

6

Net Zero and a whole system approach

This chapter sets out how we are responding to the urgent need to decarbonise the energy system, on the road to the UK's Net Zero emissions target. It describes how we are applying whole energy system thinking to support decarbonisation and the energy system transition, and wider stakeholder driven environmental and economic considerations, including clean air and economic growth. We also explain how we are using whole energy system thinking to drive innovation.

We show how we are preparing for a range of outcomes resulting from different decarbonisation pathways. This includes the work we have done on a pathway where energy efficiency and clean gas could combine to deliver the climate change targets, and how we are determined to drive this transformation to secure a 'Net Zero' future.

This chapter has the following structure:

- 6.1 The Net Zero challenge
- 6.2 The road to zero emissions – a clean gas pathway
- 6.3 Preparing for different Net Zero scenarios
- 6.4 Enabling whole system solutions
- 6.5 Whole system commitments summary

Key messages

- It is critical that we maintain momentum in delivering pathways which will contribute to meeting the UK government's climate change targets. We recognise the critical role that gas networks will have to play, given that these networks currently transport a predominantly fossil fuel product.
- We have been taking a leadership role in innovating to facilitate renewable gas producers to inject biomethane and BioSNG into the distribution network. We are exploring and developing the potential for hydrogen to be transported to our customers through our landmark HyNet and HyDeploy projects.
- We set out the timeline of the engagement work we are doing in conjunction with the other energy networks to provide tangible long-term solutions for clean gas, such as hydrogen conversion, hydrogen blending and renewable gases across our regions, including the commercial and regulatory frameworks that will be needed to support this.
- We set out our strategy on delivering whole system solutions across all four of our customer outcome areas.
- We set out our commitments to develop joint planning offices with electricity networks to support regional authorities with their plans, as well as optimising capacity between the transmission and distribution networks.
- We are proposing a stakeholder incentive to encourage further innovation and ongoing development of whole system solutions.

Net Zero and a whole system approach

6.1 The Net Zero challenge

The UK has already committed to reduce greenhouse gas emissions by 80% by 2050 from 1990 levels, and the government has now legislated to deliver a Net Zero target by 2050 based on the Committee on Climate Change's ('CCC') recommendation. The scale of this challenge is immense and urgent action is needed in the next few years to ensure pathways are available to deliver a low cost, secure and sustainable energy transition.

The core areas where we are taking steps to create such pathways are heat and transport. The CCC recognised in their recent report the key role lower-carbon gas and hydrogen could play in decarbonising heat. We have long been a leading voice, ensuring the gas network is playing a full role in the journey to decarbonise the whole energy system. We have always believed, supported by increasing research and studies, that there are no credible future low-carbon energy scenarios in which the gas network is not playing a vital role.

The needs of our customers and stakeholders have always been clear: that decarbonisation must be achieved at the lowest cost and with minimal disruption, both at home and in their communities.

The decarbonisation question we have sought to address has therefore been to identify how the gas network can help to unlock the lowest cost and least disruptive pathway to the decarbonisation of heat and transport.

6.1.1 Our engagement strategy and approach

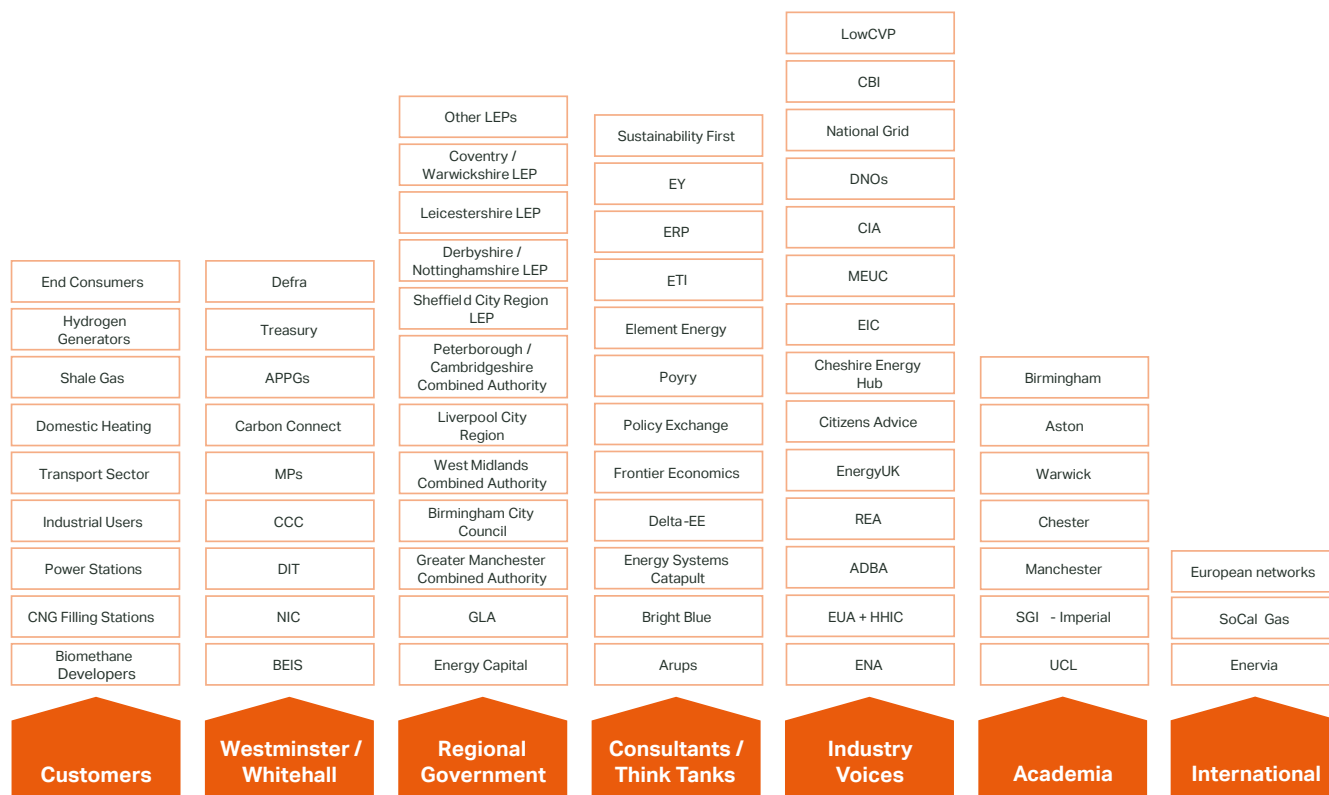
Our engagement approach has been to:



We have sought to do this collaboratively with the other energy networks and involve a wide range of stakeholders. The charts below show the breadth of our engagement and the types of channels and methods we have used to support the four goals above.

Figure 06.01: Breadth of Stakeholder Engagement

Our stakeholders



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Figure 06.02: Our future energy engagement

Our future energy engagement

Studies	Events	Innovations	Educate and Inform	Media	Memberships
Hydrogen	Trade Missions	Future of Gas Networks	Future of Gas	Print	Strategic Infrastructure Board
Heat	Sponsorships	HyNet	Advise on Air Quality	Interviews	High Level Infrastructure Board
Freight	Presentations	HyDeploy	Advise on Transport	Blogs	
Transport	Conferences	Future billing methodology			
Future Networks	Forums	Whole system modelling			
Infrastructure	Regular meetings				

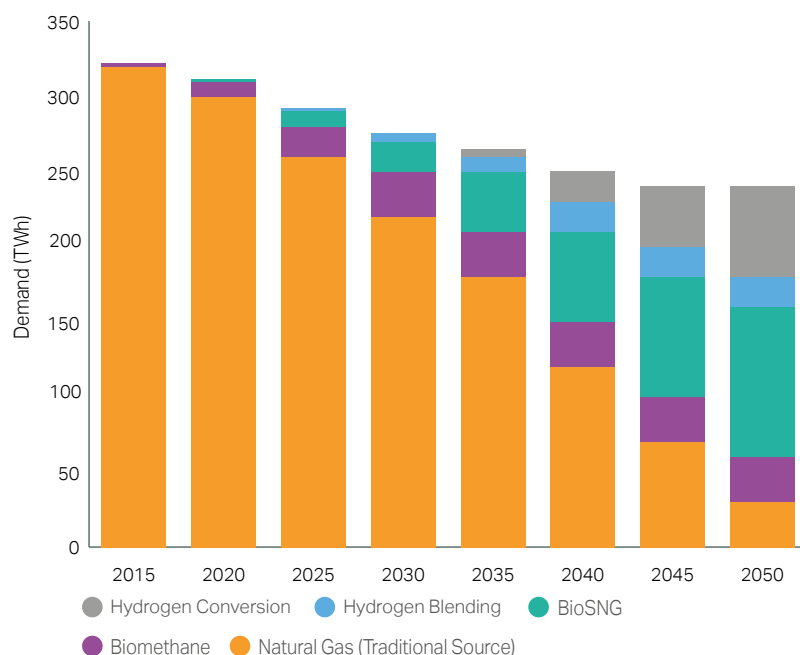
We engage widely on the energy systems transition through a mixture of national and regional engagement. We are actively supporting regional authorities and local enterprise partnerships to develop their Local Area Energy Plans. We are also active members of several government sponsored groups such as the Carbon Capture and Usage Advisory group as well as the Hydrogen Transformation Strategy group involving BEIS, Ofgem and the other gas networks. We are engaged with a wide range of academia and think tanks in developing evidence to support policymakers on the costs and practicalities of different decarbonisation pathways, in particular supporting Policy Connect’s work and Imperial College’s Sustainable Gas Institute research.

A significant challenge in delivering the Net Zero challenge will be consumer attitudes and behaviours towards heat decarbonisation given, unlike power decarbonisation, changes will affect people in their homes and require action of some sort with disruption and cost implications. We explored this issue in our Future of Gas series described below, and we are testing consumer attitudes to hydrogen transition through our HyDeploy blending projects at Keele University and with industrial customers attitudes through our hydrogen transformation project HyNet. We also explored general attitudes to heat decarbonisation in our customer forums as part of our tailored engagement approach. We continue to support the government through the Hy4Heat programme which is looking at trials to explore consumer issues and we will also support this through our off-grid community innovation project. We have identified consumer behaviours as a key theme for our innovation strategy and we will be looking to explore the practical issues and realities of the transition to Net Zero through further work in this area.

As the challenges of decarbonising heat and transport were not well understood, we published a series of discussion documents, starting in 2015, to help engage stakeholders and raise awareness to encourage a wider industry debate. The final document in this series is included in the references. It summarises the research findings around the topics of customer demand, transport, renewable gas and heat.

The summary from this work sets out a pathway of how the gas network could evolve to deliver a decarbonised solution for heat and transport as illustrated below:

Figure 06.03: The pathway to 2050



6.1.2 Our decarbonisation journey

The emergence of biomethane

Almost ten years ago we took the first steps to supporting the emerging biomethane industry, working with government to establish the Renewable Heat Incentive ('RHI') to support green gas injection into the gas grid. Our aim was to encourage the use of biomethane from anaerobic digestion. We worked to remove technical barriers and to establish an effective financial support mechanism through the RHI. We have also lobbied to encourage changes to wider energy policy to direct feedstocks from less efficient combustion to the production of lower emission and more flexible green gas.

This has been a great success, with an impressive step-change in the amount of low-carbon biomethane coming on to the gas grid across the UK. We now have 32 biomethane plants connected to our network with a capacity of 2.28 TWh/annum delivering 0.5% of total demand through renewable gas. There is still much more work to be done to build on this strong start and enable and facilitate the full potential from biomethane.

Bio-synthetic natural gas – turning black-bag waste into energy

Whilst biomethane is low-carbon, low cost, and reduces emissions with no consumer disruption, we knew that the scope for biomethane was limited by feedstock availability. We saw the potential from a new technology: BioSNG. This could create flexible Syngas, producing either hydrogen or methane, from the more abundant drier waste and non-waste feedstocks, including black-bag waste. We supported an initial pilot project at Swindon which successfully demonstrated each component. We then invested in a larger commercial demonstrator project. This project, supported by Ofgem's Network Innovation Competition and funding from the Department for Transport ('DfT'), has shown the challenges of gaining commercial agreement to significant investments during the innovation development stage and the risks that investors face.

The Swindon project continues to show the support for this emerging technology, and learning from the project has driven further development of the technology and supporting commercial models. We would welcome amendments to the innovation funding mechanism to respond flexibly to changes in external partner funding.

To understand the potential for green gas, we commissioned a **report from Anthesis and E4Tech** to identify the potential for biomethane and BioSNG from indigenous feedstock. This showed the UK could produce up to 180TWh of green gas in 2050, which is sufficient gas to supply 50% of homes in the UK.

Exploring the commercial regime

To take forward the discussion in supporting policy, in parallel with the technical demonstration, we commissioned EY to produce a report which assessed the best options for a financial support mechanism for BioSNG to enable large-scale roll out. This was published in 2018. Please see **Appendix 06.02**.



In parallel with the support for low-carbon alternatives to fossil natural gas, we have also considered the role of the gas network to reduce emissions from other sectors. The transport sector, whilst focusing on electricity for smaller vehicles, did not have a credible alternative to diesel for larger vehicles. We could see the potential for the existing gas network to support a large reduction in emissions from HGVs via the use of Compressed Natural Gas ('CNG'). We partnered with CNG Fuels and John Lewis to commission the first high pressure filling station near Preston and ensured a quality evidence base was built up so that the benefits were unequivocal. We established, with the help of Energy & Utility Skills and the EUA, the Natural Gas Vehicles Network, which brought together representatives across the supply chain to coordinate work and insights into potential for this technology. Through these partnerships, we successfully lobbied the Treasury to establish and maintain a fuel duty differential to support fleets switching over to CNG. There is now a healthy pipeline of new CNG refuelling stations being developed across our network, with manufacturers confident to develop the vehicles. We are also considering how this sector could subsequently transition to hydrogen in the longer term.

6.2 The road to zero emissions – a clean gas pathway

Biomethane and BioSNG can deliver a huge reduction in carbon emissions, but they cannot take us to or beyond our current carbon reduction targets. This requires the replacement of natural gas, with a zero or negative carbon alternative. The only candidate to fill this role at scale is hydrogen.

There are many engineering and other challenges associated with replacing natural gas with hydrogen in our network, and there is the potential for the introduction of hydrogen to result in disruption. Working alongside government and the other gas networks to understand the work required to repurpose the gas network for hydrogen, we have also led the work to show the merits of hydrogen blending. We developed and launched the HyDeploy project, which was designed to show how much hydrogen can be added to methane without requiring any changes to consumer appliances.

This would deliver a further step-change in carbon emission reductions beyond those from biomethane and BioSNG and would also enable the hydrogen supply chain to develop, prove itself, innovate, identify whole system interactions, and reduce costs. As well as the HyDeploy project, and to enable faster implementation, we are including a commitment relating to the implementation of an operational hydrogen blending regime in the **Environmental Action Plan** section of Our commitments.

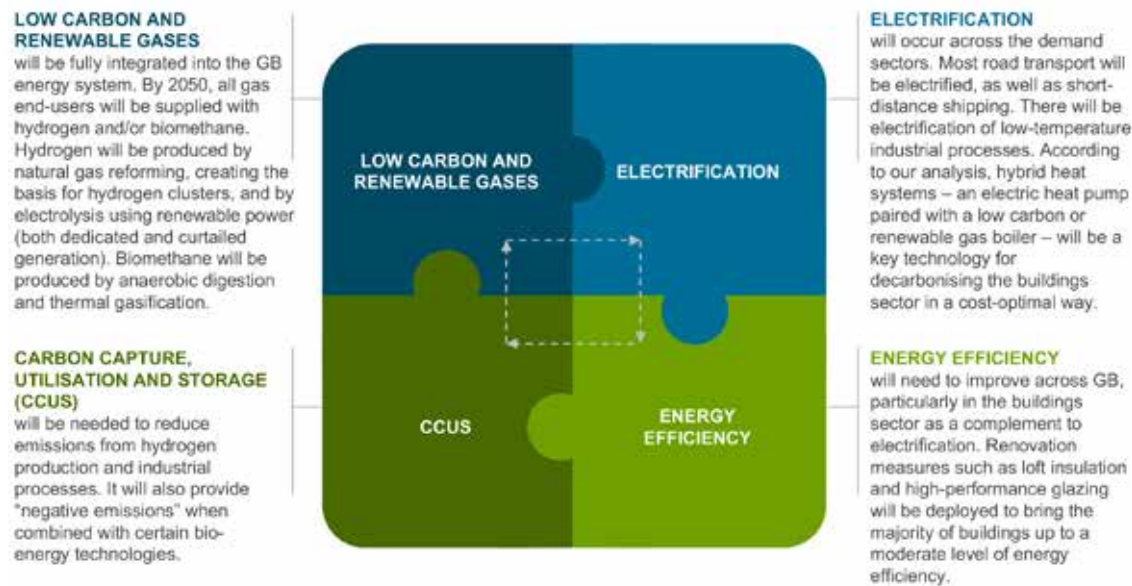
To demonstrate the potential for hydrogen, as well as our work with government and the other gas networks to understand the impact of re-purposing the gas network, we have also listened to our stakeholders and identified the HyNet project as a strong candidate for the first hydrogen/Carbon Capture and Storage ('CCS') cluster in the UK. This project is primarily aimed at establishing a credible decarbonisation option for heavy industry, but would also provide a low-carbon fuel for transport, power generation and for heating. This is discussed in more detail in our **Environmental Action Plan (Appendix 07.04.00)**.

We are constantly engaging and responding to our stakeholders, and in 2018, government and BEIS challenged the gas networks to produce a coherent pathway to decarbonise gas, bringing together all the activities across different companies into a single credible strategy.

To determine a clear pathway to Net Zero, the Energy Networks Association commissioned a report by Navigant, which was published in October 2019 see **Appendix 06.03**.

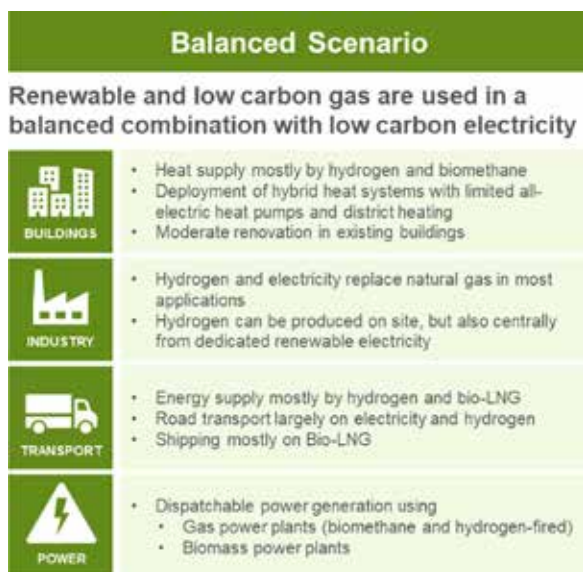
Net Zero and a whole system approach continued

Figure 06.04: Gas pathways core elements



The Navigant work has been supported throughout by extensive stakeholder engagement, including with energy networks, energy suppliers, appliance manufacturers, trade and consumer representatives and academia. The study was based around four core elements:

Figure 06.05: The navigant balanced scenario

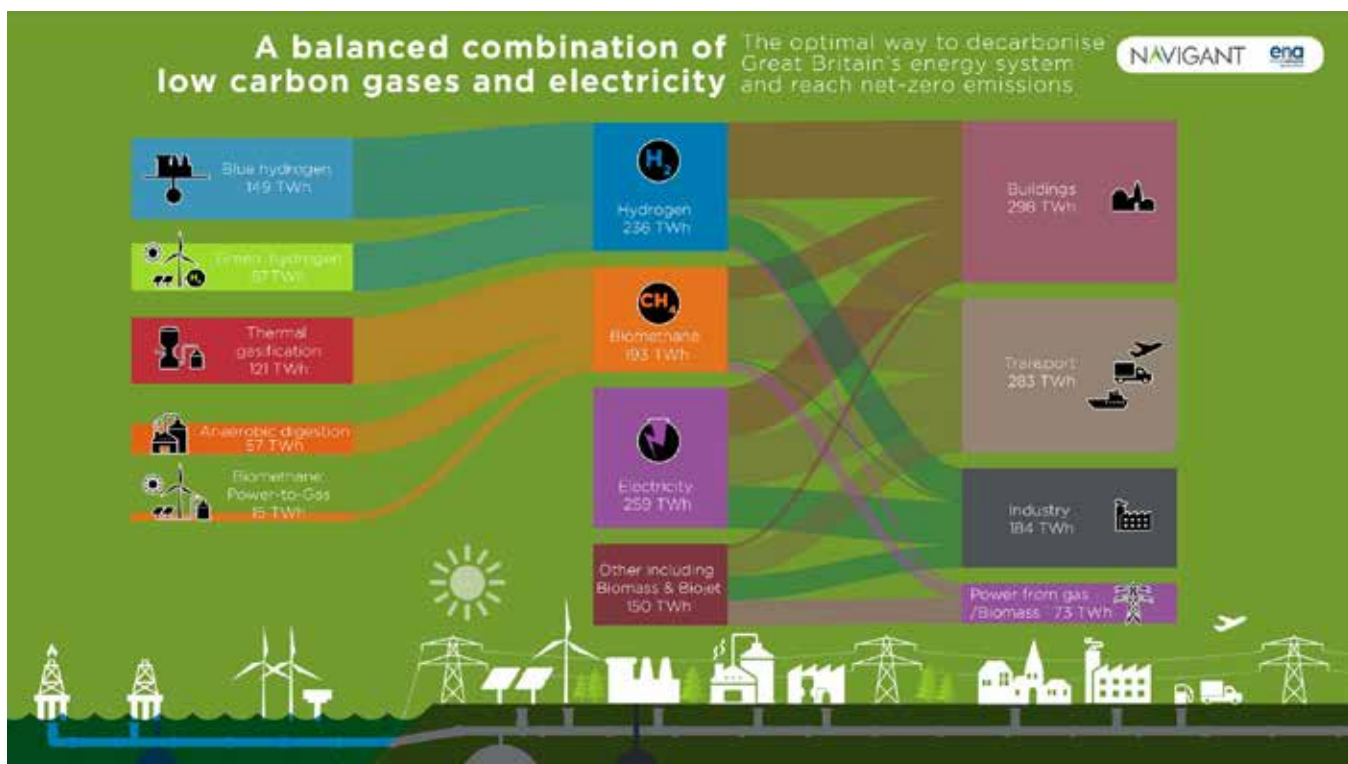


The Navigant work found the Balanced Scenario represented the lowest cost pathway for the energy networks to achieve Net Zero by 2050.

It shows how the first steps to Net Zero involving biomethane, BioSNG and hydrogen blending can be expanded, and with hybrid heating systems, and hydrogen production, progressively move the UK on to a clean gas economy.

Their approach moves ultimately to 100% hydrogen in large areas, grown from the initial hydrogen/CCS clusters, and with blends of green gas in areas further away from where hydrogen production is viable.

Figure 06.06: The role for gases in the navigant balanced scenario



Navigant then set out the actions required to support the delivery of the Net Zero clean gas pathway, highlighting the actions that needed addressing within the RIIO-2 period.

Figure 06.07: Low regrets actions to support the Net Zero pathway



Following the publication of the Navigant report, the gas networks are now assessing the coordinated programme of work to deliver the required next steps. Some areas will be led by the gas networks, and in others, we will work with the ENA to influence government, Ofgem and other key stakeholders.

Net Zero and a whole system approach continued

There are many areas however where we have already recognised the need to take action, including filling evidence gaps. How we are supporting these actions, either with work already in progress, or within our RIIO-2 Business Plan, are summarised below.

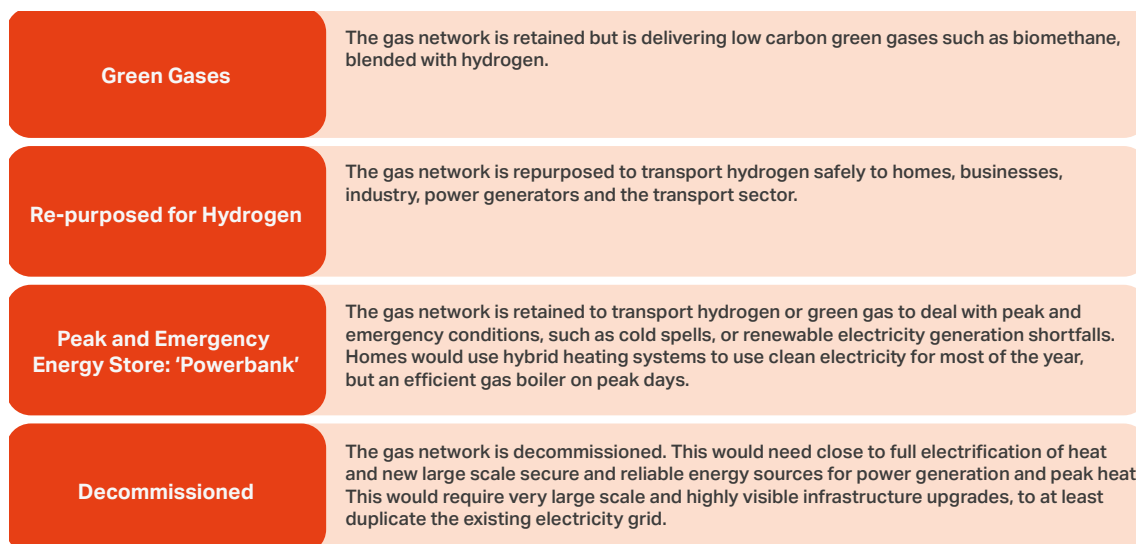
Table 06.01: Cadent’s supporting initiatives

Action	How this is supported by Cadent
Facilitate Biomethane injection	Entry enablement and ongoing Distributed Entry Gas Stakeholder Forum
Standardise gas network connection requirements	Entry Gas Connections Standard and ongoing Distributed Entry Gas Stakeholder Forum
Gas safety, metering and billing	Future Billing Methodology project is designed to identify a solution to remove the need to propanate. The Distribution Entry Gas Stakeholder Forum can propose supporting changes to the industry framework.
CCUS Implementation	We have been key members of the government’s CCUS Task Force.
Repurposing high pressure networks for hydrogen	All networks are involved with H21 re-purposing. We also have existing innovation projects looking at hydrogen purity and de-blending potential to separate hydrogen from a hydrogen/methane blend.
Hydrogen storage needs	Innovation projects can support this, with NTS expected to take the lead
Low-carbon trials	Innovation projects and heat policy re-openers. BEIS Hy4Heat project will oversee hydrogen trials
Raising awareness	RIIO stakeholder plan, informed by trials and pilots supported by the innovation mechanisms

6.3 Preparing for different Net Zero scenarios

Whilst the work by Navigant shows a credible pathway to Net Zero, there are a range of possible pathways and destinations for the gas network when we look out to 2050. We have assessed the four pathways that BEIS are exploring as government develops its heat strategy. These options are green gas development, hydrogen solutions, electrification and hybrid gas and electric solutions. Broadly, this gives four End States which we may need to address. We have sought to ensure our Business Plan supports all likely pathways and does not create any unnecessary barriers under each of the four possible 2050 End States. These End States are summarised below and all require a substantial change to the way the gas network is employed.

Figure 06.08: Possible 2050 End States



6.3.1 Our plans for RIIO-2

We have assessed these End States in developing the output delivery commitments for RIIO-2. We have considered our investment plans and we have also considered the balance of where we can forecast with certainty and where it might be more appropriate to have an uncertainty mechanism to keep options open or create flexibility to uncertain developments:

- Our detailed environmental action plan (**Appendix 07.04.00**) sets out our proposals for supporting each of these possible End States in terms of the actions we will explore and the mechanisms we are proposing.

Part 1 sets out our plans to continue to reduce leakage of methane from our networks through our main replacement programme.

How we plan to reduce to Net Zero certified on the rest of our business carbon footprint and reduce emissions from our supply chain.

Part 2 sets out our plans on reducing our wider environmental impact looking at reducing waste to landfill, biodiversity and supporting our employees to reduce their environmental footprint.

Part 3 set out the plans we have to facilitate the energy system transitions. The key elements are:

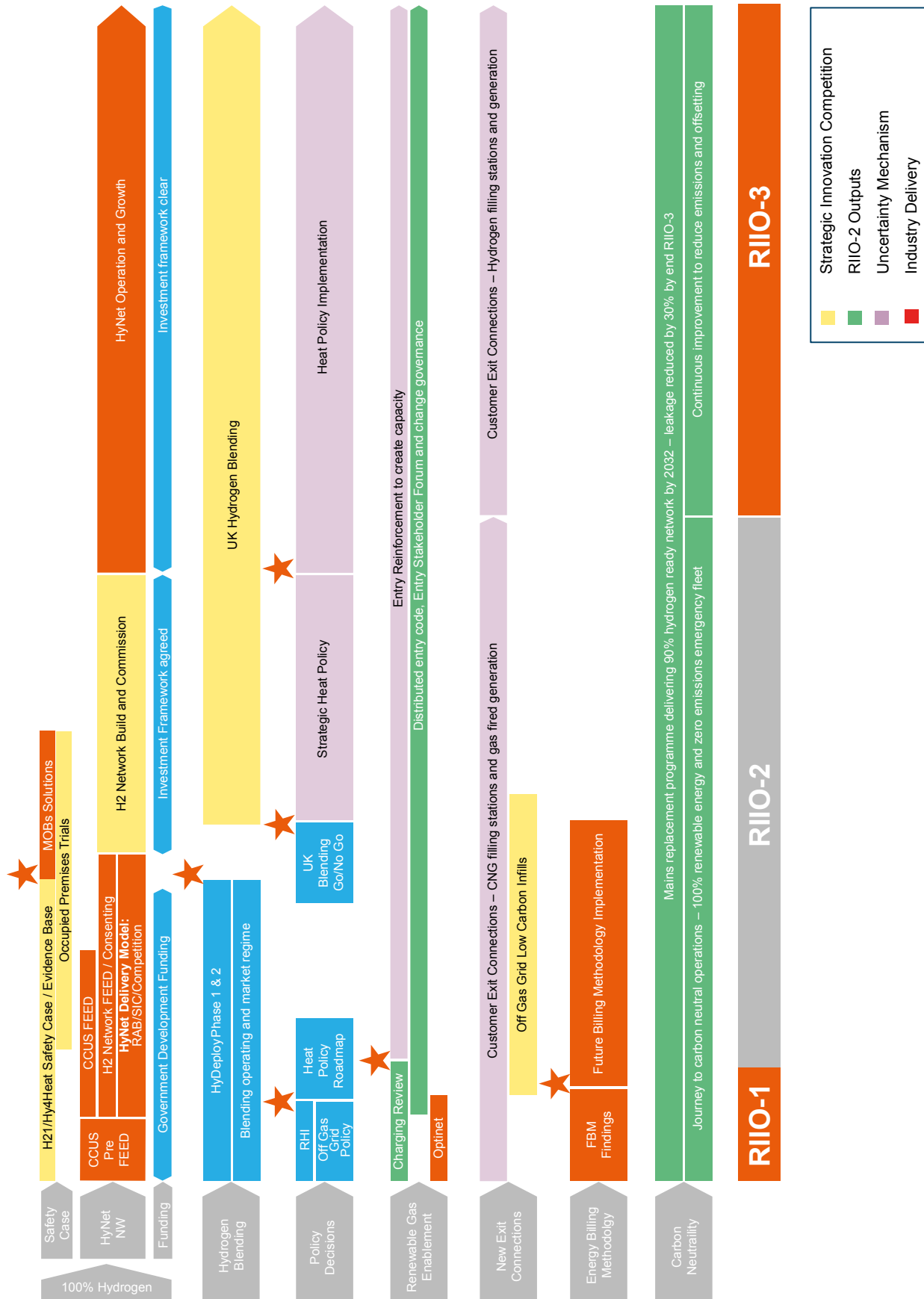
 - Distribution Entry Enablement – we are facilitating a charging and access review for entry connections which looks at how costs to enable additional capacity might be socialised over wider consumers thus potentially enabling greater volumes of clean gas.
 - Meeting the demand for gas fired power stations that wish to connect to the gas distribution network to provide a response and reserve service to the electricity balancing market.
 - Exploring the role clean gas could have in supporting off grid communities to switch from more carbon intense fossil-fuels such as oil and coal.
 - Our hydrogen transformation project in the North West, HyNet looking to decarbonise industry, transport and domestic heat through a consortium of hydrogen production, CCUS and a hydrogen pipeline connecting into the local distribution network.
 - Facilitating new exit connections for heavy duty transport such as HGVs, buses and trains, initially through CNG filling station and then transitioning to hydrogen.
 - Our continued trail to demonstrate the transition to flowing hydrogen through our network through the HyDeploy projects testing a hydrogen blend through Keele University and moving onto a public network.
 - Our future billing methodology which is looking at how we measure low Calorific Value gases entering the network and the best method to enable the most effective energy billing for clean gas options such as biomethane and hydrogen.
 - Our **consumer vulnerability strategy (Appendix 07.03.00)** and summarised in **Chapter 7**) sets out how we plan to horizon scan to understand and assess the impact of various technological and other changes which will impact on customers in vulnerable situations.
 - Our **Chapter 9, Costs and efficiency** sets out how we have factored the risk of different pathways into our cost benefit analysis on payback periods and in assessing discretionary investment.
 - This has driven our approach to the volume of mains replacement and reinforcement we might need to provide in our network. We have looked at what work is essential to be delivered to meet our safety case requirements and have engaged with customers on the level of cost benefit work that we should progress in RIIO-2 as well as the balance of focus of the work between safety, reliability and the impact on the environment. (see **Appendix 09.02** for more detail) .
 - We have assessed the potential and benefits of supporting customers to exchange gas cooking for electric cooking in multi-occupancy buildings (see **Appendix 09.04**).
 - We have set out how we have used energy efficiency projections from the core agreed scenario of forecasting work done with the industry.
 - The **Chapter 10, Managing Risk and uncertainty** sets out how we have assessed the required uncertainty mechanisms to support the changing futures.
 - Ofgem's proposed Heat policy re-opener.
 - A re-opener triggered by the outcome of our distributed entry charging review to support reinforcement requirements.
 - Connection volume and reinforcement revenue driver given volume uncertainty and housing growth.
 - Fuel Poor network extension scheme re-opener if policy changes.
 - Our **Innovation and Competition plans (in Chapter 8)** set out how we propose to use the Strategic Innovation Competition to support the Net Zero challenge through our large scale hydrogen projects and through developing research into customer behaviours and how the transition would be delivered.
 - Our **competition plan** sets out that for the HyNet project a range of investment models could be looked at to deliver the different constituent parts and ensure a low cost solution for customers and manage risk for investors.
 - Our **Chapter 11, Affordability and financing our plan** sets out how we might underpin long-term confidence in the investment community to support the climate change targets and uncertainty on pathways.
- Our ongoing stakeholder engagement strategy and plan** (see **Chapter 5** and **Appendix 05.01**) highlights the ongoing role for engagement in this area and the focus on particular groups.
- Entry enablement focusing on meeting the needs of new renewable gas producers wishing to enter the gas market, with the establishment of an Entry Gas Stakeholder Forum and a Connections Standards Methodology to support consistency and transparency, and to provide a voice to influence and prioritise change.
 - Our whole system section below setting out regional planning and development, standardised information and capacity signalling as well as timely reinforcement.
 - An internal Net Zero strategy group chaired by the Safety and Strategy Director, feeding into the Safety and Sustainability Committee of the board. This cross-business group, including regional and operational leads, will monitor and respond to developments in the external landscape and track progress of both the Net Zero work and whole system thinking.

Net Zero and a whole system approach continued

6.3.2 Key milestones and interactions

There will be interaction between policy decisions, development and conclusions from innovation projects and testing, development of charging, commercial and funding frameworks and ongoing projects. We have summarised how these might interact in the diagram below.

Figure 06.09: Net Zero Key Milestones



This diagram illustrates the interactivity and potential timings of when policy decisions may drive changes to the plan or trigger the need for action through customer demand changes, infrastructure development and project stage gates.

We will continue to work with BEIS and Ofgem on developing and demonstrating the delivery of the clean gas pathway and in developing the frameworks and mechanisms to roll out with minimal disruption to the end consumers at the lowest cost. Our plan has been shaped to enable the flexibility to do this without taking big bets about the precise form of this given its ongoing development and the need to consider this at both a local and national level.

We set out in the next section of this chapter our approach to working beyond the gas sector to consider whole system solutions which embrace the challenges of creating flexible solutions for customers across sectors.

6.4 Enabling whole energy system solutions

The role of the gas networks in the low-carbon energy system of 2050 is an example of long-term whole system thinking at a macro-UK level. In the short to medium term, to deliver additional benefits to customers and stakeholders we have considered approaches which enable whole system solutions across all of the four priority outcome areas that have been driven from our customer insights and through our investment plans. We have considered where benefits will be seen by gas network customers but also explored benefits seen by other stakeholders and sectors beyond gas. The output commitments we have proposed are summarised below.

6.4.1 Engagement driving whole system thinking

Ofgem's broader approach to whole system thinking set out in their May 2019 sector specific methodology decision document and updated Business Plan Guidance, fully aligns with our approach to working with our colleagues in the energy networks and broader stakeholders to solve challenges beyond just our own network responsibilities.

We have taken an active and leading role in applying whole energy system thinking to the development of the future energy system architecture. We will continue to participate in relevant electricity sector engagement and consultation processes, and we will champion and support cross sector initiatives and trials, system modelling and forecasting, building on the work already undertaken in RIIO-1.

We have been prominent and active participants in the industry initiatives, including the Open Networks Whole System workstream, in which we are leading the team to identify and realise benefits in the Investment Planning area, working with a wide group of stakeholders. This has highlighted support for three deliverables, covering information capture and sharing, and a joint planning approach to support local strategies

We have included these in our plans and the initiatives are discussed further below.

We are supporting policymakers to adopt a whole energy systems perspective as they seek to decarbonise the energy system. There are no options for decarbonising heat and transport that do not have some impact on the electricity and gas networks. From diverting fuels and feedstocks, to providing secure back up or storage options, decarbonisation has to be viewed through a whole energy system lens. However, to date, a whole energy system coordinated vision has been limited.

Through stronger relationships with the electricity networks, we will encourage the emergence of a clear and coherent whole energy system consensus view on the future options for energy system decarbonisation.

Understandably, with the large scale of potential expenditure required to support the electricity system transition, industry attention on whole system benefits has focused on the electricity networks and, in particular, on identifying and delivering benefits across electricity transmission and distribution. However, with the increasing move to decentralised small-scale energy, in both the gas and electricity sectors, we are convinced that coordination across gas and electricity distribution networks will also deliver benefits for customers.

6.4.2 Network related whole system solutions

In parallel with the government's recognition that there are highly credible gas network alternatives to the full electrification of heat, through our ongoing engagement with our regional stakeholders we have also been making real progress in encouraging whole system thinking. Cadent are now active members of the regional energy and Infrastructure boards that are starting to emerge across the UK. These are constituted by the Authority directly or by the Local Enterprise Partnership, with the more established Boards operating in London, Manchester, Cheshire and Warrington and the West Midlands. We will continue to support these existing bodies and encourage and facilitate new emerging groups. Through these relationships we can listen to the challenges and ambitions of our stakeholders, and propose solutions and approaches that can help meet their objectives.

Three examples of such stakeholder driven initiatives included in our RIIO-2 Business Plan, are the establishment of a joint gas and electricity longer-term (3+ years) optioneering service for local authorities, a new mechanism to support timely and efficient network investments, and higher quality, more efficient data gathering. The rationale for these commitments are covered in more detail in the dedicated **Appendix 07.02.05 "Whole System Network planning"** with a summary of our proposals in these areas outlined below.

A. Joint energy network planning office

We have seen the emergence of LAEPs, and are involved in their preparation, including being a member of the team that produced the LAEP for Bury in the North West.

Regional authorities are developing long-term plans such as for low emission transport or for domestic and business growth, which will impact on the energy networks, and with a whole system approach, a wider range of options can be identified and considered. For example, the expected growth could result in extensive reinforcement requirements on the power grid, however, the creation of a gas fired combined heat and power scheme ('CHP'), or even conversion of existing electrical heating, could represent a preferred solution. The authority may have multiple drivers for their Decision-making and not just cost. The preferred option may be more expensive if, for example, it can be completed more quickly, be more robust to future uncertainty or have lower delivery risk.

The creation of a joint electricity and gas energy network planning office would provide a service for local authorities to share their development thinking, and receive a set of coherent whole system options that they can then take forward in their strategies. The need and value from this approach have been identified through our relationships with our regional stakeholders. The strongest example of stakeholder support has been through Cheshire and Warrington LEP Infrastructure Group, working with both the local Distribution Network Operators ('DNOs'): Scottish Power Energy Networks and Electricity North West. We have also confirmed wider support through the development of the Investment Planning deliverables, led by Cadent, within the ENA's Open Networks Whole Systems workstream. As part of these activities we supported a workshop case study with Coventry and Warwickshire LEP, and Western Power Distribution.

Net Zero and a whole system approach continued

We have partnered in five bids submitted this summer to Innovate UK for Smart Energy Systems. Most notable amongst these is the bid from the West Midlands (Energy Capital) to develop an approach to regional energy planning that could be rolled out UK wide.

To support regional authorities in the development of their infrastructure strategies and plans, we will establish a pilot joint energy network planning function with at least one DNO by 31 March 2022. If successful, and subject to DNO agreement, we will roll these out across our entire footprint by the end of RIIO-2.

Work is underway to develop this service within the Open Networks Whole System workstream. The 12-month action plan being taken to the Steering Board in December 2019 for agreement by the networks is outlined below, and is based on commencement with trials in early 2020. We have agreed with SPEN Manweb to explore using the Liverpool City Region and Cheshire and Warrington as a potential trial area.

Table 06.02: Whole system planning development timetable

Activity	Duration
Identify trial areas	Jan-Feb 2020
Local Authority confirm objectives and constraints	March 2020
Energy networks identify constraints and required works	Apr-May 2020
Energy networks identify options to optimise capacity	June-July 2020
Options report presented to the LA	August 2020
Trial Feedback Report	September 2020
Go/No Go	October 2020
Design Universal Service	Oct-Nov 2020
Develop Implementation Plan	Nov-Dec 2020

The final Universal Service may need to be funded by the local authorities, to avoid potential inefficiencies from the provision of a free service.

B. Standardising information sought by networks

We will continue to be champions of information sharing across the networks, and in doing this in a way that is efficient for all parties. A considerable part of the critical information used by the networks to develop their plans is sourced from external parties such as Local Authorities. It is important to make the capture of this information robust, consistent and efficient. We are seeking to avoid situations where different networks ask the same regional organisation for similar data, at slightly different times, with slightly different formats, and also possibly addressed to different stakeholder contacts. This is not conducive to quality and consistent data.

It also can introduce costs and frustrations for our stakeholders. Through our leadership of the Investment Planning activities within the Open Networks Whole Systems Workstream, we have championed a new process across the energy networks that will standardise and coordinate our approaches, with the aspiration to agree a single organisation to undertake the data capture and sharing for all networks.

An agreed programme to deliver a coordinated procurement strategy in 2020 is being discussed at the Open Networks Steering Group in December 2019.

C. Supporting timely and efficient network investment

A recurring issue from many of our regional stakeholders is that timely energy network investment is a barrier to their growth plans e.g. Greater Lincolnshire Local Enterprise Partnership. This barrier is created by the inability of the energy networks to make speculative investments ahead of demand. Inefficiencies can be created by the staged release of different phases to different developers over time, preventing a clear view of the overall requirement.

We have consulted on a potential solution to this issue, by enabling local bodies to underwrite appropriately sized and early reinforcements, without creating an asset stranding risk for existing gas consumers. We have had positive feedback on this initiative and we will bring forward detailed proposals through our Connection Charging Methodology.

We will work with our colleagues in the other networks to implement a similar approach as the principles are common across gas and electricity. This proposal will require regulatory support that the underwriting is a sufficiently strong signal to justify the network investment.

D. Providing information to facilitate the market in decentralised gas operation

There seems little doubt that the growth in decentralised gas generation will continue – this growth is a feature of the forecasts and scenarios issued by National Grid and the electricity Distribution Network Operators, and reiterated in the Core Scenario work.

The driver for gas generation is the provision of services to the electricity sector. The gas networks role is secondary and one of facilitation. As companies compete to offer services to the electricity market, if their offerings are contingent on access to gas network capacity, information provision about our network will improve the efficient operation of the market. We will therefore commit to publishing data on available or scarce network capacity and will continue engaging with our stakeholders through RIIO-2 to identify and implement further improvements in information provision that might better facilitate the market in decentralised gas generation. This is also an Investment Planning deliverable validated and supported through the Open Networks Whole Systems workstream.

Subject to the decision by the Open Networks Steering Group in December 2019, we expect a deliverable across all the energy networks to be taken forward in 2020 within the ENA Energy Data Working Group. This cross-sector ENA group has been set up to coordinate the network’s activities on digitalisation and in response to the Energy Data Taskforce conclusions. We will therefore assess how best to make available the planning information publicly as part of our Data and digitalisation strategy. Further detail on our proposals can be found in **Appendix 07.02.05 “Whole System Joint Network Planning”**.

6.4.3 Optimising capacity across transmission and distribution

Efficient development and operation of the gas network across transmission and distribution will deliver whole system benefits, with the provision and management of network capacity a key factor. In RIIO-1, Ofgem set a framework which would encourage GDNs to effectively manage their network capacity such that customer demand was met at the lowest cost. The RIIO-1 Capacity Incentive encourages us to book capacity on the NTS to meet our 1 in 20 licence obligation, against a target volume set out at the start of the price control. This ensures companies do not hoard capacity and incentivises them to book at an efficient level, helping the NTS to have the ability to manage their network effectively. The NTS Exit Capacity incentive has delivered significant benefits to gas customers.

Ofgem has proposed to amend the existing incentive as at RII0-1 by:

- Replacing advance capacity price estimates with final offtake capacity prices when calculating rewards and penalties; and
- Introducing a mechanism that enables a within-period adjustment of offtake capacity baselines, to ensure ongoing alignment between baselines and peak demand forecasts.

We are seeing an increasing demand for flexible capacity across the gas networks (including to facilitate gas generation). This has been seen most clearly across the NTS with the need for increased compressor operation to deal with the high level of within-day fluctuations. Managing within-day flexibility capacity is a whole system issue as it is a key requirement for gas-fired power station operations which support both the electricity and gas markets. We fully support Ofgem's review of this issue in the context of the current transportation charging and access work. We have set out our commitment to work with Ofgem and industry participants to bring forward detailed proposals for a Flexibility Incentive to support the exit capacity incentives to maximise the whole system benefits. The overall exit capacity approach will be informed by the UNC changes currently under development, with conclusions due in the next few months.

We will continue to work with Ofgem and National Grid NTS to develop the NTS exit and flexibility incentive mechanisms.

Further detail on our proposals in this area can be found in **Appendix 07.02.04 "Optimising capacity between transmission and distribution"**.

6.4.4 Wider whole system solutions

We have also gained insight from customers and stakeholders outside of our regional and local authority relationships, and through these observations, we have identified a number of other whole energy system initiatives:

Off Gas Grid Communities Decarbonisation

Ahead of policy to decarbonise heat across the UK, the government are considering the approach to decarbonise high carbon heating off the gas grid. We have urged a whole system approach to off gas grid communities, so that the energy infrastructure can be designed that can meet the whole community's long-term needs. We continue to believe that, in some cases, extending the gas grid will be the option preferred by communities to deliver faster, lower cost emissions reductions than any other alternatives. Further benefits can be delivered as the gas carried by the networks is progressively decarbonised.

To provide the evidence to support this hypothesis, **we will extend the network a short distance to connect with pilot communities and work with householders to switch from oil or coal as soon as possible.** We will work with these communities to identify the best options for them, including considering energy efficiency measures. This work will provide vital evidence to enable gas solutions to play a full part in whole system solutions for off gas grid communities.

More detail on our proposals to support off grid communities can be found in Appendix 07.04.09 "Supporting Off grid communities" and in our Environmental Action Plan in Chapter 7, Our commitments.

Connection Standardisation

We have made a commitment to remove barriers and present solutions for our customers and stakeholders by bringing forward changes to the regulatory and commercial framework (see developing a safe and resilient network for now and the future). By supporting customers and stakeholders that operate across many regions and many energy networks, this will enable a whole system approach: this initiative supports gas power generators, gas refuelling stations, biomethane plants, and regional

authorities, all of which operate and impact multiple sectors. This whole system perspective is clear for gas power generators, but **the commitment to establish Distributed Entry Gas Connection Standards across the gas networks** is also a whole system approach, applicable outside of Cadent's networks, and responding to a clearly stated customer challenge.

More detail on our proposals to this commitment can be found in Appendix 07.04.00 our Environmental Action Plan in Chapter 7, Our commitments.

HyNet

The HyNet project is an alliance of partners from across the sectors, industry and academia. These partners have come together to create a vision for how industry can be decarbonised in the most cost-effective way with significant benefits to local employment and the creation of an exportable industry for the UK.

HyNet was applied initially to the heavy industry in the North West but it can also play a significant role in supporting the reduction in emissions in the transport, power generation and heat sectors. The proposal includes hydrogen production and carbon capture, transportation and storage, all of which are outside of our Business As Usual ('BAU') activities.

We have used our innovation mechanisms to support the development of HyNet, and most recently this has included a study into the benefits of using HyNet supplied hydrogen in the transport sector known as 'HyMotion'. We are working closely with the government as they progress their plans for carbon capture and hydrogen clusters, with the aim of having clusters operating in the next decade.

We have a strong relationship with Scottish Power Energy Networks and they also support this project as they believe it can deliver substantial value by keeping significant new loads, including heating, off their network.

A demonstration of our approach has been the development of a vision for decarbonisation of the North West of England. HyNet has been developed by an alliance of partners from across the sectors, industry and academia to create a vision for how industry can be decarbonised in the most cost effective way with significant benefits to local employment and the creation of an exportable industry for the UK.

More detail on our proposals to this commitment can be found in our Environmental Action Plan in Chapter 7, Our commitments.

Energy exchange in multi-occupancy buildings

We have employed whole system thinking for our approach to gas in multi-occupancy buildings, set out in detail in Our commitments – revolutionising the experience for customers living in multi-occupancy buildings.

In our London network, we have identified existing and planned district heating schemes, and we will seek to explore whether these present a lower long-term cost and practicable alternative to the extensive replacement of gas infrastructure. We also work with local authorities and housing bodies, and the electricity distribution networks, to explore opportunities to rationalise energy infrastructure by replacing gas cooking facilities with electrical alternatives where there may be a disproportionate cost and complexity of maintaining dual infrastructure, and where there is a customer demand for this and there is capacity on the local power grid. We are progressing with this option in RII0-1 and have built a continuation of this into our plans for RII0-2.

More detail on our plans can be found in the Appendix 09.04 'Transforming the experience for customers living in Multi-occupancy Buildings'.

Net Zero and a whole system approach continued

Applying whole system thinking to addressing the needs of vulnerable customers

We have applied this thinking to a number of areas in the proposed plan, seeking to deliver the best outcome for customers and stakeholders at a whole system level from their perspective, rather than just from what we could do as a gas network. Highlights of our proposals are summarised below, and you can find further details in **Our customer vulnerability strategy Appendix 07.03.00**:

- **Fuel poverty** – We are trialling an approach to bring together funding streams from a number of sectors to deliver the best fuel poverty actions in England (starting in our West Midlands network) as well as delivering a new fuel-poor identification tool which can be used to identify homes to target for both energy company obligation services and fuel-poor network extensions.
- **Going beyond to strive to never leave a customer vulnerable without gas** – We are reaching beyond our traditional boundaries to developing services to ensure customers can get reconnected with gas supply following a disconnection.
- **Identifying needs of customers in vulnerable situations** – We are joining up the Priority Services Register Needs Codes; identifying services required and creating partnerships to deliver services to customers in a one-stop way.

These commitments can all be seen in our Customer Vulnerability Strategy in [Chapter 7, Our commitments](#).

Minimising disruption – Coordinating works with other utilities

The cost of congestion to the general public, commerce, industry and the local and wider economy is increasingly significant as

urban and rural areas become more populated and infrastructure develops. Our customer insight (summarised in **Chapter 5, Enhanced engagement, discussed in detail in Appendix 07.03.08**) has highlighted this as one of our customers' key priorities. We have also been working with local authorities and regional development agencies who are keen to explore solutions whereby better planning could be achieved across utilities to minimise the time roadworks are required and to plan infrastructure developments with less disruption.

We are exploring with the Greater London Authority how we might value the cost of disruption in order to assess the whole system solution benefits of coordinating works. We have also made a commitment to develop schemes in partnership with other utilities and to monitor and measure the benefits delivered (**this is covered in the 'Delivering a quality experience for our customers' outcome' area of [Chapter 7, Our commitments](#)**).

6.5 Whole system commitments summary

The summary below outlines our headline whole energy system initiatives and we have mapped them against the criteria set by Ofgem in their RIIO-2 Business Plan guidelines:

- Plans for joint planning with other network companies and/or system operator.
- Identification of effective whole system solutions and approaches.
- Demonstrates long-term whole system thinking and value for customers, including identification of uncertainties and mitigations.

We have also shown the wider whole system solutions map to the guidelines.

Table 06.03: Summary of whole energy system initiatives

	Joint Planning	Whole System Solutions	Long-Term Thinking	Benefits
Whole System Solutions – Network related				
Joint Planning Office	✓	✓	✓	Sector costs, reduced carbon, clean air, non-sector costs and growth.
Standardising information sought by networks	✓	✓	✓	Lower costs, higher quality data enabling better Decision-making.
Timely Reinforcement	✗	✓	✓	Economic growth, lower carbon.
Network capacity information	✓	✓	✓	Enabling better customer/stakeholder Decision-making.
Optimising capacity across Transmission and Distribution NTS Exit and Flex Capacity	✓	✓	✓	Lower costs.
Wider whole system solutions				
Please see Chapter 7, Our commitments for more information				
Off Gas Grid Communities	✗	✓	✓	Sector costs, reduced carbon, clean air.
Connections process standardisation across networks	✗	✓	✓	Sector + non-sector costs, facilitating competition.
HyNet North West	✓	✓	✓	Sector/Non-Sector costs, reduced carbon, clean air, growth.
Preparing for different Decarbonisation Pathways	✓	✓	✓	Sector costs, reduced carbon, clean air.
Energy Exchange for MOBs	✓	✓	✓	Lower overall costs, less disruptive.
Fuel Poverty interventions	✓	✓	✓	Energy efficiency, warmth, social mobility.
Going beyond to never leave a customer vulnerable without gas	✓	✓	✓	Improved customer experience.
Identifying common needs for customers in vulnerable situations	✓	✓	✗	Lower costs, improved customer experience.
Coordinating works with other utilities	✓	✓	✓	Reduced disruption, better customer experience, growth facilitation.

The table below explains the cost and regulatory treatment of our whole system commitments.

Table 06.04: Whole energy system output commitment

	Cost	Regulatory Treatment	Comments
Whole System Solutions – network related			
Joint Planning Office	£0.5m (2 FTEs per network)	Base plan totex	Costs split with electricity DNO, exploring whether local authority could be charged for this service.
Standardising information sought by networks			
Network capacity information			
Timely Reinforcement		Revenue driver	Dependent on new commercial arrangements on user commitment being approved.
Optimising capacity across Transmission and Distribution NTS Exit and Flex Capacity	£102m p.a. forecast base cost	Output delivery incentive of costs around base plan	Dependent on outcome of NTS exit charging review and ongoing development of flex incentive options with NTS.
Co-ordinated whole system thinking uncertainty mechanism	Materiality Threshold TBC	Re-opener for new projects	Ofgem proposed re-opener mechanism to cater for material new projects during RIIO-2.

Stakeholder engagement on whole system thinking

A stakeholder engagement incentive was introduced for RIIO-1. This aimed to reward high quality stakeholder activities undertaken by GDNs and the outcomes they deliver beyond business as usual activities.

All GDNs have received rewards under the Stakeholder Engagement incentive and the feedback from the independent panel is that the stakeholder engagement incentive in RIIO-1 has driven significant improvements in how GDNs engage proactively with, and are responsive to the needs of, a wide range of stakeholders.

In particular, the incentive has driven a focus on stakeholder engagement on: the future role of gas, the challenges facing customers in vulnerable situations, development of cost benefit analysis for measuring the benefits of stakeholder engagement, and development of different tools and strategies for engagement. The use of objective criteria to assess the performance in this area has also helped development year on year.

Whilst we have set out a diverse range of whole system solution proposals in this plan, it seems evident that this is an area that will evolve and should be an area where we might be encouraged to continue to develop plans through the RIIO-2 period. Our insight tells us that stakeholder engagement is going to be critical in further developing whole system thinking to create value beyond local responsibilities. This is illustrated by the breadth of engagement required as illustrated in Figure 06.02 above. Whilst firm foundations have been established around ongoing stakeholder engagement, given the size and nature of the challenge and significant societal benefits possible, we believe that a stakeholder engagement incentive should be created to stimulate and reward additional innovation in engagement-led outcomes in developing whole system thinking. This view also reflects representations made by Sustainability First, the National Infrastructure Commission and National Council for Voluntary Organisations all who call for ongoing focus and incentivisation for collaboration to develop whole system solutions. We are proposing a reward-only incentive and assessed by an Independent Panel who could judge the value that has been added from above and beyond engagement-led initiatives. More detail on the rationale and evidence for this incentive can be found in **Appendix 07.03.02 "Enhanced engagement incentive on whole system thinking"**.

Output	Measure	Common/bespoke output?	Regulatory Treatment (PCD, ODI, LO)	RIIO-1 Position	RIIO-2 Target Ambition
Enhanced Engagement on whole system thinking	Independent Panel assessment against prescribed criteria	Proposed Common	ODI (F)+	ODI (F) on enhanced stakeholder engagement	Continuing to raise the bar on engagement and outcomes on whole system thinking

Tracking Progress on delivery of Net Zero and Whole System Thinking commitments

Given the importance of the Net Zero commitments and the need for whole system thinking, our Board have taken strategic ownership of this area. They regularly have agenda items to horizon scan the external landscape and assess our thinking. They have also set up Safety and Sustainability sub-committee which will oversee the progress around the Net Zero commitments and our progress on whole system thinking. Our Executive have also set up a dedicated Net Zero Strategy committee which will contain representatives from each of our Network Directors covering our four networks as well as input from our regional stakeholder engagement managers. Chaired by the Safety & Strategy Director, this group will monitor progress against our whole system commitments and assess and refine our engagement strategy and Net Zero action plans on an ongoing basis.

References

Appendix 06.00 Future of Gas series: **Unlocking network capability**

Appendix 06.01 Review of bioenergy potential: **Survey Report**

Appendix 06.02 EY report on **Options for stimulating investment in BioSNG**

Appendix 06.03 Navigant report: **Pathways to Net Zero: Decarbonising the gas networks in Great Britain**