economy;
- Developing a self-sustaining carbon capture, utilisation and storage sector;
- Supporting green economy professional and financial services, with global reach:
- Growing our hydrogen sector; and
- Establishing Scotland as a competitive centre for the clean energy intensive industries of the future.

75 These are areas we would look to support through our engagement and work in partnership with our industrial and commercial consumers to help deliver a green industrial ecosystem.

76 One other area we will focus on in GD3 is managing the interest we expect from stakeholders at our H100 Fife demonstration site. In GD2, as the project has progressed through the different stages, we have seen significant interest from external organisations wishing to visit the site to gain detailed insight to this world-leading development. We have unfortunately had to decline a number of these visits to allow the project team to focus on delivery. However, once the project is live, a genuine world-first, we expect significant interest from a range of stakeholders, and we want to be able to accommodate and share the learnings, experience and evidence from the project. Facilitating these visits provides not only UK and international policymakers with insight but also other stakeholders who are interested in the consumer experience.

Understanding our consumers' needs funding request

77 To support the increased data-led analytics and engagement, we will establish a dedicated industrial and commercial consumer engagement team and invest in the support systems and data analysis functions to augment the delivery of credible information for consumers.

78 Developing and maturing an engagement strategy through GD3 will deliver an increased understanding of our consumers and network users. This will allow us to maintain strong relationships that support their forecasting and decarbonisation plans as part of the energy system transition, whilst using our assets to preserve their energy security and continue to provide significant value to the UK economy. Our deliverables from this proposal are listed below:

- Detailed consumer segmentation and demographic analysis;
- Understand consumer needs;
- Impact assessment for each end user type;
- Regional variations in requirements; and
- Societal and consumer vulnerability impacts.

79 To ensure a high quality of service for consumers we will link this initiative across other areas of our regulated business to fully understand and share insights, especially where vulnerable consumers require support now and in the future. See our SGN-GD3-BP-00 Business Plan, Chapter 4: High quality service, Section D and Appendix SGN-GD3-SD-10 Vulnerability Strategy, Section E: Delivering our GD3 vulnerability.

80 Table 7 below provides a breakdown of the different elements of our funding request for this focus area, using both Totex and NIA mechanisms to develop and deliver our plan.

[13] https://www.gov.scot/publications/green-industrial-strategy/documents/

Table 7: Understanding consumers' needs funding proposal

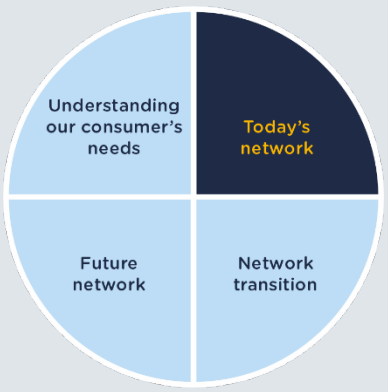
Area	Funding (£m)					
	2026/2027	2027/2028	2028/2029	2029/2030	2030/2031	Total GD3
Totex						
Consumer engagement and analysis	0.2	0.3	0.3	0.3	0.3	1.4
NIA						
System development	0.2	-	-	-	-	0.2
Total	0.4	0.3	0.3	0.3	0.3	1.6

Source: SGN Future of Energy Directorate estimate (based on 2024 prices)

81 From Table 7 above, we predict an efficient spend profile for the people resource element of our engagement and analysis function under Totex that increases over the GD3 period as engagement is embedded in our day-to-day activities. This will also include a resource to manage the visitor interest at our H100 Fife site. For system development under NIA, we expect this to be delivered in the first year of GD3 to ensure we have the support tools in place following our initial engagement programme to capture our consumers' needs.

Section F Today's network

Table 8: Summary of our key commitment, objectives and funding

Key commitment	Responsible investment into research and development that benefits all		
Our objectives	Funding Type	Amount (£m)	
• Drive innovation that enables us to be safer, more efficient, resilient, and sustainable • Develop a detailed understanding of the changing nature of vulnerability and prepare us to respond to our customers' needs when they require us to • Research, develop, and introduce solutions that enable our customers to decarbonise their energy use, safely and efficiently	Totex	3.6	
	NIA	1.3	
	Total	4.9	

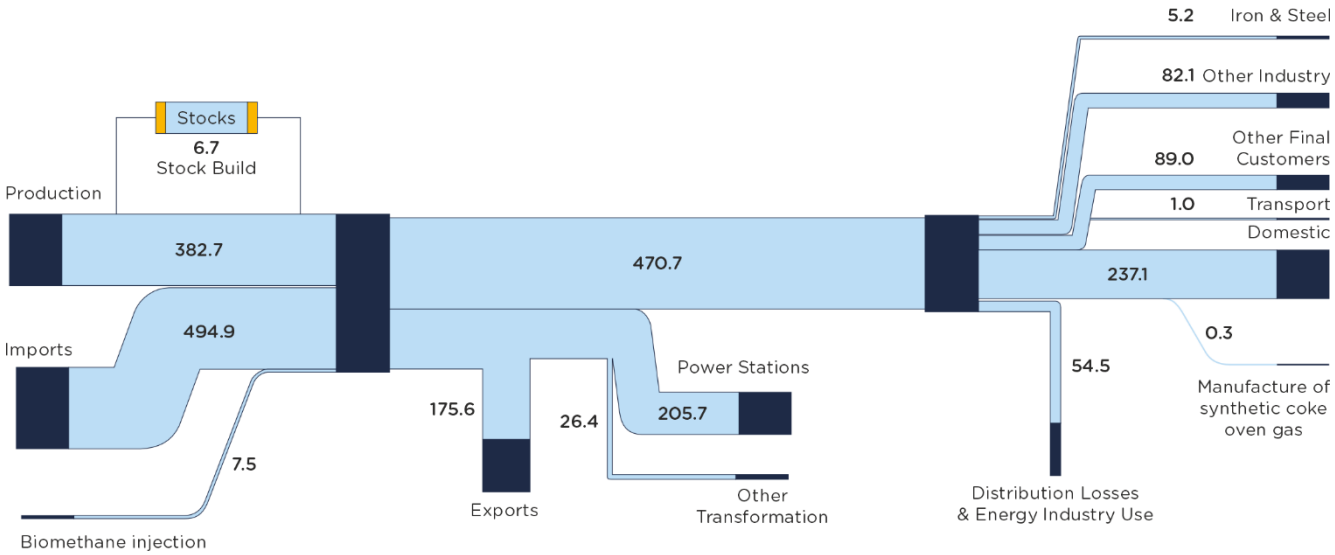
Source: SGN Future of Energy Directorate estimate (based on 2024 prices)

82 Table 8 summarises our key commitment, objectives and funding request by mechanism under our today's network area. We provide further details within this section of our plan.

83 The gas network is key to GB's energy system and is critical in providing a safe, affordable, resilient and secure supply of energy for consumers. In 2023, natural gas consumption was nearly 879TWh. Figure 10, below, illustrates the flow of natural gas across the energy system in 2023. The chart shows the flows of natural gas from production and imports through to consumption. It illustrates the flow of gas from the point at which it becomes available from indigenous production or imports (on the left) to the final use of

gas (on the right), as well as that transformed into other forms of energy or exported. The widths of the bands are proportional to the size of the flow they represent.

Figure 10: Natural gas flow chart 2023 (TWh)



Source: Digest of UK Energy Statistics 2023[14]

84 As can be seen in Figure 10, the UK economy continues to rely heavily on natural gas to support the whole energy system, due mainly to its storability and transportability through Britain's extensive gas network infrastructure and the affordability and ease of use for the end consumer. Natural gas also plays a critical role in energy security with the import of gas from Europe and via liquid natural gas from further afield.

85 In this section we outline our approach to ensure our existing natural gas network is developed for the safe, reliable and efficient delivery of the energy consumer's need. We have identified three areas, delivering innovation to provide secure and resilient supplies and the quality of service our customers expect from our core BAU operations, especially those in vulnerable situations. These are:

- **Safety:** Fostering a safety-conscious environment, providing ongoing training, support and targeted innovation for our workforce. Ensuring a collective responsibility and having proactive risk management practices to achieve our goal of zero harm.
- **Efficiency:** Improvements with a commitment to innovation aimed at optimising processes and workflows to maximise the productivity of our operatives and back-office support activities.
- **Sustainability:** Advancing decarbonisation initiatives, promoting the circular economy within our operations.

86 These will provide the means to ensure we continue to operate a safe, secure and resilient network which is efficient, data-rich and responsive to change, where consumers have access to gas supplies that are resilient to physical, financial, climate and cyber shocks.

87 In the following sections we outline the breakthrough innovation element of our GD3 Business Plan for today's network. We believe this plan represents a balanced approach to risk for energy bill-payers, spreading the funding mechanisms across those funded by consumers such as NIA and Totex, and external sources such as SIF or Innovate UK and Transport for London Lane Rental innovation programmes.

88 Our plan has been built using the guidance of subject matter experts and our stakeholder representative groups and will be enhanced through further insights from our engagement functions, detailed in this Appendix (Understanding our consumers' needs and Whole system approach). During GD3 we will also develop a picture of the outside world, including macro- and industry-specific trends, capturing the ideas

[14] https://assets.publishing.service.gov.uk/media/66a7e14da3c2a28abb50d922/DUKES_2024_Chapters_1-7.pdf

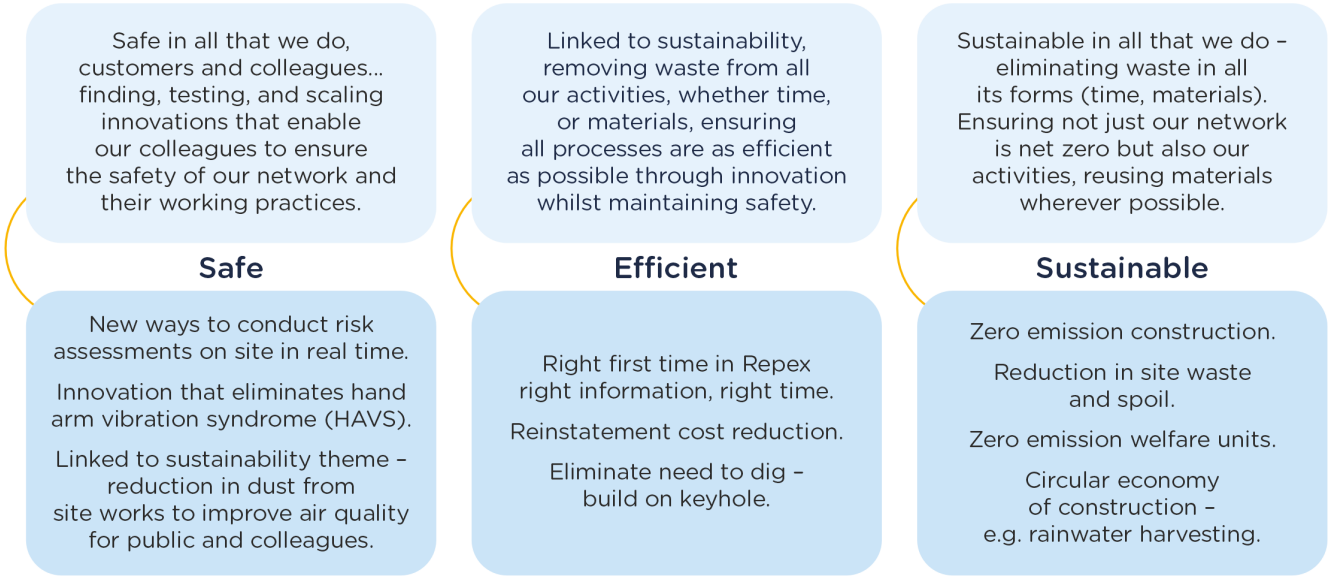
from our ecosystem and converting the best into projects through our innovation project-control framework.

89 We are confident that the themes we have highlighted, and the funding prioritisation attached to them represent a sensible and programmatic approach for what is inherently a riskier area of investment than others, allowing us to remain focused on delivering innovation into BAU which provides a safe, efficient and quality service in our core business operations for consumers.

Today's network, our GD3 objectives

90 For GD3, there are distinct focus areas for our BAU innovation portfolio under our today's network strategic area that we expand on in the following sections. Figure 11 below illustrates these areas at a high level.

Figure 11: BAU Innovation for today's network area in GD3



Source: SGN Future of Energy Directorate

91 These broad areas focus on safety, efficiency and sustainability, which are key to drive meaningful innovations into our organisation which have the best chance of adoption and transfer to BAU, whilst supporting Ofgem's strategy of ensuring we have a safe, resilient and reliable network.

92 Safety is a top priority for every part of our organisation and is embedded within our culture through initiatives such as our Protect programme and our health and safety policy[15]. This comprehensive safety framework emphasises collective responsibility and proactive risk management practices to achieve our goal of zero harm. By fostering a safety-conscious environment and providing ongoing training, support and targeted innovation to our workforce, we are committed to ensuring that every employee returns home safely at the end of each day and our customers remain safe and warm.

93 Efficiency improvements will also be a key focus, with a commitment to innovation aimed at optimising processes and workflows to maximise the productivity of our operatives and back-office activities. We will also concentrate effort on the double benefits of leakage reduction, which not only improves our efficiency but also lowers emissions and promotes wider sustainability.

94 Our resilience and sustainability programme will concentrate on advancing decarbonisation initiatives and promoting the circular economy within our operations. We recognise the importance of reducing our carbon footprint and environmental impact and, as such, we will actively explore innovative ideas to achieve net zero emissions and optimise resource utilisation which incorporates smart solutions, reducing public disruption. Through collaboration with industry partners, academia and government agencies, we

[15] https://www.sgn.co.uk/sites/default/files/media-entities/documents/2024-01/SGN-health-and-safety-policy-2023.pdf

aim to drive meaningful progress towards a more sustainable future for our business and the communities we serve.

95 Our plans will embrace full collaboration with a wide range of third parties, including small and medium sized enterprises, through 'call for ideas', engagement at industry events, exhibitions and tradeshows to ensure full consideration of third-party innovation ideas.

Today's network funding request

96 In Table 9 we indicate our request for funding for these key innovation activities in GD3 under our today's network area as described above. We believe that NIA and Totex funding should be made available for the core BAU innovation elements of our plan, allowing the flexibility these mechanisms offer to act promptly on new and emerging opportunities as they arise and deliver consumer benefits through the introduction of new operational technologies. Recognising that SIF discovery phase will likely be covered by NIA in GD3, we will have projects focused on sustainability and resilience in our portfolio and want to use NIA for these early-stage innovations.

97 This also encompasses our emerging technology programme, where we will look to increase our work with academia, sponsoring research, and building a productive ecosystem for our innovation portfolio. This will be focused on academic research, and third-party innovators from outside our sector.

98 We anticipate that other external sources of funding (beyond SIF) could amount to a further circa £4.0m of potential support from collaborative, competition-based mechanisms building on our recent experience, these are not included in the table below. We have been successful at winning external funding for innovations in our GD2 programme and will continue to use these mechanisms for innovations that improve our service to customers and the environment.

Table 9: Funding split by mechanism for today's network innovation

Mechanism	Funding (£m)					
	2026/2027	2027/2028	2028/2029	2029/2030	2030/2031	Total GD3
NIA	0.3	0.3	0.3	0.3	0.3	1.3
Totex	1.2	1.2	0.7	0.3	0.3	3.6
Total	1.4	1.4	1.0	0.6	0.6	4.9

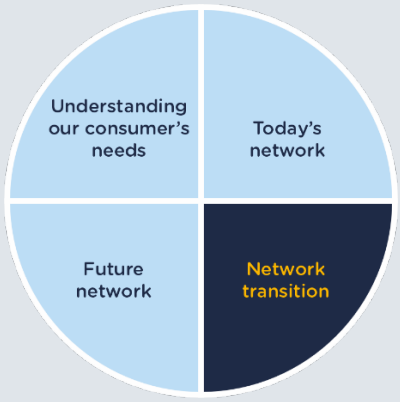
Source: SGN Future of Energy Directorate estimate (based on 2024 prices)

99 In Table 9 our proposed spending profile for this portfolio is to 'front-load' and invest more in the early years of the price control. We believe this will enable rigorous testing of new innovations to commence at the start of the period, and therefore be ready in time either for deployment to BAU within the GD3 timeframe or can be delivered as BAU during the following GD4 period.

100 We believe our plan outlined here and the associated spend is prudent and represents fair value for our customers with a balanced risk. We are confident that the themes we have highlighted are critical areas to explore through innovation and will play an important part in maintaining a safe, resilient and reliable network.

Section G Network transition

Table 10: Summary of our key commitment, objectives and funding

Key commitment	A coordinated whole system approach, delivering carbon reductions for our consumers, now		
Our objectives	Funding type	Amount (£m)	
• Maximise biomethane injection, working collaboratively with the biomethane industry to enhance the gas networks' role in greening energy supplies • Progress hydrogen blending evidence from GD2 to consolidate 'no regrets' verification, supporting its viability • Deliver technical verification, and validation of our operating models under hydrogen blending scenarios • Progress the decarbonisation opportunities for consumers by introducing hydrogen as a blend into our network • Work with stakeholders on solutions to decarbonise high-rise multi occupancy buildings transitioning from natural gas • Establish the capability and capacity to work collaboratively with stakeholders for a whole system approach for the decarbonisation of the energy system	Totex	6.4	
	NIA	19.3	
	NZARD	1.6	
	CNIA	6.8	
	Total	34.0	

Source: SGN Future of Energy Directorate estimate (based on 2024 prices)

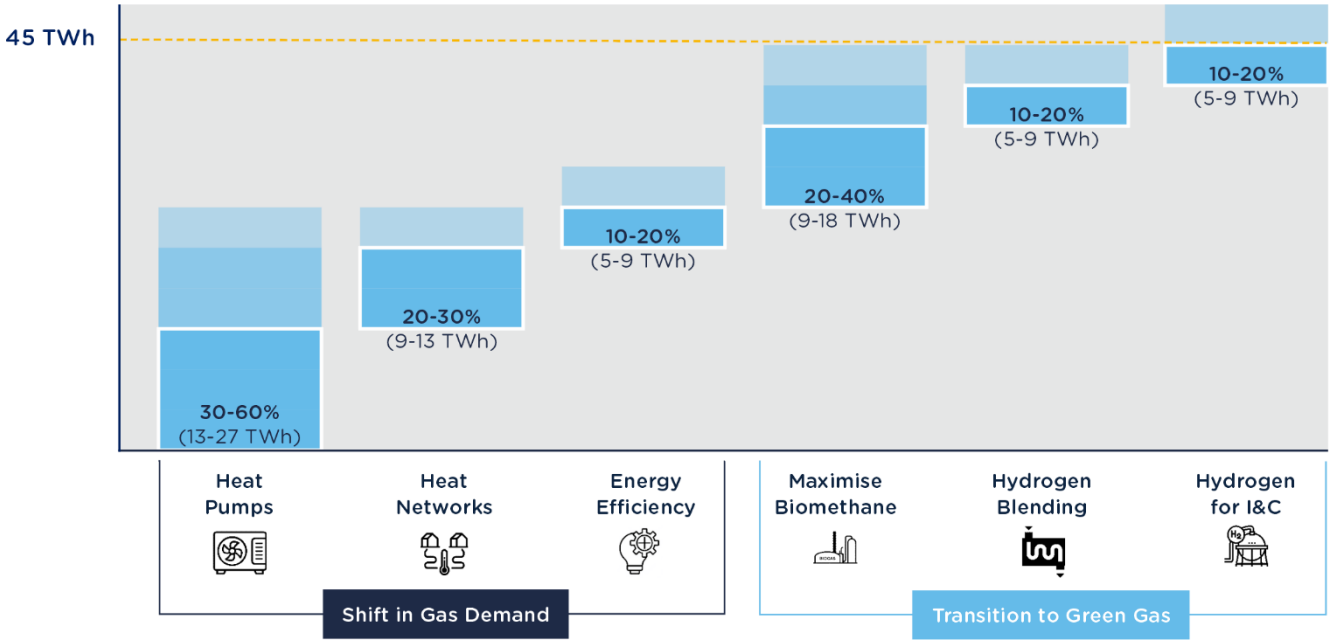
101 Table 10 above summarises our key commitment, objectives and funding request for our network transition area. We provide further details within this section of our plan.

102 Our role in the transition to net zero throughout GD3 will facilitate the improved coordination between network companies, system operators and other key stakeholders. This will ensure a range of options is available to deliver low carbon energy to consumers, whilst continuing to develop and maintain our existing network, legal obligations and safety requirements, enabling a low-cost transition to net zero.

103 This is irrespective of the outcome of the decision on the role of hydrogen in a domestic setting following the Hydrogen Heat Policy review in 2026. Hydrogen, and other green gases such as biomethane, have a key role to play in the future net zero economy. Blending them into the existing gas network can play a critical part in the transition of the energy system. The GB gas industry can play an important stimulus role in hydrogen and biomethane production to reduce emissions from existing gas consumers, whilst delivering a whole system solution for the transition to net zero.

104 As an example, Figure 12 below illustrates the potential to meet Scotland's existing energy demand through the gas distribution network via a range of technologies and the blending of green gases to meet net zero.

Figure 12: Potential to meet today's energy requirements through the Scottish gas distribution network



Source: SGN Future of Energy Directorate estimate

105 With the expected reduction in natural gas demand, Figure 12 shows how a transition towards green gases can facilitate a net zero gas grid, maximising the value of an existing asset that our customers have paid for.

106 In this section we expand on the opportunities in GD3 to deliver real carbon reductions now for consumers from the transportation of green gases through our network, solutions to the challenges of decarbonising high-rise buildings in the transition to net zero, and how we will undertake a whole system approach for the evolution of the energy system. Primarily utilising NIA, we will focus on the following areas:

- **Whole system approach:** Support the development of the Regional Energy Strategic Plans (RESP) and other stakeholder-led net zero strategies, including those brought forward by local authorities or Local Area Energy Plans (LAEPs), to deliver a coordinated energy system that revolves around an integrated, stakeholder- and network-led collaborative approach to the energy system transition. Adopting whole system engagement with the National Energy System Operator (NESO), Distribution Network Operators (DNOs) and Gas Distribution Networks (GDNs) via joint cross vector NIA projects will constitute a key part of how this focus area will be delivered.
- **Greening the network – biomethane**: Deliver greater volumes of biomethane into our network through a proactive approach, developing our business to facilitate growth in this sector. Biomethane has a key role to play in decarbonising the gas conveyed in our network and will be instrumental in partnering with hydrogen blending to deliver a clean, decarbonised, renewable energy source to meet government net zero targets.
- **Greening the network – hydrogen blending**: Through CNIA and NIA we will carry on developing the hydrogen blending evidence from GD2 to consolidate 'no regrets' verification, supporting its viability and introduction into our network. We will also look to implement and evolve a framework to deliver a targeted methodology for hydrogen blending, offering a route to market and an opportunity to alleviate curtailment and constrained renewable generation of electricity.
- **Multi occupancy buildings, assessing a low-cost transition to net zero**: As a responsible network operator, we will look to deliver solutions for the transition of multi occupancy buildings (MOBs) to alternative heating systems, managing the incumbent duty of supply legislation placed upon GDNs. Our research in GD2 indicated that internal network risers over six storeys high are largely unsuitable for hydrogen conversion, while some of our most vulnerable customers reside in MOBs. In GD3 we will focus on NIA projects to refine the transitional safety, technical, financial, legal and logistical

aspects of decarbonising MOBs. We will conduct extensive stakeholder engagement and ensure minimal disruption to residents through the transition.

107 These activities, primarily using NIA, will deliver the necessary building blocks and engagement to facilitate a low carbon energy system, taking into consideration the outcomes of our engagement with consumers to understand their needs. This will enable us to better understand the transition to net zero and minimise the cost to consumers of a system transformation.

108 We also highlight in this section three potential projects we will look to take forward in GD3 through the NZASP uncertainty mechanism. These are at an early stage of development; however we have provided an indication of the associated costs for these under NZASP, noting the high degree of uncertainty in these figures that will be further refined and supported by the use case and appropriate feasibility studies we will undertake first with NIA and NZARD funding, validating assumptions and requirements prior to NZASP.

Whole system approach

109 Our definition of a whole system approach supports the alignment of the collective resources, strategies, and ambitions, to build and maintain a future energy system. This will deliver clean, sustainable energy for customers through an efficient and collaborative transformation, supporting Government policy objectives and providing optimal solutions for consumers.

110 As we move towards a more integrated energy system, supplied by a diverse range of renewable and low carbon sources, the need to ensure a coordinated approach towards energy network investment, operation, and the impact this has on consumers is increasingly important. The whole system approach is essential to deliver solutions that support decarbonisation and assure energy security of supply and resilience at the most efficient cost for consumers. Improved coordination between network companies, system operators and other actors that impact the energy system will ensure that more options are available to deliver low carbon energy to consumers at the lowest cost.

111 Critical to the delivery of whole system solutions will be collaboration and engagement at a national and regional level which unites the gas distribution network, its users and key stakeholders. The challenge of decarbonisation is transporting renewable energy to every part of the whole system in a way that is safe, reliable, affordable and practical. Breaking down the barriers that currently restrict a whole system integrated approach is a critical step towards achieving this.

112 A whole system modelling approach recognises that analysing the electricity and gas systems in isolation is neither sufficient nor appropriate. This is particularly important in the context of the electricity and gas systems becoming increasingly interdependent in the pathway to net zero. For example, electricity networks will have to be sized and will have to account for generation capacity fully or partially dedicated to the production of hydrogen. At the same time, gas networks will have to be repurposed to facilitate the potential increase in green gases flowing through them, as well as the use of hydrogen in power generation to support renewable electricity generation. There will also be decommissioning of parts of the network for other uses as alternative energy sources begin to dominate the transition to net zero.

113 For gas networks, the decarbonisation pathway remains uncertain until the UK Government's policy decision on hydrogen domestic use is made in 2026. There is uncertainty as to which solutions will deliver the decarbonisation that we rightfully seek at a local, national and even global scale. We therefore need to tread carefully with assumptions and scenarios, rather than real indications, from markets and customer choices for example, when determining asset investment plans.

114 It is becoming increasingly clear that strategic whole system planning is crucial to achieving net zero carbon emissions targets across the UK, leading to the coordinated development of the system across multiple vectors. By taking this approach, we can find the most cost-effective solutions for our customers while ensuring energy security. The creation of the NESO and RESPs to independently drive national and regional energy planning, bringing electricity, gas and hydrogen plans together is a step in the right direction. This is a complex task in an ever-evolving landscape, filled with uncertainty and trade-offs between different energy vectors to ensure investment is made when and where it is needed.

115 Through its recent consultation, Regional Energy Strategic Plan policy framework consultation, July 2024[16], Ofgem has started to detail the function, governance and boundaries for RESPs which will improve local energy planning and speed up the transition to net zero. It is important to recognise that regional characteristics will drive solutions and technology adoption, requiring whole system thinking. Our Scotland and southern England networks have different attributes and policy environments which will likely impact the decarbonisation pathways for each region.

116 In our response to Ofgem's consultation, we supported the general principles and intention behind the RESPs. However, we highlighted the need for careful consideration of several factors which will impact their practical deliverability. These included network planning and coordination with industry participants, network obligations and responsibilities and the need to consider and address the cost impacts for consumers as a result of proposed energy solutions.

117 It is not only the introduction of the NESO and RESP that will help deliver net zero. Working in tandem with local government, including county, district, borough and combined authorities plays a critical role in developing a bottom-up approach in the transition to net zero. Through planning, investment and leadership, local authorities are supporting the roll-out of low carbon technologies which will help meet decarbonisation targets, with many now developing LAEPs. As a result, collaboration between energy networks and local government is key to ensure robust forecasts about where, when and how to focus investment on energy infrastructure to support the transition to net zero, feeding this engagement into the RESPs and actively supporting this by conducting the required research projects via NIA and NZARD mechanisms.

118 Implementing a whole system approach, highlighting key areas where increased interaction between electricity and gas infrastructure will be required and the engagement to understand this, will influence changes to regulation, market frameworks and system operator practices to deliver value to consumers.

Whole system approach, our GD3 objectives

119 Our key objectives from a whole system perspective during GD3 will support the RESPs and other stakeholders, such as local government and LAEPs, in the development of a coordinated distribution system based on an integrated, stakeholder-led approach for the transition to net zero. Ensuring investment in our network is made where and when required to support local needs is critical to deliver security of supply and resilience for our consumers. Our proposal will align with the underlying RESP building blocks and principles of:

- **Place-based**: On the requirements of the local area under consideration, including the physical geography, domestic and industrial population, existing energy infrastructure and the viability of new/differing infrastructure, funding projects via NZARD;
- **Whole system**: Considering all energy vectors in addition to heat, transport, power, and industry, based on the place-based considerations and observable customer behaviour and cross-vector demand, aligned via NIA projects;
- **Vision-led**: Planning in line with the agreed principles for the region, which must include consideration of customer priorities utilising NZARD and NIA; and
- **Proactive**: Planning investment ahead of need, to build investor confidence.

We would also add:

- **Energy security**: To ensure that a region retains a defined acceptable level of energy security, even in a multi-vector scenario. This includes maintaining network resilience and the relevant investment required during the transition to net zero. Viable alternatives need to be available prior to any transition activity to ensure we do not jeopardise consumers' energy security. Under security of

[16] https://www.ofgem.gov.uk/sites/default/files/2024-07/Regional_Energy_Strategic_Plan_policy_framework_consultation.pdf

supply legal arrangements, GDNs are duty-bound to this principle. We also believe this is morally the right thing to do, to ensure equality of energy and that no customer is left stranded.

120 To deliver our objectives we will establish a whole system function to ensure coordination, collaboration, engagement and knowledge-sharing with the RESPs and other stakeholders can be supported, from regional governance at a Strategic Board level, local authority LAEPs/LHEES and local working groups.

121 We will target regional alignment across our networks to ensure we have the appropriate resources in place to engage with the RESP and other actors, marrying up with the boundaries set out in the Ofgem consultation document, Regional Energy Strategic Plan policy framework consultation, July 2024. This identifies six potential areas of interaction in our southern England network and one in our Scotland network. As well as face-to-face engagement resources, we have identified back-office roles that will be required to support the delivery of data and data analysis for the RESP and other interested parties.

122 Increasing our head count over the GD3 period will allow us to facilitate regional engagement and collaboration across energy networks, local government and consumers to ensure robust forecasts about where, when and how to deliver 'no-regrets' investment in energy infrastructure to support the transition to net zero. This will ensure a common objective for each region, improve understanding of what infrastructure is needed to achieve net zero prospects and send a strong signal to investors.

Greening the network – biomethane

123 We have been at the heart of biomethane injection into the UK gas distribution network since the first biomethane-to-grid plant went live at Didcot in Oxfordshire in 2010. We also pioneered the first commercial biomethane-to-grid facility at Poundbury[17] in 2012, which is still successfully operating in 2024 and with plans to expand and increase its biomethane injection rate in GD2. We have been at the forefront in adopting requirements of the biomethane industry in terms of developing biomethane policy and procedures and providing assets to deliver solutions.

124 Importantly, we recognise that biomethane has a key role to play in decarbonising the gas conveyed in our network and will be instrumental in partnering with hydrogen to deliver a clean, decarbonised, renewable energy source to meet government net zero targets.

125 Our strategy to develop biomethane to date has enabled us to provide a responsive, efficient and economic gas network, facilitating biomethane entry in a safe and timely manner to meet important government subsidy deadlines.

126 Currently we have 42 connected and operational biomethane plants across Scotland and southern England that deliver enough entry capacity to meet the equivalent of 317,000 of our domestic customers' energy demands. In GD2 we are working towards an increase in biomethane connected capacity, aiming to deliver sufficient conveyed energy to supply the equivalent of 450,000 of our domestic customers with clean green gas.

127 This will be taken forward to push towards a greater ambition of enabling the equivalent of one million of our domestic customers by the end of GD3. However, we recognise that to achieve this ambition the strategy underpinning this must build upon objectives that proactively support sustained biomethane growth and must be supported by government, local authorities and RESPs.

128 In this context, biomethane has an important role in meeting net zero targets and the requirement to shape our network and associated processes to support this required growth.

Greening the network – biomethane, our GD3 objectives

129 Currently we plan and develop our networks to meet licence conditions around security of supply through delivering natural gas to meet year-round customer capacity requirements. Whilst this will remain at the forefront of our business into GD3 to maintain a safe and reliable network, the planning and development

[17] https://poundbury.co.uk/sustainability/ad-plant/

of our network also needs to pivot towards establishing a platform to accommodate significant growth in biomethane entry.

130 To deliver our objectives in GD3, we have identified four key strategic goals underpinning the transition, which are listed below:

- Biomethane gas conveyance will be prioritised over natural gas;
- We will establish dedicated teams in our Scotland and southern England networks to support new and existing biomethane sites;
- We will develop the regulatory and commercial landscapes to enable biomethane entry capacity to deliver security of supply standards; and
- We will develop a biomethane gas solution for our Wick and Thurso SIUs, utilising locally produced biomethane to partially decarbonise the energy requirement of these networks.

131 For further details on these initiatives, see our SGN-GD3-BP-00 Business Plan, Chapter 6: Infrastructure fit for a low carbon transition, Section C: Biomethane. Appendix SGN-GD3-SD-01 Environmental Action Plan, Section C: Environmental action plan and Appendix SGN-GD3-SD-11 SIU Strategy, Section H: Future energy options.

Greening the network – hydrogen blending

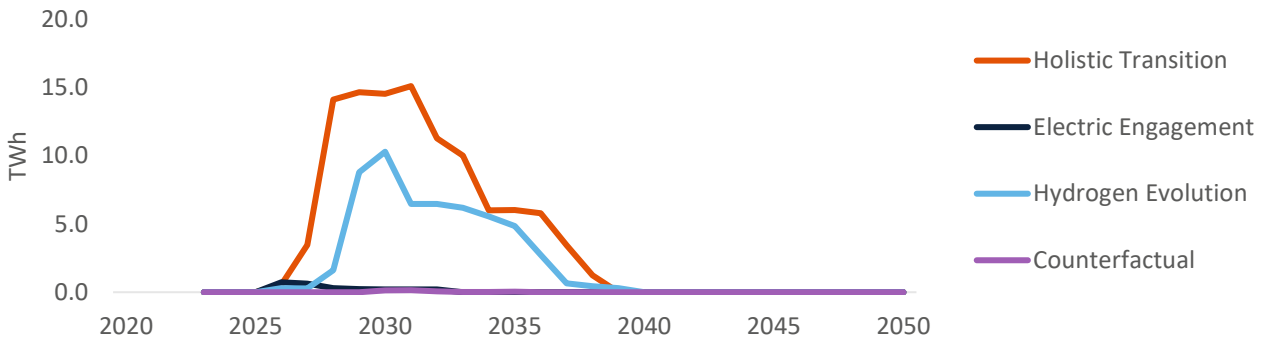
132 The UK government has made a strategic policy decision to support blending of up to 20% hydrogen by volume into the GB gas distribution networks[18]. This decision will be subject to gathering and assessing the relevant safety evidence from projects such as HyDeploy[19], industry trials, demonstrations and tests.

133 In its policy decision the Government confirmed a free-market approach is the preferred technical delivery model for hydrogen blending. The free-market approach mimics the existing arrangements for connections to the gas network and would let the market decide where to inject hydrogen into the network. Whilst we support this approach, we need to clearly understand the implications at a network level for the roll-out of hydrogen blending. A strategic approach to blending may be more appropriate in certain circumstances.

134 The EU is also proposing to allow a blend of up to 5% hydrogen in cross border transport, therefore gas entering the National Transmission System at terminals such as Bacton Interconnector or Isle of Grain could potentially contain blends of up to 5% hydrogen in the near future.

135 Figure 13 below illustrates the potential for hydrogen blending at a GB level, under the different pathways in the 2024 National Energy System Operator's Future Energy Pathways.[20]

Figure 13 : Potential for blending across GB



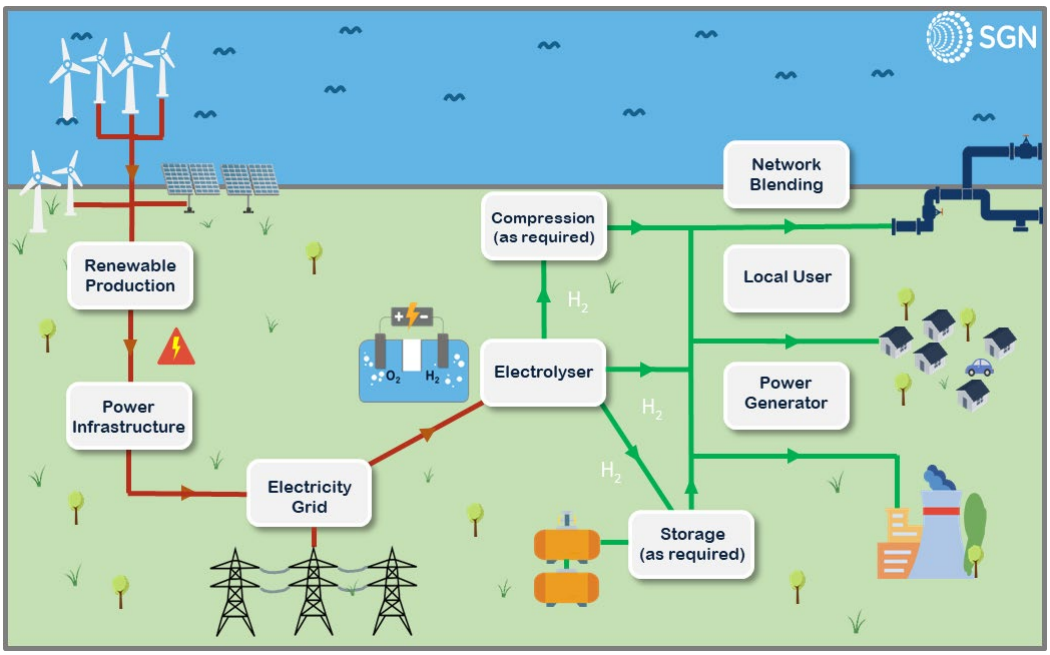
Source: NESO FEP 2024

[18] https://www.gov.uk/government/publications/hydrogen-blending-in-gb-distribution-networks-strategic-decision
[19] https://hydeploy.co.uk/
[20] https://www.neso.energy/publications/future-energy-scenarios-fes#Executive-introduction-key-message-and-modelling-changes

136 Whilst Figure 13 shows the GB potential level of hydrogen blending, our own analysis could support 9TWh of hydrogen blended into our networks at 20% by volume.

137 Other sources of hydrogen could stem from industrial clusters like Grangemouth. Projects such as Acorn[21] and Kintore Hydrogen[22] are looking to produce hydrogen in our Scotland network area, offering the opportunity to blend this into the gas transmission or distribution networks. In addition, given an initial absence of large-scale hydrogen transport and storage infrastructure, blending can act as a strategic enabler to stimulate electrolytic hydrogen producers to support the wider energy system, while minimising overall system costs for consumers, as illustrated in Figure 14.

Figure 14: Whole system solution through electrolytic hydrogen blending



Source: SGN Future of Energy Directorate

138 We will work collaboratively to influence the development of National Gas Transmission (NGT) blending policy and its impact on lower pressure networks. We will look to further understand the wider European development of hydrogen blending, where agreement has been reached at a transmission level[23]. Imported blended natural gas from Europe into the GB will have a material impact on gas network assets.

139 Whilst we acknowledge Ofgem's position on hydrogen blending in the SSMD we believe, and this is a view strongly supported by participants in our consumer research and engagement sessions to shape our plan, that blending should be progressed from the start of GD3 as a 'no regrets' activity. Considering the UK Government's decision to progress hydrogen blending, there is still significant work to be undertaken and delivered in relation to the safety, economic and legislative changes required to implement blending in the gas network. Funding this work through the baseline mechanisms such as CNIA, NIA and NZARD in GD3 will allow the flexibility to collaborate and engage with other network operators and expert partners to develop credible options in order to be ready to support the early introduction of hydrogen in the network.

140 In GD3 we see the opportunity to introduce hydrogen blending through electrolytic deployment in areas of electricity grid constraints or specific hydrogen production sites as mentioned above. This will support decarbonisation progress with our existing consumers, including industrial and commercial customers as highlighted in our consumer engagement programme. Since 2021, power system congestion has cost

[21] https://www.theacornproject.uk/news-and-events/hydrogen-in-scotland-the-role-of-acorn-hydrogen-in-enabling-net-zero
[22] https://kintorehydrogen.co.uk/vision
[23] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401788

consumers more than £2bn, with curtailment payments expected to exceed £3.5bn annually by the end of the decade[24].

Greening the network – hydrogen blending, our GD3 objectives

141 Throughout GD2 we have been working with the other gas networks and stakeholders to support the introduction of hydrogen blending into our networks. This crucial 'no regrets' work will deliver the early-stage outcomes for hydrogen blending. We plan to build on this work in GD3 using the Carry-over Network Innovation Allowance (CNIA).

142 In GD2 we are seeking to understand the impact on customer billing, and we anticipate that several projects in this area will carry over from GD2 into GD3 with the requirement to utilise the CNIA funding mechanism. This will allow us the opportunity to plan these projects effectively to deliver credible outcomes, rather than forcing them to be completed by the end of GD2.

143 Our objective during GD3 will be to complete and deliver the outcomes for the projects started in GD2 as components for the transition of the gas network to transport low carbon gases. These elements are 'no regrets' enabling activities which help facilitate the energy system transition for gas consumers.

144 We have specified below in Table 11 projects we will commence in GD2 to roll over into GD3, with an initial outline of their content.

Table 11: GD2 roll-over projects into GD3

Project	Description
Hydrogen blending implementation – Phase 2B	This will look to deliver the plan for blending implementation as identified through Phase 2A, including the network operational readiness plan and procedural updates, as well as formal UNC and network licence changes.
Hydrogen connection agreement	Development of a standardised approach to connection agreements covering the potential wide range of agreement parameters to facilitate network connections.
Hydrogen connection standardisation	Creation of hydrogen connections parameters in a consistent and standardised way to maximise network accessibility. Bespoke design for each connection should be avoided to reduce complexity and cost. We propose the development of a baseline requirements model, simplifying the approach to adoption.
LTS assets repurposing suitability for blends, 2%-20%	Focusing on the need for a range of potential network upgrades on our LTS systems to manage the technical requirements for blend injection ranges from 2%, 5%, 10%, 20%. These physical systems must be managed through the development of a transitional plan at the physical asset and procedural level to ensure network robustness and security of supply.
Real Time Settlement Methodology (RTSM) – Phase 2	Phase 2 will focus on developing a robust and comprehensive Master Plan that reflects all technical and project-specific requirements for the implementation and execution of a demonstration of the RTSM equitable billing solution for consumers.

Source: SGN Future of Energy Directorate

[24] https://policyexchange.org.uk/wp-content/uploads/Turning-Wasted-Wind-into-Clean-Hydrogen.pdf

145 Whilst the projects outlined in Table 11 above are specific, we have also identified other themes but not specified individual projects at this stage. At a high level these revolve around network suitability; risk assessment; mitigation and controls; capability and training; standards and procedures; policy and regulation; and implementation.

146 One other area for development, starting in GD2, is understanding the role of hydrogen blending in the decarbonisation of sectors such as industrial and commercial consumers, power generation and transport applications. Facilitating this will require infrastructure for whole system interoperability and efficient transportation of the energy our consumers need.

147 A holistic and interconnected approach is necessary for the delivery of these projects, involving focusing our CNIA funding on these specific areas. This allows us to maintain a collaborative and multifaceted approach to our wider net zero and whole system strategy. As we transition from GD2 into GD3 we progressively move from critical safety evidence to enabling requirements as part of our CNIA activity.

148 During GD3 we will continue to evolve a framework to support hydrogen blending, with an emphasis on technical considerations for optimal network management. We will deliver a network able to accommodate hydrogen blends safely and efficiently, reducing carbon emissions, removing generation and grid constraints through electrolytic production and de-risking hydrogen production at scale in readiness for future demand.

149 A crucial part of this is a programme to enable Gas Safety (Management) Regulation (GS(M)R) changes and develop the first Network Entry Agreements (NEAs) through a collaborative framework with all network licensees.

150 Addressing all elements of operational readiness of our system to ensure an equitable approach for hydrogen blending will also be undertaken. Delivering safety evidence, market frameworks for a consistent blending methodology and a comprehensive strategy will be supported by additional evidentiary work to further enhance efficiency and volumetric opportunity.

151 Proving a route to alleviate electricity network constraints and associated curtailment costs is key to the successful integration of hydrogen blending. Delivering modelling solutions to align constraint and network demand availability will ensure critical blending opportunities are capitalised on and onerous curtailment charges for consumers are removed from the supply chain. Energy vector interactivity will demonstrate the full value chain of a whole system approach, driven by the hydrogen blending opportunity.

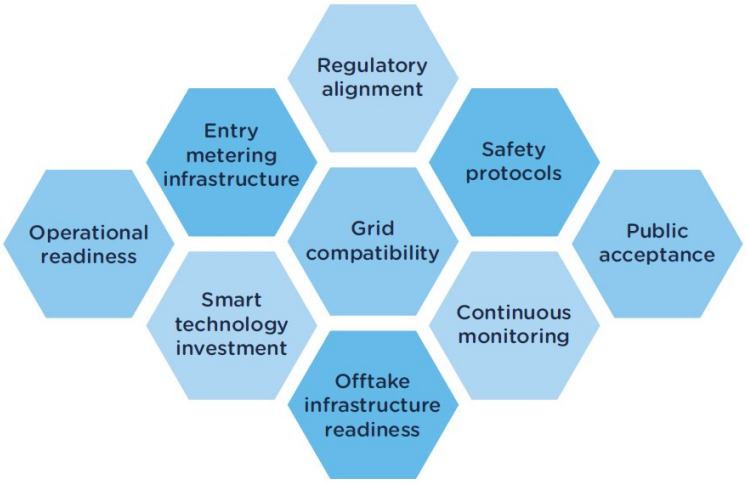
152 Following development of an equitable billing solution in GD2 under the Real-Time Settlement Methodology programme (RTSM)[25], our objective in GD3 will be to scale implementation of this framework and introduce roll-out. This solution to current billing constraints, driven by restrictions on billing zones, will support the unlocking of blends of hydrogen from 5%-20%, representing a step change in the potential impact on decarbonisation that blending can play for our consumers.

153 To ensure we meet our commitment to stakeholders to deliver hydrogen blending over the GD3 period, we will look to resource our team to facilitate the coordinated and efficient delivery of our programme of works.

154 Other key areas that will be critical to the deployment of hydrogen blending over the GD3 period which we propose to undertake are illustrated below in Figure 15, incorporating critical evidence and enablers under an operational readiness framework.

[25] https://smarter.energynetworks.org/projects/nia2_sgn0046/
Also see: Real Time Settlement Methodology (RTSM) - XOSERVE

Figure 15: Operational readiness activities



Source: SGN Future of Energy Directorate

155 Our operational readiness activities also include an assessment of the NGT blending policy, where there may be material impacts on national offtake infrastructure as a result of the flow of blended natural gas into our network. Should this occur, we will look at funding any upgrade work at our offtakes to accommodate blending from the NTS through the NZASP reopener mechanism. Further details are provided below in our Hydrogen blending operational readiness NZASP proposal.

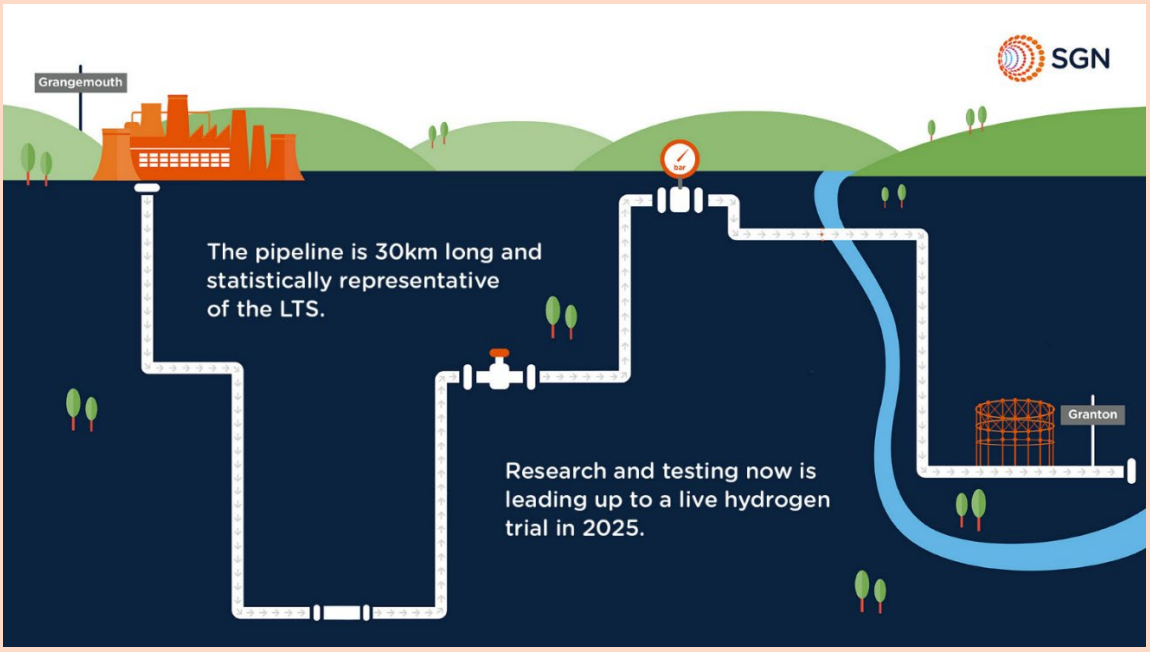
156 We will continue engaging key stakeholders, including gas network operators, safety regulators, technology developers and government agencies, as we aim to systematically address aspects of the transition, highlighting the wider customer and social value chain gas networks support in the communities we serve. Furthermore, partnerships with training institutions and industry associations will ensure a skilled workforce, while advocating for supportive policies and fostering public awareness will contribute to a positive societal shift.

157 Our funding request to Ofgem for hydrogen blending, encompassing CNIA, NIA, NZARD and Totex mechanisms, forms part of our overall network transition submission of our innovation strategy, which is summarised in Table 11.

Hydrogen blending into Edinburgh NZASP proposal

Our LTS Futures project in GD2 is poised to demonstrate a key opportunity in the energy system transition by repurposing the Grangemouth to Granton pipeline for hydrogen use, setting a precedent for sustainable future pipeline energy infrastructure. As the pioneering hydrogen-ready transmission pipeline in Great Britain, this transformative endeavour bypasses the need for natural gas to hydrogen conversion as there are currently no connected customers. Figure 16 below illustrates our LTS Futures project in GD2.

Figure 16: LTS Futures



Source: SGN LTS Futures[26]

We are uniquely positioned with a hydrogen-ready pipeline isolated from the rest of the network that provides an ideal pilot to facilitate hydrogen blending into Edinburgh. This initiative provides significant support in decarbonising the capital city of Scotland, providing a step on the pathway to meet regional and national net zero targets.

The pipeline terminates at Granton in Edinburgh, at the Granton Pressure Reduction Station (PRS) which supplies approximately 56% of Edinburgh's natural gas demand. With some alterations, we could blend up to 20% hydrogen with existing natural gas, reducing the carbon impact, marking a significant step towards net zero targets.

Large onshore hydrogen production is currently expected to be installed at Grangemouth, to be used by INEOS[27]. There is potential for hydrogen production to be expanded in the area, with RWE announcing a potential 600MWe, with an initial 3.6 tonnes of hydrogen per hour in 2029[28]. We will work with stakeholders to understand the opportunity that could be realised through hydrogen blending in the first instance.

We will endeavour to use green hydrogen for this decarbonisation opportunity. However, the availability of suitable hydrogen in the vicinity of Granton PRS (critical enabler for this opportunity) is uncertain at this stage. We will continue our stakeholder engagement efforts from GD2 into GD3, exploring partnership with prospective producers.

For the remainder of GD2 we plan to develop this opportunity further, utilising NIA and NZARD funding to undertake a feasibility assessment and use case development with key stakeholders, policymakers and other whole system partners.

Our GD3 objective

Building on the knowledge gained through our LTS Futures and NIA programme in GD2, our ambition in GD3 is to deliver a programme of works through NZASP reopener to facilitate the blending of hydrogen using the Grangemouth to Granton pipeline, including detailed design (£1.0m), land acquisition (£1.0m), build and commissioning (£4.0m).

To achieve this, we will develop a whole system strategy, utilising different sources of hydrogen and consumption models, aligning with the regulatory, safety, legal, commercial, technical and engineering requirements for hydrogen blending. These areas will form part of our NIA operational readiness programme in GD3.

NZASP funding, hydrogen blending into Edinburgh

We propose to utilise the NZASP reopener funding mechanism to deliver this project, given we are in the early development stage. Our preliminary estimate for the funding required for these works is circa £6.0m, noting the high degree of uncertainty in this figure that will be further refined and supported by the use case and appropriate feasibility studies we are undertaking in GD2, validating assumptions and requirements.

Whilst our estimate to progress this initiative in GD3 is ambitious, the outcomes of this opportunity will stimulate the wider hydrogen and decarbonisation economy of the region.

To deliver this important project, we will need to understand the relationship and interaction between the existing regulated GDN business and the DESNZ Hydrogen Transportation Business Model (HTBM). Currently the Grangemouth to Granton pipeline is a regulated asset within the confines of Scotland Gas Networks licence. There is also safety, financial and regulatory areas that need clarification as part of the delivery of this initiative.

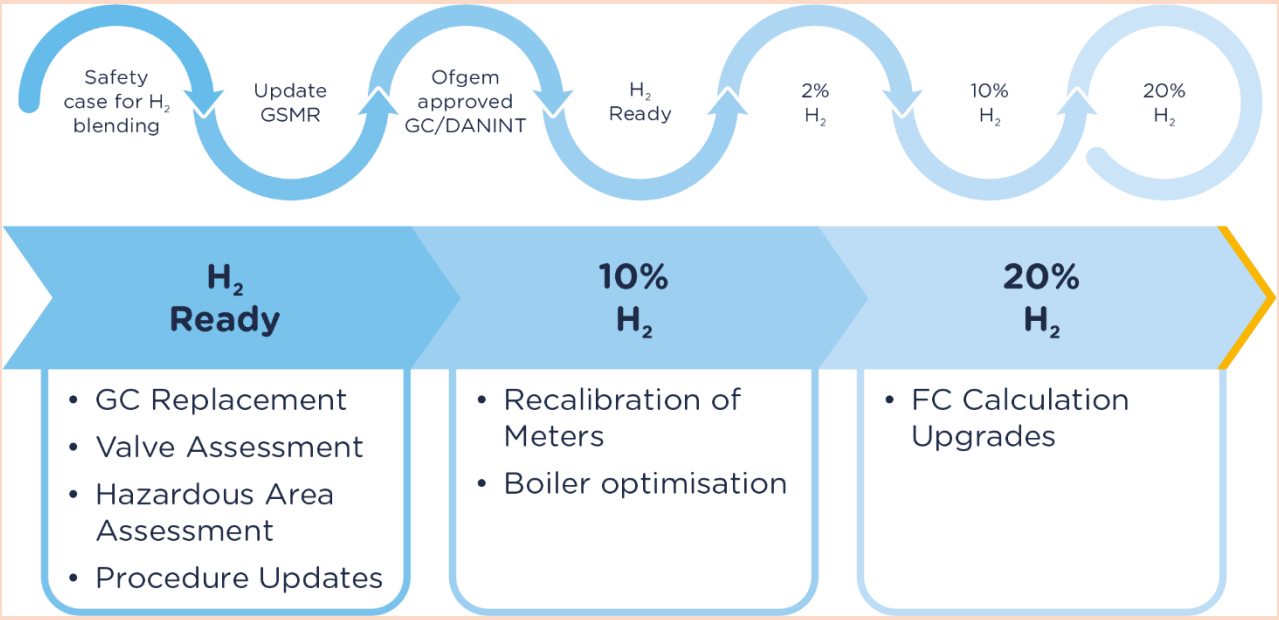
[26] https://www.sgn.co.uk/about-us/future-of-gas/lts-futures-0
[27] https://www.ineos.com/news/shared-news/ineos-at-grangemouth-announces-plans-to-construct-a-low-carbon-hydrogen-manufacturing-plant/
[28] https://uk.rwe.com/press-and-news/2024-05-14-rwe-announces-large-scale-green-hydrogen-plant-in-grangemouth/

Hydrogen blending operational readiness NZASP proposal

In GD2 we partnered with industry experts Kelton to undertake an NIA project, Hydrogen Entry Unit Design[29], to understand the impacts of a 2% and 20% hydrogen blend from the NTS on our assets at our national offtake sites. An assessment and review of two sample sites was undertaken, with the desired outcome to produce a blueprint design, compliant with current regulations and appraisal processes to upgrade all our national offtake sites that could be repeatable across GB.

Figure 17 summarises the roadmap for upgrading offtakes. It highlights several of the key pieces of equipment, procedure and assessments that will be required to be either replaced, reconfigured or modified because of blended hydrogen entering the GDN networks at the national offtakes, such as gas chromatographs (GC), flow computers (FC) and metering.

Figure 17: Hydrogen entry unit design roadmap



Source: SGN Hydrogen Entry Unit NIA2_SGN0018

Whilst Figure 17 identifies several key assets, there are implications for other pieces of vital equipment identified as part of the design blueprint, including software (DANINT), site capacity calculations, venting and pipework. These will require the appropriate remedial actions to be carried out in the event of the system receiving blended natural gas and hydrogen.

Our GD3 objective

Building on the knowledge through the blueprint developed in GD2, we would look to ensure our assets at the national offtakes comply with the design proposals identified within our study through a programme of upgrade works. This will ensure we are able to facilitate the entry of blended natural gas and hydrogen at the national offtakes, should NGT and wider European gas transporters introduce hydrogen blending in their systems.

This has several benefits for the energy system transition to net zero, allowing an important step in reaching government decarbonisation targets and stimulating the market for hydrogen production. It also allows the interconnectors between GB and Europe to continue to act as a critical importer of energy for the resilience and security of supply of GB energy consumers.

NZASP funding, hydrogen blending operational readiness

Our decision to utilise the NZASP mechanism reflects the uncertainty around the timing of implementation and policy changes required to facilitate blended natural gas and hydrogen availability through the NTS.

Our preliminary estimate to deliver these critical upgrades for operational readiness at our offtakes is circa £10.0m, noting a high degree of uncertainty in this figure that will be further refined and supported through a coordinated, collaborative approach with all involved parties. This value reflects the programme of work from the expected impact on offtakes as hydrogen blending from the NTS increases across our networks in GD3.

Multi occupancy buildings, assessing a low-cost transition to net zero

158 Approximately a third of the customers that we transport gas to live in Multi occupancy buildings (MOBs). The majority of these buildings are mixed-tenure, and include a combination of owner-occupied, private rental, social housing and, in some cases, mixed use. It is also recognised that a part of this customer group constitutes some of the most vulnerable segments of society.

159 Both the UK and Scottish Governments identify the challenges of decarbonising this sector in their respective Heat and (in) Buildings Strategies[30, 31]. They raise concerns that a lack of the appropriate detailed assessments being carried out at a building level regarding energy efficiency and decarbonisation solutions could lead to consumers being further impacted by fuel poverty. There are also challenges in coordinating multiple stakeholders to ensure a collaborative whole system approach is taken towards the transition of high-rise buildings to a net zero energy solution, predominately for the delivery of heat.

160 As a responsible and prudent network operator we have obligations to ensure our consumers are treated fairly and are not negatively impacted by the activities we undertake. This aspect is further enshrined under the duty of supply Gas Act legal obligation that GDNs must follow as its primary legislation. As a duty holder we are legally bound to provide a connection when requested unless unsafe to do so. In addition, as part of Ofgem's 'just net zero transition' objective, we believe we have a role in how these assets are decarbonised. Where appropriate, we will contribute to assessing, identifying and coordinating solutions, based on the needs of our customers, especially those in vulnerable situations often present in MOBs.

161 Our knowledge and experience through the delivery of the Iron Mains Risk Reduction Programme (IMRRP) provides the baseline capability required to support the net zero transition of high-rise buildings. Specifically, our interactions with different agencies, stakeholders, the supply chain and most importantly consumers to deliver large-scale, multi-faceted, complex infrastructure projects. We will build on existing subject matter expertise gained from IMRRP to design, plan and coordinate the execution of projects that impact different property types, tenures and occupants, including those who are considered the most vulnerable.

162 Linked to the transition of MOBs to alternative energy solutions is the work we will carry out in GD3 under our riser replacement and refurbishment programme, where an element of this assesses the permanent disconnection of gas supplies to MOBs where we define a building as unsafe. In this situation we may need to cut off supplies, relinquishing any responsibility for the provision of alternative energy solutions back to the duty holder for the building. Managing this type of scenario is critical linking into our vulnerability section, SGN-GD3-BP-00 Business Plan, Chapter 4: High quality service, Section D and Appendix SGN-GD3-SD-10 Vulnerability Strategy, Section E: Delivering our GD3 vulnerability, to ensure we are working with affected stakeholders to avoid customer impact where possible. Identifying these challenges as part of wider LAEPs and delivering viable solutions in conjunction with DNOs as part of a whole system solution approach is crucial.

163 This work has become more critical following the publication of The Grenfell Inquiry Report: Phases 1 and 2, which resulted in the introduction of The Building Safety Act 2022. This changed the management of gas

[29] https://smarter.energynetworks.org/projects/nia2_sgn0018/

[30] https://assets.publishing.service.gov.uk/media/61d450eb8fa8f54c14eb14e4/6.7408_BEIS_Clean_Heat_Heat___Buildings_Strategy_Stage_2_v5_WEB.pdf

[31] https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2021/10/heat-buildings-strategy-achieving-net-zero-emissions-scotlands-buildings/documents/heat-buildings-strategy-achieving-net-zero-emissions-scotlands-buildings/heat-buildings-strategy-achieving-net-zero-emissions-scotlands-buildings/govscot%3Adocument/heat-buildings-strategy-achieving-net-zero-emissions-scotlands-buildings.pdf

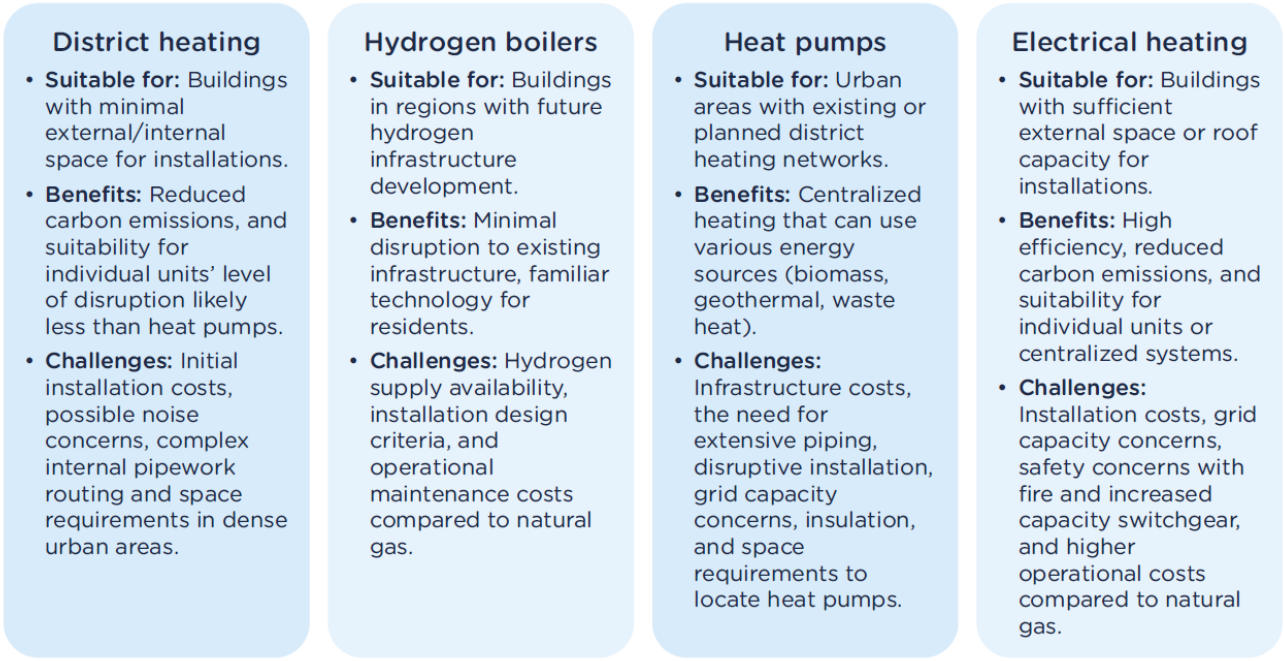
supplies to MOBs and made recommendations to gas transporters in managing different aspects of their infrastructure. It also recommended that the definition of a high-risk building is urgently reviewed, to consider not just the height of the building but the usage, occupancy type and structural integrity of the building, particularly where there are vulnerable occupants.

164 This is likely to impact the vast majority of MOBs supplied by gas across Scotland and England. We will work closely across the different parts of our business to understand the interactions with different work programmes in developing decarbonisation solutions for MOBs where the integrity of existing risers becomes a concern. Further details of this can be found in our Appendix SGN-GD3-SD-06 Network Asset Management Strategy, Section C: Supplies to multi -occupancy buildings.

165 In GD2 we conducted substantive feasibility projects to assess the viability for the transition of MOBs served by natural gas to hydrogen. The outcome showed that significant effort is required to repurpose existing internal high-rise installations to the required level of safety for hydrogen conversion. Essentially, MOBs with internal network risers over six storeys high are not suitable for hydrogen conversion. On this basis a GDN's activity under duty of supply would be to cut off the supply and manage a transfer of responsibility which would not provide a just transition for alternative heat options for some of the most vulnerable segments of society.

166 To transition high-rise properties to an appropriate net zero heating solution, we need to develop a robust framework to properly evaluate options against safety, resilience and cost-effectiveness criteria, as illustrated in Figure 18 below.

Figure 18: High rise buildings heat solutions



Source: SGN Future of Energy Directorate

167 Stakeholder engagement covering a wide range of actors and groups is critical in this process to ensure coordination and collaboration across the whole system. Key players will include GDNs, DNOs, building owners, duty holders and the supply chain to ensure buy-in and smooth implementation of alternative heating options. Engaging with residents, property managers, local authorities, and energy providers will also be fundamental to deliver a just transition for the conversion of high-rise MOBs.

Multi occupancy buildings, our GD3 objectives

168 Our MOBs transition approach will require careful planning and will involve several strategic steps, reflecting the sensitive nature of these buildings. Using a whole system approach, we plan to explore five key areas:

- **Assessment and planning phase** (Feasibility Studies and Energy Audits): Conduct comprehensive feasibility studies and energy audits for high-rise buildings deemed inappropriate for decarbonisation through hydrogen (as demonstrated in GD2) to determine the most suitable alternative heating systems.
- **Selection of alternative heating systems**: Identify regional, whole system infrastructure needs to accommodate alternative decarbonisation solutions for high-rise buildings.
- **Infrastructure development and retrofit mapping**: Identify the retrofit requirements for high-rise buildings to accommodate alternative heating systems.
- **Customer engagement and transitional support programs**: Develop engagement and educational programmes for consumers, from concept, delivery and ongoing support to residents.
- **Regulation and policy change framework**: Develop processes to manage our current obligations under the Gas Act and other regulatory or legal requirements (such as duty of supply).

169 We propose that the development costs for these outcomes are funded through NIA, falling under the governance of this funding mechanism as part of a whole energy system transition for existing gas consumers. We then intend to progress the initial NIA work into a trial and demonstration project to decarbonise a MOB through our Multi occupancy building whole system demonstration NZASP proposal, following the appropriate feasibility and use case development funded through NIA and NZARD.

170 This targeted plan is structured to ensure a smooth and safe transition to alternative heating systems in high-rise domestic properties for consumers. The plan ensures that the financial burden is shared across sectors under a whole system approach to the energy system transition to net zero. We believe that emphasising our customers' safety and well-being throughout the transition is critical, with investment in safety systems, customer engagement and education, and support programmes all crucial elements. The timeline and budget allocations are designed to accommodate the scale and complexity of this task, to demonstrate that the transition can be both effective and sustainable.

Multi occupancy building whole system demonstration NZASP proposal

As we progress with the delivery of the outcomes from our NIA activities above, we plan to execute a 'real-life' demonstration of a whole system transition within a selected high-rise multi occupancy building (MOB). This project will showcase how various energy systems can integrate and support the shift towards low-carbon solutions, offering a replicable model for future high-rise retrofits. It will address the technical, social and operational elements of alternative solutions, including electrification, district heating or hydrogen, targeting three main objectives:

- Demonstrate technical feasibility and integration of renewable energy systems;
- Engage with stakeholders and end users to ensure their needs are met and their voices heard; and
- Create a blueprint for future retrofits that can be scaled across other high-rise MOBs.

Adopting a consumer and stakeholder-led engagement

Stakeholder engagement will be crucial for the success of this activity in GD3, as the transition involves multiple parties, each with their own priorities and concerns. We will work closely with stakeholders, such as:

- Local authorities, to understand regional policies and align the project with local decarbonisation goals;
- Tenant Management Organisations (TMOs), partnering with TMOs to ensure seamless communication with residents and building management;
- Private tenants and owners, with regular consultations held to understand energy needs, concerns, and expectations; and
- Building owners and duty holders, to ensure they are on-board with long-term changes that affect their property value and operational costs.

These engagement actives will be carried out through several processes and mechanisms, depending on the specific MOB selected for the trial (based on earlier development work). Some of the stakeholders outlined above will play a part in the decision-making role on which solution and approach works best. A formal agreement will be required from the decision-making parties to proceed with the NZASP application, to fund the design, build, testing and commissioning of a MOB trial.

Whole system and energy system components modelling

We will employ whole system modelling to simulate energy consumption and production across different scenarios. The goal is to map the transition away from natural gas towards more sustainable options. Key components to be modelled include:

- **Heat pumps**: Assess the impact of air source or ground source heat pumps for space heating.
- **District heating networks**: Explore the feasibility of connecting the building to existing or new district heating schemes, including hybrid systems.
- **Energy storage**: Model battery systems for storing excess electricity generated by renewable sources.
- **Hydrogen**: Explore the use of hydrogen in conjunction with other energy sources, noting GD2 studies which concluded that hydrogen is unsuitable for unventilated internal >6 storey MOBs.
- **Electricity demand**: Evaluate the building's increased electricity demand as residents shift from gas to electric systems for heating and cooking.

The outputs from this modelling will be a detailed report outlining the technical feasibility, energy savings, and cost-benefit analysis for each energy vector. A comprehensive risk assessment addressing potential challenges in system integration, grid capacity and energy security will also be developed.

Supply chain engagement

For this demonstration to be successful, engaging with the supply chain is critical. We will collaborate with other network operators and with equipment manufacturers, installers and service providers to ensure the timely availability and delivery of the necessary infrastructure and equipment.

Transitional operational readiness plan

For the successful transition from natural gas to alternative energy sources, a phased approach will be developed and followed.

Consumer acceptance

To secure buy-in from residents and stakeholders, a tailored communication and support strategy will be implemented.

Measuring acceptance

We will conduct regular surveys and town hall meetings to gauge resident satisfaction with the new systems, identifying areas for improvement and ensuring continued engagement throughout the process. This activity in GD3 is designed to ensure that all aspects of a whole system energy transition in multi occupancy buildings are covered, from stakeholder engagement and system modelling to consumer acceptance and operational readiness.

Table 12 and Figure 19 below summarise our GD3 programme of works, and the estimated costs associated with the scope of each of these work packages.

Table 12 and Figure 19: MOBs whole system demonstration programme of works and indicative costs

Work package	Preliminary estimate (£m)
Consumer and stakeholder engagement approach	2.0
Supply chain engagement approach	1.5
Whole system and energy system modelling	3.5
Development and transition to operational readiness	12.0
Consumer acceptance	1.0
Total	20.0

Source: SGN Future of Energy Directorate

NZASP funding, MOBs whole system demonstration

During GD3 we propose to utilise the NZASP reopener as the appropriate funding mechanism to deliver this demonstration. Our preliminary estimates for the funding that will be required for these works is circa £20.0m, noting the high degree of uncertainty in the figures that will be further refined and supported by the use case and appropriate feasibility studies, validating assumptions and requirements using NIA and NZARD funding.

Overall, this project will set a blueprint for the roll-out of decarbonisation solutions for high-rise buildings, helping consumers, especially those in vulnerable situations, in the transition of their properties to meet net zero.

Network transition funding request

171 Our second innovation strategy area, network transition, crosses between the carry-over funding from GD2 (CNIA) and new funding to be made available in GD3 under NIA, NZARD and Totex. Table 13 below provides our annual spend profile over the period for each of these mechanisms.

172 CNIA (£6.8m) will enable us to progress the critical enabling activities for hydrogen blending started in GD2, ensuring the foundations for the correct products, systems and process frameworks are established.

173 For the new activities we plan to undertake in GD3 on hydrogen blending we are proposing the use of Totex (£1.7m) to establish the blending resource function and NIA (£6.5m) to fund our programme of work to deliver our operational readiness activities.

174 We will also use Totex (£4.7m) to fund the people resource for our whole system engagement function for regional energy planning, along with NIA (£6.8m) to develop the engagement tools and technical evidence around whole system interoperability and the policy and regulatory framework to facilitate this.

175 Given the innovative and collaborative nature of the programme we are proposing for MOBs, which has alignment with the governance around a whole energy system transition and consumer vulnerability, our proposal looks to utilise NIA (£6.0m) for the outcomes associated in developing a framework assessment for the transition of MOBs to alternative low carbon solutions.

176 Our proposal requires the flexibility to ensure the commitments we have given can be delivered for these developing areas of decarbonisation.

Table 13: Annual funding, split by mechanism for network transition innovation

Mechanism	Funding (£m)					
	2026/2027	2027/2028	2028/2029	2029/2030	2030/2031	Total GD3
NIA	5.0	5.2	4.2	2.6	2.3	19.3
NZARD	1.2	0.4	-	-	-	1.6
Totex	0.7	1.2	1.5	1.5	1.5	6.4
CNIA	3.7	3.1	-	-	-	6.8
Total	10.5	9.9	5.7	4.1	3.8	34.0

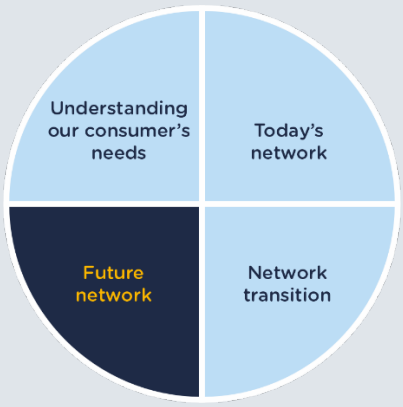
Source: SGN Future of Energy Directorate estimate (based on 2024 prices)

177 Table 13 above shows our Totex spending profile for the Whole system engagement and hydrogen blending resources increasing over the GD3 period but flattening out as we embed the roles and responsibilities of these functions. This will ensure we have a consistent and agile pool of people in place to deliver the engagement, data analysis and collaboration for all stakeholders. Our funding profile under NIA is based on the development of tools and R&D required during the initial years of GD3, with a declining spend as the outcomes from projects are delivered.

178 The NZARD element of funding is required to carry out preparatory work for the NZASP submissions for the Hydrogen blending into Edinburgh NZASP proposal and Multi occupancy building whole system demonstration NZASP proposal, detailed in the sections above.

Section H Future network

Table 14: Summary of our key commitment, objectives and funding

Key commitment	Supporting a low carbon energy transition, a key component of a system transformation		
Our objectives	Funding Type	Amount (£m)	
• Support decarbonisation of the whole energy system through effective and productive repurposing of assets, regardless of Heat Policy decision • Develop credible plans to deliver a viable and safe transition pathway. Understanding the impact of network decommissioning for our customers, network operation and policy and regulatory frameworks in a transition to net zero.	Totex	0.4	
	NIA	10.0	
	Total	10.4	

Source: SGN Future of Energy Directorate estimate (based on 2024 prices)

179 Table 14 above summarises our key commitment, objectives and funding request by mechanism under our future network area. We provide further details within this section of our plan.

180 The future network element of our GD3 innovation strategy sets out our ambitions to develop our network to support a low carbon energy system, enabling the transition to net zero with infrastructure that is a key component of a system transformation.

181 Within this section we look at the opportunities for repurposing elements of our network as part of the wider whole energy system decarbonisation, ensuring consumers and network users see value from the investment already made in our assets.

182 We also present a viable counterfactual pathway proposal for the decommissioning of our networks, developing a credible plan to deliver a safe decommissioning pathway for a minimum viable network, interlinked with a whole system approach to the energy system transition to net zero.

183 The activities we detail within this future network area will be driven by the engagement we undertake with stakeholders through our Understanding our consumers' needs and the Whole system approach functions, proposed earlier in this Appendix. Gaining insight and direction from the actors involved or impacted by the energy system transition will be crucial in how we develop our network for the future.

Supporting the future network

184 We have identified seven areas we believe cover the key elements that are important to our stakeholders and consumers, the decarbonisation of a whole energy system, and for the effective and productive use of assets that were ultimately paid for by our customers, regardless of the government decision for the role of hydrogen.

185 Within this portfolio we also intend to explore broader topics as they arise, based on their merit and the potential impact they have on the network and consumers. We will track and monitor macro trends across our industry and beyond, to bring learnings into our organisation to ensure a wider sphere of knowledge is utilised.

186 The seven areas are illustrated in Figure 20 below with a brief overview of what they cover.

Figure 20: Future innovation portfolio areas

Source: SGN Future of Energy Directorate

187 These are not exhaustive and will evolve as we learn from our ecosystem, our stakeholder engagement and develop new ideas through our work. Several technology solutions span these areas, including the exploration of the use of hybrid systems for domestic, industrial and commercial and heat network decarbonisation. A commonality over all areas is ensuring we are as sustainable as possible in whatever future scenarios emerge and we play our role in a whole system approach, assisting in the decarbonisation of the energy system in our regions.

188 When we look to the future network this tangibly means rejecting 'decommissioning' as involving simply turning off the network or 'scrapping' the network assets in any future non-gas scenario. Our focus under areas such as asset management and evolution comes from a circular economy approach and looks to uncover what we can productively and sustainably do with our assets in the future if they aren't required

for gas transportation. Maximising the value for our customers who funded them and minimising waste and impact to the environment are key drivers for this activity; this could be routing for fibre network connections, heat network support, or even as storm drainage for water networks as some of the early examples in this theme.

189 Continuing the theme of circularity, we are keen to explore 'alternative heat' as a key area of innovation. Waste heat sources are increasing, and we will look to build on the collaborative work where we supported colleagues at WWU in GD2 with data centre mapping and will look across industry for areas where we can provide sustainable solutions where they are needed using our asset base as part of the waste heat recovery, heat storage or heat provision process.

190 As we look to the network transition area, there are multiple subjects and projects we want to explore throughout GD3 to support the whole system transition, underpinned by our focus on understanding our consumers' needs. We want to explore the role GDNs have in supporting the transition to net zero for our industrial and commercial customers, looking at how the network could play its part in carbon capture, utilisation and storage (CCUS) and how our network assets can support renewables either as a back-up or as a means of delivery.

191 It is important to note that these initial areas may change and, as our thinking develops and our engagement programmes provide further insight, we will add to these, exploring other areas relevant to our setting and important in the energy system transition for our customers.

Developing a viable methodology for network transition

192 A key focus area in GD3 is the development of a counter-factual evidence position to green gas conversion, assessing the impact of network decommissioning as alternative technologies start to dominate the transition to net zero, where repurposing our assets is not viable (see Supporting the future network). Understanding the associated costs and challenges of a complete energy system switch-over from gas is imperative for a comprehensive and viable whole energy transition. While alternatives such as electrification are often hailed as a clean energy solution, it is crucial to critically examine the ramifications of a transition. We have included the HSE's guidance on decommissioning under the Pipeline Safety Regulations (PSR)[32, 33] below.

HSE guidance on decommissioning; Regulation 14 of the Pipeline Safety Regulations (PSR)

Regulation 14.1: *"The operator shall ensure that a pipeline which has ceased to be used for the conveyance of any fluid is left in a safe condition."*

The corresponding guidance notes:

64. Pipelines should be decommissioned in a manner so as not to become a source of danger. Once a pipeline has come to the end of its useful life, it should be either dismantled and removed or left in a safe condition. Consideration should be given to the physical separation and isolation of the pipeline. It may be necessary to purge or clean the pipeline; due consideration should be given to the hazardous properties of any fluid conveyed in the pipeline or introduced during the decommissioning.

65. Depending on the physical dimensions of an onshore pipeline and its location, under the general provisions of the HSW Act, it may be necessary to consider the risk of the pipeline corroding and causing subsidence or acting as a channel for water or gases.

193 Our whole system engagement and circularity strategy for our assets will play a crucial role in this activity, to understand the interactions between the system operator and energy networks as decarbonisation plans develop across the regions. These stakeholders will also be crucial in guiding some of the deliverables in this activity.

[32] https://www.legislation.gov.uk/uksi/1996/825/regulation/14/made#:~:text=%E2%80%94%20%281%29%20The%20operator%20shall%20ensure%20that%20a,duty%20contained%20in%20paragraph%20%281%29%20is%20performed%20safely.
[33] https://www.hse.gov.uk/pubns/priced/l82.pdf

194 A decommissioning assessment is required to ensure a safe and compliant means to de-energise the gas network, considering the implications of a minimum viable network for our customers security of supply, system resilience and balancing legal requirements. As a licensed duty holder with clear responsibilities, we must ensure a safe and cost-effective transition to net zero for consumers, especially those in vulnerable situations.

195 Where our assets cannot be repurposed, either to transport green gases or for alternative uses, decommissioning represents a significant technical challenge; gas networks are extensive and deeply integrated systems, across urban and rural areas, supplying homes and businesses which in turn have supply chain and support structures in place. The perceived simplicity of decommissioning is little understood from a technical and safety perspective. Based on theoretical future end state scenarios, there is limited evidence to support the efficacy of the decommissioning based on the sound technical and safety aspects which need to be considered if this is taken forward to understand a minimum viable network.

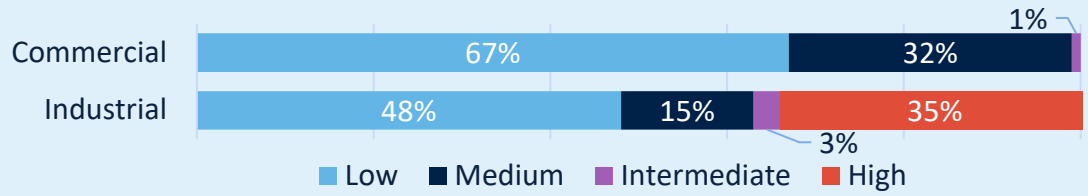
196 In GD2 we carried out an initial analysis of the concept of a minimum viable network, with demand purely focused on supplying industrial and commercial (I&C) consumers. We outline below in our case study, minimum viable network (MVN), the results of this work.

Minimum viable network

We have been examining the concept of a minimum viable network (MVN) which may arise through the transition to net zero and as consumers select alternatives to natural gas. This helps understand the viability of the gas grids as they pivot towards a future potential use. For this illustration we have assumed the gas grid will continue to support Industrial and Commercial (I&C) needs and no longer supplies domestic heating for consumers.

Our gas networks comprise 98% residential and 2% I&C connections, however I&C customers consume 40% of the total energy delivered by the network and are highly integrated across all pressure tiers. Figure 21 provides an indication of the distribution of I&C consumers across our southern England network pressure tiers, showing nearly 50% of industrial consumers and 67% of commercial consumers are supplied through the low-pressure distribution network.

Figure 21: Industrial and commercial consumer split across our southern England network pressure tiers

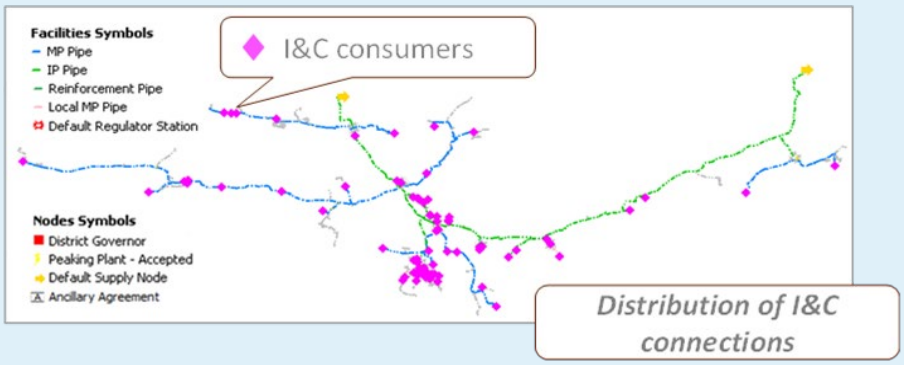


Source: SGN Future of Energy Directorate (note - numbers do not add up to 100 due to rounding)

We conducted analysis of four gas grids with different characteristics (e.g. rural/urban, Scotland/southern England) serving approximately 400,000 customers to understand the impact of removing all domestic demand. This aligns with several of the scenarios we have worked through with DESNZ during the development of the HHP. The results of our analysis are shown in Table 15 below, indicating the percentage of the network that is still required to serve a significantly reduced number of end users.

Table 15: Percentage of remaining network with domestic demand removed

Pressure tier	I&C
High pressure	100%
IP/MP	75%
LP	25%



Source: SGN Future of Energy Directorate

Our analysis suggests that in a case where all domestic gas demand transitions to an alternative technology, 100% of the high-pressure network, 75% of the medium/intermediate pressure network and 25% of the low-pressure network is still required to supply I&C consumers.

This example illustrates that a gas network will be required even with substantial electrification of heat. Any transition will take time and throughout that period it is important we maintain a safe, affordable and resilient gas network.

197 The scale of implementation is a critical factor which needs to be considered in the development of a decommissioning plan. The transition of the whole energy system presents significant challenges, involving almost every home and business across the country. Coordinating such a large-scale change requires careful planning and execution, with cooperation between national and local government, regulators, GDNs, DNOs, system operators, the wider utilities supply chain, and the private sector.

Future network, our GD3 objectives

198 We will develop credible plans for a viable and safe decommissioning pathway, interlinked with a whole system approach to the energy system transition to net zero. We will deliver outcomes that will focus on the following areas:

- Network decommissioning safety;
- The minimum viable network;
- Operational planning methodology; and
- Asset reconfiguration assessment, including options for repurposing.

199 Developing a counter-factual evidenced position for green gas deployment with regard to network decommissioning, including the associated costs, is imperative for a comprehensive and sustainable energy transition. The challenges of a complete energy system evolution must also be recognised.

200 As a licensed duty holder, we have clear legal obligations and responsibility to maintain a resilient, secure, and safe network for consumers. Decommissioning sections or all the gas network has many implications in maintaining a minimum viable network during the transition to net zero. To facilitate a low-cost, fit for purpose network, ensuring system efficiency and value for money to consumers, we must first understand and plan for a variety of scenarios and their potential impacts.

Future network funding request

201 The NIA funding element of our future network strategic area will deliver the outcomes outlined in the sections above. NIA will allow the flexibility to collaborate and engage with other network operators and expert partners to develop credible options to support the future network (£5.0m) and to establish a decommissioning methodology (£5.0m), emphasising the infrastructure safety aspects required, and the impact this could have on domestic and commercial gas consumers. Table 16 below provides our annual spend profile over the period for each of these mechanisms.

Table 16: Annual funding, split by mechanism for future network innovation

Mechanism	Funding (£m)					
	2026/2027	2027/2028	2028/2029	2029/2030	2030/2031	Total GD3
NIA	2.0	2.0	2.0	2.0	2.0	10.0
Totex	0.1	0.1	0.1	0.1	0.1	0.4
Total	2.1	2.1	2.1	2.1	2.1	10.4

Source: SGN Future of Energy Directorate estimate (based on 2024 prices)

202 The NIA spend profile is relatively flat to ensure we can deliver projects and programmes of work as our understanding of the decommissioning process develops, along with the support projects required to ensure our assets are repurposed to alternative uses, for the benefit of gas consumers. Totex spend under this strategic area is less reliant on the price control process to enable deployment across our business.

Section I Assurance

203 Our SGN-GD3-BP-00 Business Plan, including Appendices, has been subject to a rigorous assurance process which is detailed in our Assurance Statement SGN-GD3-SD-17.

204 Our Future of Energy Director was appointed as the Sponsor for the Innovation Strategy Appendix, which has been through the following levels of review and assurance:

First Line

205 This was undertaken at project level by the team producing the document, as a regular self-check or peer review.

Second Line

206 This was undertaken independently within the organisation to review and feedback on product development. Both Senior Manager and Director sign-off was obtained.

207 Our GD3 Executive Committee: (1) considered the appropriateness of assurance activity for the Appendix and (2) provided assurance to SGN's Board that the Business Plan meets Ofgem's assurance requirements.

Third Line

208 This was undertaken by external advisors and groups providing critical challenge during the development of products within the Business Plan. In addition to the feedback and challenge provided by the Independent Stakeholder Group (ISG) this Appendix was developed after consultation with and advice from:

Advisor/Group	Contribution
Stakeholders	Deliberative Research to Shape the Plan and Stakeholder Engagement Events on Shaping our Plans Together

Fourth Line

209 This was undertaken by independent and impartial external providers, who provided a detailed and comprehensive report to both the Executive Committee and Board of Directors:

Advisor/Group	Contribution
PwC	Review of Innovation Strategy Appendix against Ofgem's assurance requirements.