Annex A10.03

RIIO-2 engagement report

December 2019

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Contents

Executive summary

We've undertaken our most extensive listening exercise ever to understand consumer and stakeholder expectations. Stakeholders have shaped our plan right from the start, through the development of our consumer and stakeholder priorities to feeding back on options for each priority. We have then worked with stakeholders to refine our proposals ahead of final submission. We are confident that we have accurately understood and interpreted stakeholder insight to develop a truly stakeholder-led business plan.

This report explains our approach to stakeholder engagement and summarises some of the engagement we have undertaken. In the appendices we provide a summary of our BAU stakeholder engagement, our RIIO stakeholder engagement, consumer engagement and case studies on Asset Health and Bacton engagement.

Further information on our stakeholder engagement and how this has influenced our business plan can be found can be found in the following annex's

- A3.03 Output Delivery Incentives
- A12.05 Network Capability Engagement report
- A14.01 Gas on and Off Engagement Report
- A14.24 Asset Health Engagement Report
- A15.14 External Threats Engagement Log
- A16.06 Environment Engagement Report
- A16.07 Demolition Engagement Report
- A17.01 Whole Energy System Engagement Report
- A17.02 Future Balancing and Capacity Engagement Report
- A18.01 Information Provision Engagement Report

What we've heard from stakeholders

Priority	A summary of what we've heard
I want the gas system to be safe	• Safety is of paramount importance to our stakeholders • Stakeholders expect us to meet legislative compliance and keep the public safe.
I want you to move gas on and off the transmission system where and when I want	• Customers and stakeholders value the reliability the gas transmission system has provided • Any change to this would have significant impacts to the commerciality of non-domestic consumers • Due to uncertainty in the future, stakeholders want us to maintain flexibility by keeping options open, allowing them to adapt their strategies where needed • Consumers take for granted an uninterrupted, safe gas supply. It is sacrosanct. It gives them peace of mind, allowing them to focus on other things • Stakeholders at Bacton, have told us that Bacton is critical to their operations and that they expect their flows at Bacton to continue past 2040 • Stakeholders generally believe we should take a risk-based approach to mitigation against environmental impacts to our network.
I want you to protect the transmission system from cyber and external threats	• Stakeholders are aware of - and concerned about - the growing threat from cyber-attacks and are keen for us to minimise the impact of any such attacks on them • Stakeholders recognise this is an area that will require innovation.
I want you to care for the environment and communities	• Our focus on monitoring and reducing emissions should expand across our entire network including construction, methane leaks and non-operational emissions of our business • Stakeholders want us to demolish assets on a risk-based approach, sharing the cost between current and future consumers • All alternative uses for the assets, in particular pipelines, should be considered before demolition. • Stakeholders and consumers see the value of environmental stewardship and encourage us to continue.
I want you to facilitate the whole energy system of the future – innovating to meet the challenges ahead	• Innovation is critical to get to a decarbonised energy system • The energy system should work collaboratively to address the problem. This may benefit from an incentive • There is a general consensus that whole energy systems thinking will deliver consumer benefits but also recognition that it won't be easy to measure this • Gas can deliver an affordable transition to a decarbonised energy system with minimal disruption to consumers • It is important to engage with consumers on this topic.

I want all the information I need to run my business, and to know what you do and why	• Stakeholders rely on the information and data we provide and use it to plan their business activities both operational and strategically • The energy landscape is complex and getting more so • Consumers are very confused about energy but are interested to find out more.
I want to connect to the transmission system	• Stakeholders would like greater visibility of capacity for new connections across the Gas Transmission System to allow an easier assessment of potential connection locations • CLoCC has implemented a number of good changes to the connections system but these need to be rolled out further • Connecting smaller, unconventional parties to the Gas Transmission System will play a key part in decarbonising the energy system.

I want you to be efficient and affordable	• Stakeholders want more transparency and predictability on costs and would welcome metrics or greater visibility of this
	• There is a real mix of views on the right length of time to assess our plans against, due to the uncertainties around the future decarbonisation of the energy system
	• Stakeholders would welcome greater visibility of our strategy and plans to allow:
	  ○ the supply chain to efficiently cater for needs
	  ○ greater innovation across the supply chain
	• There is a lot of uncertainty, confusion and distrust around energy bills.
	  ○ Consumers aren't engaged about who they're paying for what.
	  ○ Once roles and responsibilities are explained, consumers believe we deliver value for money.

Introduction

We manage the gas transmission system on behalf of our stakeholders. We recognise the importance of bringing our stakeholders' voices into the decision-making processes of our business.

Creating a truly stakeholder-led business plan is critical for the success of National Grid Gas Transmission (NGGT) and the entire energy industry. Against a backdrop of an uncertain energy future, we will work closely with those affected to make sure our future business plans meet the diverse requirements of our stakeholders with the flexibility to adapt to changing energy needs.

We already work with a wide variety of stakeholders, including:

- **customers** who pay us for the products and services we provide
- **consumers**, including domestic households, businesses and industrial users
- **other parties with an interest in the future of energy**, like government and non-government organisations, regulators, consumer groups, consultancies and academics.

Over the last two years we have carried out our most extensive listening exercise, engaging with 795 stakeholders from 369 organisations, covering more of our business plan than ever before.

We have listened to consumers through a robust engagement programme designed to gather both qualitative and quantitative insight, surveying more than 13,500 household bill payers, 750 non-domestic consumers and 66 major energy users.

We're passionate about making sure our plan represents what consumers and stakeholders want from the Gas Transmission System in the future.

How the report is structured

This report aims to tell the story of our engagement over the past two years.

The first section details our **engagement approach**.

The second section is structured against **our stakeholder priorities** and contains:

1. **Executive Summary** of the topic and what stakeholders have told us
2. **Background and context** highlighting our engagement approach and thinking
3. **Getting your voice heard** telling the story of our engagement on each priority, including:
    - Our engagement objectives
    - Who we've engaged with
    - A summary of what we've heard against each objective – and by customer, stakeholder and consumer
    - Trade-offs
    - A summary of what we'll do.

Our Engagement Approach

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Our Engagement Approach

The diagram shows the process we've followed to develop our RIIO-2 engagement approach, with each section explored in more detail below (the blue diamond icons link to the relevant text beneath).

1 Understanding best practice

The table below summarises how we've embedded best practice into our approach and the companies we've worked with who are industry leaders in stakeholder engagement.

Company	What	How using
[redacted]	Overarching engagement approach, giving stakeholders input into all aspects of the plan (priorities, choices, holistic).	Shaped our three-phased approach to encouraging stakeholders to identify the areas they want to engage with, develop aspects of the plan with us and then challenge the holistic plan to ensure it still delivers what they need.
[redacted]	Consumer engagement – articulating who you are and what you do before engaging. Must get consumer insight from different channels to triangulate a general direction. Triangulation principles.	Developed a varied consumer engagement programme including Willingness to Pay (WTP), listening, deliberative, cultural analysis. Created a narrative with consumers to explain who we are and what we do to allow effective engagement. Combined principles with learning from [redacted] to develop our triangulation approach.
[redacted]	Triangulation approach – how to triangulate differing feedback from stakeholders.	Took key learnings into our decision-making framework.
[redacted]	Consumer engagement – engagement needs to be broad and deep. Specific feedback gained on Willingness to Pay, slider tool and acceptability testing studies.	Engaging as much as possible on our plans. Developing deliberative engagement to explore tricky topics in greater depth.

We've engaged extensively with our independent **Stakeholder User Group** to gain their expert input into our engagement approach. Their principles of engagement (see below), helped us to challenge our activities and approach in advance of reporting back to group.

Stakeholder User Group principles of engagement

1	Define and map your stakeholders - anyone who believes they are affected by your decisions. Recognising the different threads of the public interest – stakeholders, customers, consumers, citizens, communities (geographical and interest).	Part of stakeholder strategy, approach so far, and planned enduring approach. Stakeholder self-select their impact/interest level to help us target our engagement. Geographically spread engagement to allow us to tailor our engagement.
2	Be clear what you want to achieve with "engagement" – have clear policy objectives and measures of impact; (incl. where you most need to engage).	Using an outcomes-focused approach. Progress has been made on measure engagement, however more needed on measuring impact.
3	Understand the "spectrum of participation" and difference between each part of that spectrum: inform, consult, involve, collaborate, empower.	Part of stakeholder strategy. Make it clear upfront during engagement what type of input we need from them and how their insight will be used to shape our plans.
4	Engage early in the process, review and improve throughout.	A principle which is part of our approach and roll-out
5	Leadership – effective stakeholder engagement must be led from the top of the organisation.	Senior leadership at engagement events. Governance changes to ensure this becomes BAU
6	Commitment – to listen to stakeholders' views and act on or respond to them.	Part of stakeholder strategy. We will playback what we've heard, what we're doing and what we're not doing following any engagement activity.
7	Objectivity – an open approach to obtaining stakeholders' views and to interpreting them. Seek to understand views on a range of topics and on all aspects of the business plan, rather than pre-determining their priorities or seeking to endorse your own priorities.	This has been our approach over the past two years and we remain publicly committed to this
8	Transparency – to build stakeholder trust and show that you take their views seriously (incl. how we've considered views, weighted and managed trade-offs).	We playback what we've heard and what we're doing following engagement. Our triangulation approach articulates how we translate insight.
9	Be inclusive: work with stakeholder groups to gather the fullest range of interests. Understand and balance the differences between different segments. Understand and balance the differences between existing and future stakeholders.	Part of our strategy. Over the last two years, the range of stakeholder groups engaged and the level of understanding of their needs has grown significantly and this will continue to grow.
10	Be aware that those who often participate i.e. the "usual suspects" are not always representative.	Part of our strategy and identified within our triangulation approach.
11	Be accessible to all (e.g. in consideration of the tasks, timelines, contact person, tech., locations, challenges of communication, etc.).	Part of our strategy. We design our engagement based on what will work best for the targeted stakeholders and the type of insight we need.
12	Use targeted approaches to tailor engagement to suit the knowledge and awareness of different groups.	Part of our strategy. Stakeholders are asked to self-select their level of impact/interest. Prior to undertaking engagement, we also ask their level of knowledge to tailor the session to their needs.
13	An ongoing process that is embedded across the business – not just a stand-alone business planning/price control review exercise.	The enhanced engagement approach is being transitioned to BAU.
14	Evidence based – use a full range of available sources of info to identify priorities, views and challenges (e.g. operational insight, bespoke research).	Part of strategy. See external validation and triangulation approaches.
15	Gather evidence through a range of methodologies and tools including willingness to pay, qualitative research, surveys, complaints intelligence, market data.	Part of strategy. See triangulation approach.
16	Be responsive – seek to adopt a flexible process to engagement, responding to the information revealed as the process progresses.	Part of strategy. Engagement objectives and plans are defined up front and reviewed after each engagement activity.
17	Demonstrate impact of engagement – ensure that the engagement design process plans for and allows evaluation of success.	Party of strategy. Measurement of engagement effectiveness is undertaken after engagement. Measurement of impact is work in progress.
18	Innovation – trying new and innovative ways of engaging.	New approaches have been trialled over the last two years and we will continue to learn from others and be innovative in our approach.

2 Our Business as Usual (BAU) engagement strategy

It is essential that we listen to the voices of all those individuals and organisations who use the National Transmission System (NTS) and are affected by it – not just those who pay for a service. However, we must go beyond simply seeking views and listening. We have a responsibility to act on feedback and use it to improve the gas transmission system and our entire energy system for the better. At its simplest and most fundamental level our engagement strategy is our way of ensuring that external voices are heard by our organisation and the feedback we receive is acted on at all levels.

We continue to evolve our engagement strategy so that it is fit for the future. Our engagement strategy is aligned with the AA1000 Stakeholder Engagement Standard, based on the principles of:

- **inclusivity** – people should have a say in the decisions that have an impact on them
- **materiality** – decision-makers should identify and be clear about the issues that matter
- **responsiveness** – organisations should act transparently on material issues.

During our recent health check (independent assessment of our engagement practices), we were rated Advanced with an overall rating of 74%. This means we are demonstrating 'proactive engagement and highly integrated and systematic processes across the organisation.'

Key recommendations for improvements include

Recommendation	How we're acting on it
Continue to build a stakeholder centric culture	• Our senior leaders will proactively engage with stakeholders and consumers, through our 'listening' programme (see appendices for details) • Stakeholder insight embedded into our existing governance with additional oversight from our independent stakeholder user group • Stronger internal comms campaign to celebrate good practice
Better recording of stakeholder engagement	• Developing business wide Customer Relationship Management (CRM) system to capture consistent stakeholder data • Robust training programme to support system users • Embed stakeholder insight into governance to accurately capture engagement activities
Continue to develop outcome-focused metrics	Further work is being undertaken to address this including: • Metrics to measure stakeholder and consumer insight: What stakeholders and consumers think about a topic • Metrics to help triangulate stakeholder insight: How effective was the engagement and therefore how valid are the findings • Metrics to measure the delivery of plans and the stakeholder and consumer impact: What is the impact of the changes delivered identified through stakeholder engagement

Key facets of our engagement strategy

- **Lead from the top** – senior leaders underwrite our strategy and engage with customers and stakeholders themselves.
- **Accountable** – acting on feedback. We take responsibility for what we say we'll deliver and do even better wherever we can. We act on feedback to deliver continuous improvement for our customers and stakeholders.
- **Sustainable** – deliver measurable benefits now and in the future.
- **Inclusive –** involve all stakeholders in our decisions.
- **Transparent –** build trust in our relationships with stakeholders by being open in the way we operate.
- **Effective –** engage with clear purpose to focus on gaining the best outcomes from our engagement.
- **Embedded –** shared approach across our organisation that is the responsibility of everyone.

Our approach to stakeholder engagement

Planning: profiling and mapping stakeholders so that our engagement is both inclusive and relevant. Identifying the right channels to use.

Preparing: making sure the correct resources are in place to engage with our stakeholders, and that we are clear about the overall process and their role within it.

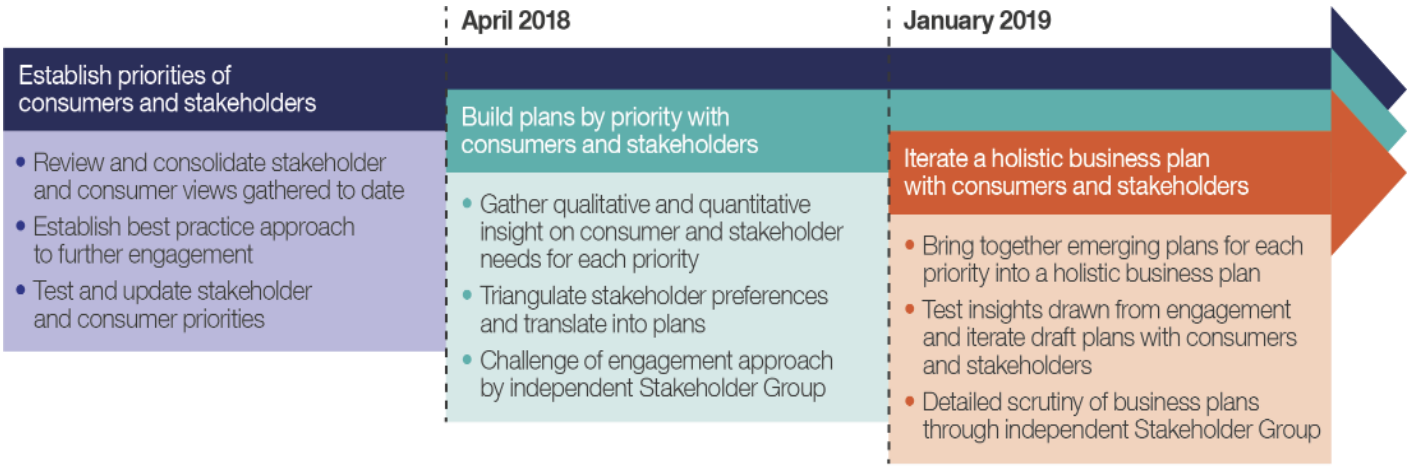
Implementing: communicating with stakeholders through appropriate channels. Inviting stakeholders to participate with enough notice, and providing relevant materials upfront as required.

> Running engagement in an open, fair and non-biased way, making sure we accurately capture what stakeholders have told us. Being clear on next steps and actions.
>
> Communicating outputs to check we have captured things correctly. Stakeholders have the chance to add further thoughts if necessary.

Reviewing and improving: looking at stakeholder - and employee – responses and feedback, from our stakeholder user group and other third parties, to learn what went well and what to improve. Publishing reports on the engagement itself and outputs for stakeholders to see.

3 Our engagement approach for RIIO 2

We recognised we needed to go over and above anything we'd done before to build our RIIO-2 business plan. Using best practice and consulting with stakeholders, we developed our engagement approach for RIIO-2. We worked with stakeholders to:



We have supported and validated this approach through:

- **a dedicated stakeholder user group** independently verifying our engagement approach, and the conclusions we've drawn from our engagement and our business plan. (see page 16 for more information)
- **an extensive consumer engagement programme** to gather qualitative and quantitative insight on consumers' needs and wants now and in the future. (see page 11 for more information)
- **expert, external companies** employed to validate our activities and independently triangulate insight

Stakeholder segmentation

We undertook an extensive stakeholder mapping exercise to understand who our stakeholders were and what their interests might be. We established the following stakeholder segments.

Consumer interest group – organisations that represent consumer interests	**Consultant/ supply chain** – external organisations that provide professional advice/services/goods	**Customer (entry)** – firms that extract natural gas and provide gas to the transmission network	**Customer (exit)** – organisations that use considerable amounts of gas and are connected to the transmission network
Customer (shipper) - firms that buy and sell gas to consumers	**Energy network operator** – companies that operate or own networks	**Env interest group** – organisations that represent environmental interests	**Gas distribution network** – firms that operate and own networks that deliver gas to consumers
Industry/ trade body – organisations that represent a specific industry	**Other energy industry** – firms that operate in the energy industry	**Other non-energy industry** – firms that operate in non-energy related industries	**Regulator/ Government** – a body that supervises our activities
University/ think tank – academic institutes that carries out research or are thought leaders	**Major energy user** – organisations that use considerable amounts of gas and are not connected to the network	**Domestic consumers** – household consumers in Great Britain	**Non-domestic consumers** – non-household consumers in Great Britain

During each engagement, we asked stakeholders:

> *"On a scale of 1 to 5, where 1 is not impacted at all and 5 is impacted a great deal, how impacted are you (or those you represent) by what we've just spoken about?"*

This is how we identified the average stakeholder impact score for each topic/priority. These were applied to further target and tailor our engagement as well as in our triangulation process to help us assess the impact of the decisions made.

Hard to reach stakeholders

Stakeholders are identified as hard to reach for a number of reasons:

Type	Description	How we are taking this into account
Lack of resource	Engagement can be costly either in people (sending people to events etc) or in travel and accommodation.	Undertaking a variety of techniques to allow stakeholders to engage in a way that works for them. Utilising BAU engagement where possible so as not to create additional burden. Creating material that can be viewed and engaged with as and when e.g. webinars, videos, newsletters and surveys. Before arranging an activity, we will check that it isn't going to clash and avoids times of the year that are particularly busy for our stakeholders. We will also give plenty of advance notice of upcoming engagement.
Lack of capacity	Certain times of the year will see different stakeholders inundated with work. This makes them less able to engage with us.	
Lack of awareness	Not being aware that an engagement activity is being planned or not being aware of how to get involved.	Regular newsletters and targeted emails issued to stakeholders highlighting and reminding them of upcoming engagement. Engagement material shared during BAU meetings.

Type	Description	How we are taking this into account
Lack of Knowledge	Do not have enough information about the topic to give an informed view or decision	In addition to continuing to build awareness of National Grid Gas and what we do, we will begin any engagement with an overview of the topic being covered. We will use plain English and check understanding throughout.
Lack of interest	Are not interested in the topic in question and therefore unwilling to commit time and energy to engage	We will ensure we articulate the purpose of engagement including 'what's in it' for stakeholders. If stakeholders are still not interested, we will respect their view and keep them informed.

How does this engagement approach deliver value for consumers?

As a result of our ongoing, robust stakeholder and consumer engagement programme, we are better placed to deliver consumer value in the future because we:

- understand what a broad variety of stakeholders want and need to make sure the Gas Transmission System is fit for the future
- have identified what consumers value and focused on this throughout
- can explain our plan and how it delivers consumer value in a language they understand.

4 Phase 1: Developing priorities

The first phase of our RIIO-2 engagement approach clarified and defined stakeholder and consumer priorities for the gas transmission business.

This allowed us to focus on what matters most to our stakeholders and to deliver value to consumers.

To gather as much insight as possible and establish these priorities, we used a variety of channels to reach a broad range of stakeholders, including: 'Business as Usual' (BAU) activities, specific 'Shaping the Future of the Gas Transmission System' workshops, online consultations, one-to-one meetings.

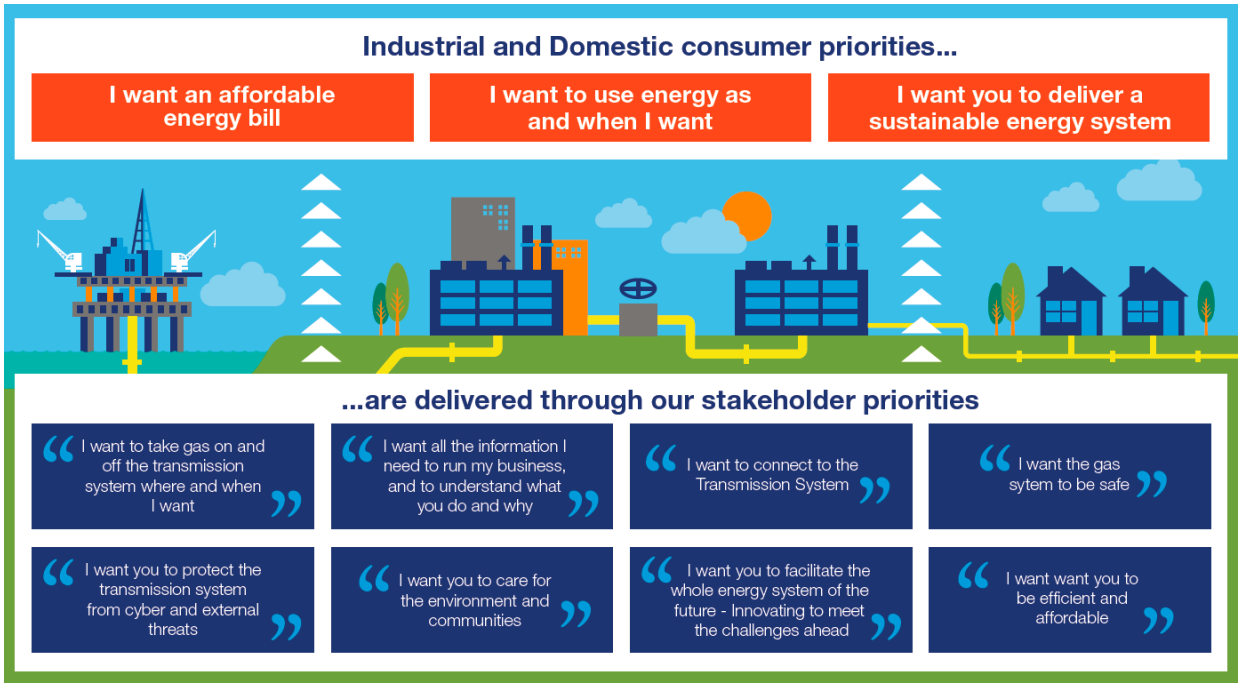
We tested these priorities with stakeholders at a webinar in January 2018 and continuously over the course of 2018-2019 to ensure we reflect evolving stakeholder and consumer needs. You can see more in our 'Listen' report[1].

We have made the following amendments to our priorities as a result of stakeholder feedback:

You said	We did
Consumers are concerned about disruption to their lives relating to the decarbonisation of energy – [redacted], consumer interest group	Triangulated insight with other sources and added a third consumer priority 'I want you to minimise the disruption to my life'
The wording of 'I want you to facilitate the energy system of the future – innovating to meet the challenges of an uncertain future' is slightly negative and clunky – needs of the network feedback	Amended the wording 'I want you to facilitate the whole energy system of the future – innovating to meet the challenges ahead'
Environment is a key priority for consumers as well – [redacted], government	Triangulated insight with other sources and amended third priority to broaden meaning and allow incorporation of wider decarbonisation and sustainability agenda: 'I want you to deliver a sustainable energy system'

[1] https://www.nationalgridgas.com/sites/gas/files/documents/RIIO%20T2%20Listen%20Report.pdf

This feedback gave us the following priorities:

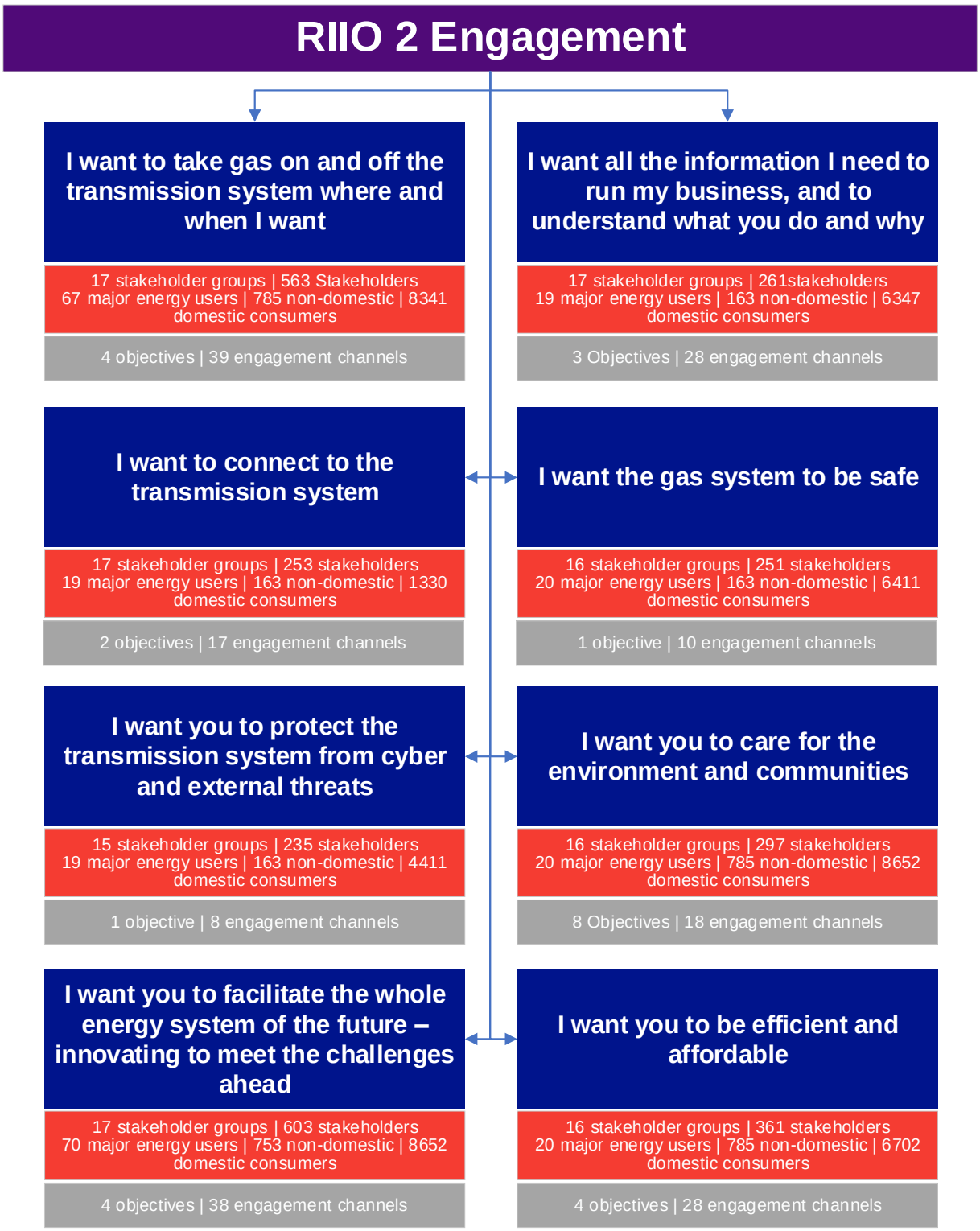


We use these priorities to:

- further engage stakeholders on aspects of the business plan
- communicate how our business plan will deliver value for stakeholders and ultimately consumers in the lead-up to RIIO-2.

5 Phase 2: Building our business plan with stakeholders

During this phase, we spent time understanding what topics we should engage on within these priorities. We did this by assessing both the materiality of the topic and the impact on stakeholders and consumers. We then worked with stakeholders to develop options and identify preferred solutions to be included in our business plan. We're using insights from a variety of different sources including primary channels, where we speak directly to our stakeholders through targeted RIIO-2 activities, as well as our everyday business engagement. We are also triangulating the outcome of our engagement activities with secondary sources (desk research).



Playing back what we've heard

Following any engagement activity, it's important we clarify what we've heard and confirm what we will be doing next. We have undertaken 10 playback webinars covering 9 topics to allow stakeholders to join and participate without causing too much disruption.

Adapting our approach

We continuously review and improve our engagement based on feedback from stakeholders. Here's a summary:

Quote	Who/When/Where	Action taken
Very broad topics with a very broad group of stakeholders. Consider more targeted approach.	[redacted], gas distribution network – Shaping the Future event (phase 1 – developing our priorities)	Further phases of engagement were planned around focused topics and a targeted approach taken.
I found it really useful and interesting for a newcomer to the gas market.	[redacted], regulator - Shaping the Future event (phase 1 – developing our priorities)	Established level of knowledge of stakeholders prior to event and ensured appropriate overview was given to ensure minimum level of understanding.
Very open to comments and opinions. Some questions too detailed (about modelling assumptions).	[redacted] consumer interest group - Shaping the Future event (phase 1 – developing our priorities)	Worked with cognitive behavioural experts Frontier Economics to ensure material and questions are plain English and at the right level.
Good session - would really like to maintain engagement about asset health and compressor upgrade.	[redacted] customer shipper - Shaping the Future event (phase 1 – developing our priorities)	Developed engagement programme and sign-posted all upcoming engagement in newsletters. Also created impacted/interested distribution list for all topics based on previous responses during engagement.
National Grid gave a good overview of the business. The event was well organised and facilitated, but a location north of London would be preferable.	[redacted], gas distribution network – environment event (London)	Held additional environment event in Scotland. Future engagement was either geographically diverse or via webinar to minimise impact on stakeholders.
It was good for background and to understand environmental impact of the sector and challenges faced. However, I would have liked to have seen more depth in discussions which would require more time and information. Yet given it was just a one-day event I thought it was pretty good.	[redacted], consumer interest group – environment event (London)	Subsequent one-to-ones held with [redacted] and other interested stakeholders to discuss more detailed aspects of the topic. Where possible and relevant, pre-read is issued to stakeholders who are attending an event.
The session was very informative, very interactive and Slido was good.	[redacted] customer entry – Needs of the Network event (St Fergus)	Slido used for polling in future events.
A lot of useful information from the team, also provided a great platform for discussion across users.	[redacted], customer entry - Needs of the Network event (St Fergus)	Engagement activities are structured to allow equal balance of inform, discussion and voting.
Whilst I enjoyed the workshop and found it very informative, in practice it had very little relevance to [redacted]	[redacted], regulator, Needs of the Network (London)	Arranged bilaterals with key stakeholders to discuss relevant topics, reducing stakeholder burden.

Quote	Who/When/Where	Action taken
It was very useful for everyone. There was learning on both sides. Good mix of attendees giving excellent discussions. Overwhelming feeling of the need for better communications.	[redacted] customer shipper – Needs of the Network (Bacton)	Regular newsletters and updates to keep the conversation going.
Well put together and presented and very interactive. Well done!	[redacted] consultant – Needs of the Network (Chester)	
It was informative, interactive and I really felt the opportunity to shape your plans was important.	[redacted] regulator – Needs of the Network (Chester)	
Very good communication skills and interaction via use of technology i.e. webinar, online Q&A etc.	[redacted], customer entry – Bacton webinar	
Our contact with National Grid Gas Transmission has been very positive, with an open relationship and engagement and ongoing flow of information and communication, which I would score as a nine or 10.	[redacted] government – Bacton strategy workshop	
Open, transparent and willingness to cooperate on cross-sector initiatives.	[redacted], energy network owner – environment event (Scotland)	

6 Phase 3: Testing the holistic business plans with stakeholders

Throughout our RIIO-2 engagement process it's critical that we are appropriately reflecting what stakeholders have told us in the latest version of our plans. We do this in two ways:

1. After each engagement activity we play back what we've heard and ask stakeholders if we've accurately reflected their views. Some examples of how we play back what we've heard to confirm our understanding include:
    - Have we captured your concerns?
    - Have we provided you with enough information to allow you to take a view?
    - Do you feel your voice has been reflected in what we've just talked about?
    - Do you feel the proposed engagement approach will give you the opportunity to get involved and have your voice heard?
2. The final phase of our engagement programme brings together all our proposals into one holistic plan. We will engage with stakeholders to make sure that the complete plan is acceptable and delivers what they need from the Gas Transmission System now and in the future.

Recognising our business plan is sometimes difficult to digest in one big chunk, we've taken a phased approach to this. In January we published a playback consultation[2] introducing what the full business plan will deliver, including cost ranges. We promoted this in our newsletter, hosted a webinar to launch the online consultation, engaged relevant trade press, sent personal emails to key stakeholders to arrange bilaterals to talk through the plan in more detail. We asked stakeholders some specific questions to guide our thinking for the first iteration of our full business plan.

Most respondents, around 80%, felt that they were impacted a lot or a great deal by what National Grid does. Industry stakeholders said that the key requirement for the gas transmission system of the future is to be flexible to adapt for new gas entry points, differing gas compositions and different types of decarbonised gas on the system. We have incorporated feedback from this consultation into our draft plan.

[2] https://www.nationalgridgas.com/sites/gas/files/documents/RIIO%20T2%20Listen%20Report.pdf

In July, we published our first full draft business plan. Again, we hosted webinars, undertook bilaterals and attended trade meetings. We also raised awareness of the plan via newsletters and personal emails to stakeholders inviting feedback.

We had feedback from 16 organisations including major energy users, trade bodies, consumer interest groups, local government, customers (shippers and entry) and other non-energy industry stakeholders. This feedback has been fed into the relevant areas, but broadly, stakeholders welcome the early playback consultation in February and find our business plan easy to navigate. 'We found the plan easy to read and are encouraged that you have aligned your plan with our 5 principles. Broadly, NGGT have communicated the plan well and have run a relatively open consultation process, which includes the playback earlier in the year.' [redacted] Consumer interest group,

7 Consumer engagement

Our role has been to deliver a reliable and safe gas transmission service so that consumers can use gas as and when they want - and they don't have to think about it. But the energy landscape is changing. Consumers are more informed and engaged then ever and it's critical the service we deliver, now and in the future, continues to meet evolving needs.

Given our limited direct interactions with consumers, they often don't know the gas transmission system exists or the role of it within the energy system.

This makes it even more important that we develop and deliver a broad and varied consumer strategy incorporating best practice. The approach we've developed will allow us to gain qualitative and quantitative insight across our entire plan to get a good sense of the direction consumers' needs and wants are taking. We will triangulate the insight alongside insight from our engagement with other stakeholders.

To help consumers engage in an informed way, we worked with them to develop a narrative that explains who we are and what we do within the broader energy ecosystem. We tested this short animation with consumers to learn how they engage with it and what meaning they take from it. We now use it to support our broader engagement activities.

Who are consumers?

Domestic consumers: Around 23 million domestic households in GB	**Future consumers:** Those who will use gas in the future	**Non-domestic consumers:** Including small to medium businesses	**Major energy users:** Companies that use or rely on energy to manufacture their product	**Directly connected consumers:** Use large amounts of energy and directly fed by the gas transmission system
For example: Homes	For example: Domestic users of the future, new types of business	For example: Retail premises and offices	For example: Ceramics, glass and chemical manufacturers	For example: Power stations

This is an overview of the channels we've used to engage and how we will use the insight gained:

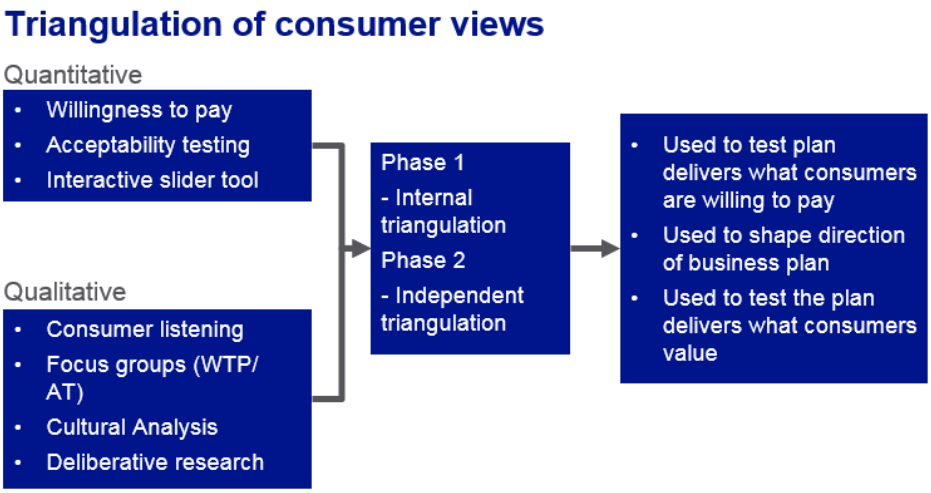
Channel	Summary	How used
Consumer attitudes research	To understand consumers', MPs' and small and medium-sized enterprise business consumers' attitudes and priorities and to gauge awareness and perceptions of National Grid.	Giving us insight into consumers' and MPs' perceptions of National Grid, how much they know about the service we provide and their high-level priorities for energy and gas in particular.
Consumer listening (qualitative)	Independently facilitated workshops designed to help us understand what consumers think about key topics.	To help set direction for the consumer engagement programme. Output is triangulated alongside other activities to build our plan. Each session starts with high level priority questions followed with some specific topics to explore views. We undertake this activity in different geographies to allow us to explore regional differences. We will use this channel in an enduring way after RIIO-2 to continue to understand consumer views.

Channel	Summary	How used
Willingness to pay (quantitative)	A nationally representative stated preference survey, undertaken collaboratively with the three Electricity Transmission Owners, to generate values for different levels of products/services from domestic and non-domestic consumers.	The value consumers are willing to pay will be used to cross-check our proposals against. The study also helps us understand consumers' priorities across the range of our activities. This study is nationally representative and therefore allows us to explore any regional or demographic differences that exist.
Interactive slider tool (quantitative)	A supplementary source of willingness to pay data, asked in a more interactive way. Using the tool as the focus of a nationally representative study, consumers can make adjustments to the plans and see the impact on their energy bill.	Covering a broader range of topics, this tool gives us rich insight into what consumers value. We will triangulate these findings with other insight to gain topic specific and network related feedback. This study is nationally representative and therefore allows us to explore any regional or demographic differences that exist. We will use this tool in an enduring way after RIIO-2 to continue to understand consumer views.
Deliberative workshops	Independently facilitated by consumer engagement experts, these are more in-depth engagement techniques using workshops and focus groups.	To explore complex topics that impact consumers, for example should current or future consumers bear the cost for the additional investments needed to move us towards a decarbonised energy system? We undertake this activity in different geographies to allow us to explore regional differences. We will use the output to shape the direction of our plan and triangulate against other engagement outputs.
Cultural analysis	Innovative approach to understanding culture without direct engagement with consumers, this seeks to understand the influences on society today and how they might change in the future.	To understand broader consumer attitudes and trends, particularly useful when looking at the needs of future consumers. We will triangulate results with other consumer research.
Acceptability testing (AT)	A nationally representative research study that presents consumers with our business plan to confirm if it delivers what consumers need from the gas transmission system at a cost they're willing to pay.	To support the testing of the holistic business plans, this channel will provide quantitative and qualitative insight to help shape our business plan. This study is nationally representative and therefore allows us to explore any regional or demographic differences that exist. We will triangulate results with other consumer research.
Major energy user survey	An online survey designed to gain insight into the priorities and needs of major energy users.	Covering topics such as interruptions, information provision and the whole energy system, this insight will be used to triangulate against other stakeholder outputs.

A high-level view on how we've engaged consumers

Priority	Consumer and MP survey	Culteral analysis	Major energy user survey	Willingness to pay	Consumer listening	Interactive slider tool	Deliberative engagement	Acceptability testing
I want the gas system to be safe	Yes	Yes	No	No	Yes	Yes	No	Yes
I want to take gas on and off the transmission system where and when you want	Yes	No	Yes	Yes	Yes	Yes	No	Yes
I want you to protect the transmission system from cyber and external threats	Yes	No	No	No	Yes	Yes	No	Yes
I want you to care for the environment and communities	Yes	Yes	No	Yes	Yes	Yes	No	Yes
I want you to facilitate the whole energy system of the future – innovating to meet the challenges ahead	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
I want all the information to run my business, and to understand what you do and why	Yes	No	Yes	No	Yes	No	No	Yes
I want to connect to the transmission system	No	No	No	No	No	No	No	Yes
I want you to be efficient and affordable	Yes	No	No	Yes	Yes	Yes	No	Yes

As we've already mentioned, understanding consumers' views is a very complex undertaking and we can't take a single source of insight as the answer. Instead, we triangulate from a number of sources:



The insight from our consumer engagement will be triangulated against our broader engagement activities.

8 BAU engagement

As part of our RIIO-1 activities we are required to report annually on our stakeholder engagement activities through our **Stakeholder Engagement Incentive Scheme Submission.** This submission provides details of our engagement strategy and how it operates, as well as a summary of our activities and outcomes relating to stakeholder engagement activities for each regulatory year – providing a useful summary of our BAU engagement.

9 Triangulation of views and translation into business plan

Our engagement programme has been designed to gather extensive feedback from more stakeholders than ever before. Understandably, the feedback we receive won't always point in the same direction, so it is vital to have a transparent process for how we reach a conclusion.

To develop this, we've taken best practice from a number of sources which use 'triangulation principles':

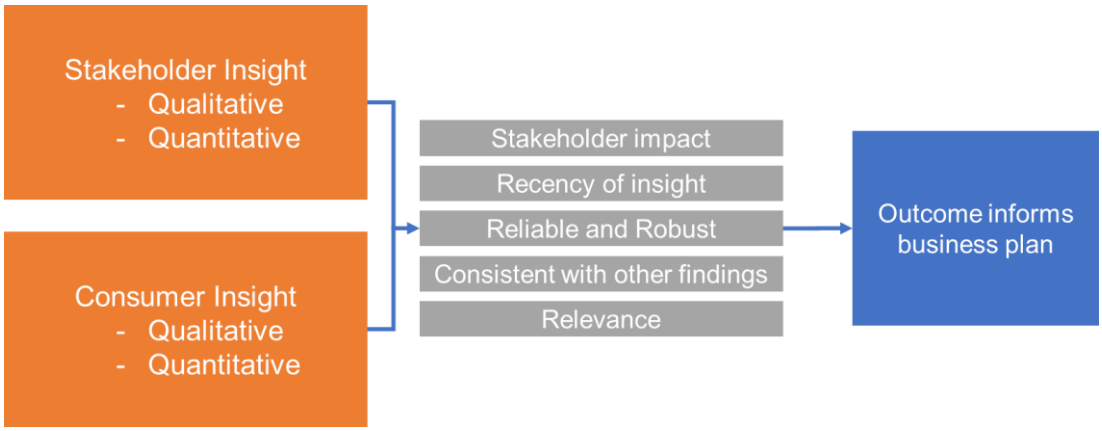
- More weight is placed on information that is consistent with other sources
- Most weight is placed on information that is fit for purpose
- More weight is placed on information that is more robust and reliable

- More weight is placed on more recent data/information, except where there is reason to suggest recent evidence is less reliable
- When considering comparative information, more weight is placed on information from closer comparators.

We've combined this approach with principles developed by [redacted], classifying and prioritising stakeholders using:

- Jules Pretty's method of normative classification-based nature of participation: functional participation (protecting objectives, advocating efficiency, bad participation (manipulative, dominating)
- Arnstein's ladder of participation based on extent of involvement and project's perceived impact: (passive vs. active involvement, direct vs. indirect impact)
- Stakeholder-mapping model based on interaction between legitimacy, power and urgency.

Using this we determined the following principles to apply to our own triangulation:



To add an additional level of confidence we asked Frontier Economics to carry out a secondary review of our findings on a number of areas to make certain we've accurately interpreted and reflected stakeholders' feedback. For more details, please see the independent assurance section below.

10 Independent assurance of engagement and outcomes

Ensuring we accurately reflect stakeholders' needs and wants in our RIIO-2 business plan and beyond is fundamental to delivering a plan that is stakeholder-led. For absolute transparency and to give confidence that we have accurately reflected stakeholders' views, we've undertaken a number of robust assurance checks.

Our approach has two stages.

Stage 1 Partway through our engagement we took a step back to review our findings and plan the next stage.

In October 2018 we asked global strategic consultancy Truth to carry out a thorough audit of our engagement to date looking at:

- stakeholder coverage
- is the engagement cognitively valid?
- have we made accurate conclusions based on what we've heard?

Here are their findings and the actions we took to address them:

Truth review

Topic	Finding	Action taken
I want the gas system to be safe	**Stakeholder coverage**: There is evidenced and reasonably substantive stakeholder	

Topic	Finding	Action taken
	engagement across priority stakeholder groups (regulator, GDNs and energy industry bodies and institutions).	**Stakeholder coverage:** We have continued to engage on this topic as part of validating our priorities.
	Quality of engagement: The engagement to date relies heavily on the Asset Health section from the Future Needs of the Network (FNON) workshops, which was designed well and executed with well-evidenced findings. Utility of the engagement to date is strong and a clear conclusion emerges.	Detailed engagement has been undertaken with the health and safety regulator.
I want to take gas on and off the transmission system where and when I want	**Stakeholder coverage**: There is evidenced stakeholder engagement across those within the energy industry, but additional evidenced engagement is required for priority stakeholder groups such as consumer bodies, consumers and government.	**Stakeholder coverage**: We have expanded our engagement to cover major energy users, consumer bodies, government departments, consumers.
	Quality of engagement: The engagement to date relies heavily on the FNON regional workshops. These workshops were designed and executed. There are some opportunities for improvement in the design, execution and analysis of the section about delivering the right gas transmission system. In the case of analysis this will help extract richer insight around operational processes impacted.	**Quality of engagement:** We've made a few changes to how we engage including simplifying the questions and making them more relevant to the targeted stakeholder group. We've engaged via workshops, surveys and webinars to allow stakeholders to engage in a way that works for them. We are also developing a common articulation of the capability of the network that can be measured.
I want you to protect the transmission system	No review was undertaken as we are engaging primarily with regulators and experts to deliver this priority.	
I want you to care for the environment and communities	**Stakeholder coverage**: Evidenced stakeholder engagement to date is sparse and priority stakeholder groups have not been engaged. Additional evidenced engagement is required across priority stakeholder groups: regulators, environment interest groups, consumer bodies, charities, industry bodies and institutions and government.	**Stakeholder coverage:** We ran a second workshop in Scotland targeting all missing stakeholder groups. We also held dedicated one-to-ones with regulators to gain targeted feedback.
	Quality of engagement: Concerns around the design and execution of this workshop in relation to the emissions and environmental stewardship sub-topics. These concerns centre on amount and type of information shared with participants and how questions were worded.	**Quality of engagement**: working with Frontier we redesigned the workshop content to address feedback. This included the order, type of information given, where and how the questions were asked and how stakeholders can give feedback without been influenced by other stakeholder's present.
I want you to facilitate the whole energy system of the future – innovating to meet	**Stakeholder coverage**: There is evidenced stakeholder engagement across regulators and those within the energy industry, but this was much lighter touch.	**Stakeholder coverage**: Since this report we have undertaken extensive additional engagement on the whole energy system and decarbonisation, including

Topic	Finding	Action taken
the challenges ahead	**Quality of engagement:** The engagement to date relies heavily on the FNON workshops which were well designed and executed with well-evidenced findings.	collaborative workshops with the ENA and consumer engagement. **Quality of engagement:** We've worked with Frontier to develop the materials used in our engagement.
I want all the information I need to run my business, and to understand what you do and why	**Stakeholder coverage:** There is evidenced stakeholder engagement across current users of NG's information services in the energy industry (i.e. shippers, terminal and storage operators). Additional evidenced engagement is required to ensure this represents smaller organisations as well as large ones engaged to date. There is also a need to engage (further) with other priority stakeholder groups (i.e. regulators, GDNs/DNOs, interconnectors, energy industry direct connects as well as major energy users / direct connects outside of the energy industry). **Quality of engagement:** The engagement to date relies heavily on the FNON workshops and the gas ops forum. There are opportunities for improvement in how these could have been designed to ensure volume and depth of response, and that questions were framed in a way that helped deliver the outcomes.	**Stakeholder coverage**: Targeted webinars, surveys and bilaterals with hard to reach stakeholders including small suppliers and major energy users. Created an innovative online portal to allow us to gather stakeholders' feedback in a way that suits them. **Quality of engagement:** We have developed our approach to gain insight making it easier for stakeholders to engage as and when they want.
I want to connect to the transmission system	**Stakeholder coverage:** The scale of stakeholder coverage from the gas connections work is reasonable in context of the number of connections a year but requires validating or bolstering further to substantiate. **Quality of engagement**: From what we can assess the gas connections journey work has been well designed, executed and evidenced meaning the utility of engagement is strong and clear conclusions emerge.	**Stakeholder coverage:** Additional workshop and interviews have been undertaken with customers on this topic.

Stage 2 Validation of findings

On completion of our engagement, for topics that are of high value or there isn't an obvious consensus, we asked Frontier to review and validate our findings.

We asked:

1. Is our engagement cognitively valid?
2. Have we captured all relevant stakeholders?
3. What conclusions do you draw from the insight?

The multi-layered assurance approach helps give confidence to our stakeholders that we have delivered a truly stakeholder-led business plan.

11 Independent stakeholder user group

Our independent stakeholder user group[3], chaired by Trisha McAuley OBE, is made up of expert representatives from consumer, environmental and public interest groups, as well as large energy users, large-scale and small-scale customers, and distribution networks.

To create a business plan that will deliver value for consumers and build on stakeholder requirements we worked closely with Ofgem and championed an enhanced engagement approach. As far as we are aware, together with Electricity Transmission, we were the first network company to set up our independent stakeholder user group and are committed to driving maximum value from our engagement with the members.

The purpose of the independent stakeholder user group is to challenge and review our approach to stakeholder engagement and also to scrutinise our business plan in areas such as outputs, uncertainty, costs and incentives. With interim deadlines through the year, in December 2019 the group will submit a final report to Ofgem alongside the submission of our final business plan.

From September 2018 through to April 2019 we presented, and were challenged, on a range of topics from within the RIIO-2 business plan. A summary of these is provided in the table below:

Topic	No of challenges	Key challenge area
Stakeholder engagement	33	**Stakeholder Engagement Strategy** - a fully comprehensive account of stakeholder engagement activities is provided. **Consumer outcomes/outputs** – develop outcomes and outputs that have a clear linkage to consumers. **Context** – provide more explanatory background information for each topic e.g. RIIO-1 performance and business as usual insights. **Stakeholder segmentation** – clarity on stakeholder segments, including gaps, segment definitions, stakeholder education. **Collaboration and benchmarking** – demonstrate collaboration with third parties, including cross sector input and benchmarking with other network operators.
Information provision	14	Articulate engagement with 'hard to reach' stakeholders.
Future balancing and capacity	10	Capture requirements of all stakeholder segments, especially smaller organisations.

[3] More information on the independent stakeholder user group can be found here: https://isug.nationalgrid.com/gas-transmission/

Whole energy system	15	Articulate leadership role and cross-sector impacts.
Gas on and off	12	Provide RIIO-1 context and overall strategic implications.
Environment	8	Articulate 'the journey' encompassing the stakeholder support and input. Detail on innovation and options to manage the environmental impacts.
Responsible demolition	7	Explore innovative options and ideas for repurposing.
Asset health	7	Articulate asset health strategy and overarching interactions. Linking cost justification and CBA through the narrative.
Emissions compliance	6	Demonstrate future-proofing of investments and options.
Innovation	20	Explain how innovation activity links through to customer outcomes and justify proposals to increase innovation funding, given the RIIO-1-allowances were not fully utilised.
Benchmarking	6	Articulate the best view of efficient costs.
Asset lives		

Substantial benefits have already been realised through our interactions to date including:

Stakeholder engagement – targets, ambition and methods	RIIO1 performance articulation and application to RIIO2 proposals	Articulation of innovation applied to all activities, Big I and Little I focus	Framing of asset health proposals and overall strategy
Step change in ambition for consumer programme	Articulation of consumer benefit	Simplification of language	More focus on clear justification across plan

How we've listened

This is a summary table showing who we've engaged by topic.

Priority	Consultant or Supply Chain		Consumer Interest Organisation		Customer (Entry): Inc Terminals, Producers, Storage, Interconnectors		Customer (Exit): Including Power Stations		Customer (Shipper/ Supplier)		Energy Network Owner/Operator		Environmental Interest Organisation		Gas Distribution Network		Industry/Trade Body		Other Energy Industry		Other Non-Energy		Regulator		University, Think Tank		Unknown	Major Energy User		Non-Domestic	Domestic
	Individuals	Companies	Individuals	Companies	Individuals	Companies	Individuals	Companies	Individuals	Companies	Individuals	Companies	Individuals	Companies	Individuals	Companies	Individuals	Companies	Individuals	Companies	Individuals	Companies	Individuals	Companies	Individuals	Companies	Individuals	Individuals	Companies	Individuals	Individuals
I want the gas system to be safe	76	45	10	2	34	14	22	9	51	23	16	9	3	3	42	4	36	18	9	7	11	8	23	10	24	15	10	19	13	150	3389
I want to take gas on and off the transmission system where and when you want	77	45	11	3	57	26	29	10	69	36	17	10	3	3	49	4	45	20	9	7	11	8	41	16	24	15	10	64	56	750	5382
- Network capability	71	40	9	3	57	26	30	11	69	39	14	9	1	1	47	4	46	19	10	8	11	8	48	17	24	15	10	63	56	0	0
- Asset Health	77	45	11	3	57	26	29	10	69	36	17	10	3	3	49	4	45	20	9	7	11	8	41	16	24	15	10	64	56	0	3241
- Bacton	3	3	0	0	43	20	3	2	4	3	3	2	5	3	5	1	5	2	0	0	0	0	15	6	1	1	0	0	0	0	0
I want you to protect the transmission system from cyber and external threats	54	32	3	2	28	14	19	8	40	21	15	9	3	3	31	4	32	15	9	7	9	7	18	8	20	11	10	18	13	150	4382
I want you to care for the environment and communities	58	32	10	2	34	14	22	9	50	21	16	9	3	3	39	4	33	16	9	7	9	7	24	10	22	10	10	19	13	150	4382
- Air quality	58	32	10	2	34	14	22	9	50	21	16	9	3	3	39	4	33	16	9	7	9	7	24	10	22	10	10	19	13	150	1308
- Climate change	58	32	10	2	34	14	22	9	50	21	16	9	3	3	39	4	33	16	9	7	9	7	24	10	22	10	10	19	13	150	4382
- Responsible demolition of redundant assets	58	32	10	2	34	14	22	9	50	21	16	9	3	3	39	4	33	16	9	7	9	7	24	10	22	10	10	19	13	150	2241
- Managing impact of climate change	58	32	10	2	34	14	22	9	50	21	16	9	3	3	39	4	33	16	9	7	9	7	24	10	22	10	10	19	13	150	1248
- Environmental stewardship	58	32	10	2	34	14	22	9	50	21	16	9	3	3	39	4	33	16	9	7	9	7	24	10	22	10	10	19	13	750	3301
- Supporting communities	58	32	10	2	34	14	22	9	50	21	16	9	3	3	39	4	33	16	9	7	9	7	24	10	22	10	10	19	13	750	3301
I want you to facilitate the whole energy system of the future - innovating to meet the challenges ahead	105	64	21	7	53	25	29	11	75	36	30	16	4	4	48	4	60	29	13	9	24	19	50	21	32	21	10	64	56	750	5382
I want all the information to run my business, and to understand what you do and why	54	32	10	3	46	25	23	9	46	24	16	10	3	3	31	4	38	17	9	7	9	7	25	15	20	11	10	63	56	150	2358
I want to connect to the transmission system	54	32	9	2	28	14	21	9	48	25	16	10	3	3	37	4	33	15	10	8	11	8	26	12	20	11	10	0	0	150	1248
I want you to be efficient and affordable	79	47	14	2	67	27	28	11	70	29	20	12	5	5	47	4	46	20	10	8	11	8	38	16	28	14	10	19	14	750	5382

As at 20th Sept 2019

Map showing where we've engaged

Our Stakeholder Priorities

nationalgrid

I want the gas system to be safe

Executive summary

This priority is about what we do to keep the public, our employees and other people who work on or around our assets, safe from the hazards inherent in our business.

At National Grid, safety is paramount. We protect the public, our employees, other personnel who work on or around our assets and the environment, from the safety risks associated with our activities. Our obligation is to comply with relevant health and safety legislation, monitored and enforced by the Health and Safety Executive (HSE).

You have consistently said that safety is a priority as you are aware of the risks associated with our operations and you appreciate the crucial role of the gas transmission system.

Background

We protect the public, our employees, other people who work on or around our assets and the environment from the safety risks associated with our activities; for example, any major release of gas from the high-pressure gas transmission system, could put many people's lives at risk.

As a gas transporter, and in our role as Network Emergency Coordinator (NEC), we must comply with written 'safety cases' accepted by the HSE. These set out how we manage the safety of the gas network in accordance with the Gas Safety (Management) Regulations and manage our top tier Control of Major Accident Hazards (COMAH) sites - St Fergus and Bacton. We've focused our engagement on those who have a direct influence on this topic. This is primarily the HSE.

Dedicated HSE engagement

As our safety regulator, the HSE has regular meetings with people at all levels within our organisation. This gives complete transparency about what we do and how we work, ensuring we are always aligned with the HSE's expectations. We also attend regular HSE forums that allows for best practices to be shared.

For engagement specifically about RIIO-2, we invited the HSE to our Needs of the Network workshops in London and Chester. Having them in the room to understand stakeholders' views and to share their insights, was invaluable. For more detail about relevant topics, we followed up with one-to-one meetings over the phone. This reduced the impact on them and allowed open and honest discussions about all topics they were interested in.

Industry engagement

We actively participate in industry wide groups in the UK and across Europe. In the UK for example, we are part of the UK Onshore Pipeline Operators' Association (UKOPA), where we participate to share knowledge and promote best practice across the industry. UKOPA helps to develop a comprehensive and consistent view of strategic issues that relate to the safe operation and maintenance of onshore pipelines.

We also undertake regular engagement with the other terminal operators at St Fergus and Bacton. These meetings cover topics from operations to safety, including any lessons learned.

Getting your voice heard

Objectives

Due to the nature of the topic and the well-established thinking in this area, there is one simple yet critical objective of our engagement: to understand what level of safety performance stakeholders expect from us.

Stakeholder landscape

We have engaged with the following number of individual stakeholders about this priority:

Consumer interest group Total engaged: 10 No of org: 2	**Consultant/ supply chain** Total engaged: 76 No of org: 45 Average SH Impact: 3.6	**Customer (entry)** Total engaged: 34 No of org: 19 Average SH Impact: 3.7	**Customer (exit)** Total engaged: 22 No of org: 9 Average SH Impact: 4
Customer (shipper) Total engaged: 51 No of org: 23 Average SH Impact: 3.7	**Energy network operator** Total engaged: 16 No of org: 9 Average SH Impact: 3.7	**Env interest group** Total engaged: 3 No of org: 3	**Gas distribution network** Total engaged: 42 No of org: 4
Industry/ trade body Total engaged: 36 No of org: 18 Average SH Impact: 3.75	**Other energy industry** Total engaged: 9 No of org: 7 Average SH Impact: 3	**Other Non-energy industry** Total engaged: 11 No of org: 8	**Regulator/ Government** Total engaged: 23 No of org: 10 Average SH Impact: 2.5
University/ think tank Total engaged: 24 No of org: 15 Average SH Impact: 4	**Major energy user** Total engaged: 20 No of organisations: 14	**Domestic consumers** Total engaged: 6411	**Non-domestic consumers** Total engaged: 163

How we engaged

What	Who	Location	Summary
Shaping the future events	Network companies Regulators Academics Industry trade bodies Supply chain Shippers, Customer Entry Customer Exit Interest groups other non-energy	London, Edinburgh, Warwick	Broad engagement events designed to understand stakeholders' priorities for energy now and in the future
Future needs of the network workshops at our Terminals	Terminal operators Offshore producers Government (Local Authorities)	Bacton St Fergus	The regional and terminal events were one day events which have been central to our RIIO 2 engagement approach. The events included a series of overview presentations followed up with facilitated discussions and voting to capture stakeholder's views
Future needs of the network workshops - Regional engagement	Network Companies (Gas Distribution Networks) Other connected customers Storage operators Government (Local Authorities) Supply chain Academics Shippers Regulators	Workshop within different GDN boundaries Chester & London (Hull cancelled due to lack of take up)	
Bilaterals with HSE	HSE	Online	
Consumer Listening	Consumers - Domestic	Birmingham	We spent time listening to what consumers want us to focus on now and in the future.
Acceptability testing	Consumers – Domestic and Non - domestic	Nationally representative	A survey to understand the level of acceptability of our business plans.

Findings

Objective **Understand what level of safety performance stakeholders expect from us**

Question	Response	Poll
Over the past five years, what have you valued and why, and what can we improve on and why?	• "Safety delivers now but increasing attention needed as assets age" – [redacted], interest group • "Safety - sounds like a good track record" – [redacted], customer (shipper).	'I want the gas system to be safe' was ranked as No 1 by stakeholders in the level of importance to their business Total: 46
What would you like us to deliver for you under this priority?	• "The network needs to be safe. A major accident has the potential for injury to be caused. You need to think about the Gas Safety (Management) Regulations 1996 (GSMR) and customer impact. Domestic customers should not face any supply security risk" – [redacted], regulator • "There should be an assessment of process safety. National Grid needs process safety indicators and to consider the health of the system" – [redacted], customer (shipper) • "Safety is a priority that should be taken for granted" – [redacted], industry trade body • "There needs to be proactive engagement in regulatory development" – [redacted] regulator • "You should maintain current safety levels achieved on the NTS and explore arrangements to improve 'loss' due to third party activity" – [redacted], consultant • "In terms of health and safety, there should be continual improvement for safety" – [redacted] regulator "The wellbeing of employees is high on our agenda and is the topic of interventions with gas network operators. Particularly shift work and fatigue and the potential safety risks associated with that" – [redacted], regulator.	
What are your thoughts on how we're planning to approach our Asset Health Programme?	• "How would the network asset risk metrics (NARMs) be used to prioritise asset maintenance and replacement work? From our perspective anything you do has to comply with basic legislative requirements. So there may be a conflict between NARMS outputs and what the law requires" – [redacted] , regulator • "GSMR and COMAH and other legislation are about preventing catastrophes, which are very infrequent but high impact events. NARMS is great for prioritisation but needs to be used with caution" – [redacted] , regulator "You've separated safety and reliability but for GSMR there are elements of continuity of supply, (minimise risk of gas interruption) – if you improve reliability, you're probably improving safety as well" – [redacted], regulator.	
What does safety mean to consumers?	**Consumer listening** • "Safety – not cutting corners" – domestic consumer • "Ensure safety of networks" – domestic consumer. • Consumers rated health and Safety: 4.08 out of a maximum of 5 How important is innovation around safety? • 4 out of a maximum of 5 **Acceptability testing:** • Safety and reliability were consistently considered to be the most important investment area. 90% of consumers found the proposed investments to be acceptable.	

What we've heard

Customers	Stakeholders	Consumers
• Customers see safety as a top priority and are happy with our performance to date • Process safety is becoming more of a focus and we should play our part.	• Stakeholders see safety as a top priority that should be taken for granted • We have a strong track record and therefore stakeholders would like to see us be more proactive in safety regulatory development • Wellbeing of employees is becoming increasingly important • Safety and reliability are linked and should be considered simultaneously when making decisions • Increasing attention is needed to safety as assets age.	• Safety is sacrosanct and must not be compromised • Consumers see safety as the direct result of incidents. They see the impact of an interruption in winter being people freezing in their homes

Trade-offs

All stakeholder segments see safety as a top priority that should not be taken for granted. Compliance with legislation is expected as a minimum. Consumers think about the impacts that occur in their homes of interruptions to their gas supply.

I want to move gas on and off the transmission system where and when I want

Executive summary

A network and commercial framework that allows customers to take gas on and off the transmission system where and when they want has many benefits for our customers and consumers of gas. Facilitating a diverse range of supplies onto the network allows the cheapest sources of gas to reach market, lowering energy costs for consumers whilst at the same time delivering security of supply.

For consumers, reliable gas supplies are essential, whether it's for heating, electricity generation or for continued operation of industrial processes. Larger consumers of gas have told us that continuity of gas supplies is essential to avoid detrimental impacts on their business processes, finances and global reputations. For some industrial consumers, loss of gas supply would cause irreparable damage to facilities and/or potential job losses at their affected facilities.

Background

We want to deliver the right gas transmission system, maintained to the right level, alongside a complementary commercial framework. Together, these will meet the needs of stakeholders, consumers and GB plc.

Our thinking is underpinned by the following:

- Our belief that there is a long-term future for gas and the network until at least 2045. This belief is based on the timescales necessary to decarbonise heat and on the limitations of alternative energy sources for industry. It factors in limited alternatives to gas-fuelled power stations for large-scale flexible generation
- We recognise there's a range of views over the long-term role of gas and the need for the network. Until the exact pathway for gas is more certain we believe it is in consumers' interests, where it makes financial sense, to maintain existing assets and keep future energy options open
- A high level of network reliability helps to keep energy bills low for domestic and industrial consumers, enabling the lowest cost gas supplies to enter the UK. High reliability also protects against losses of gas supply, which can have a significant impact on operations as we prioritise protecting supplies to domestic consumers
- We are the joint Transmission Owner (TO) and System Operator (SO). By maintaining the most efficient network and linking with new or existing commercial framework/tools, we can create additional value for stakeholders and consumers.

This is a complex and wide-ranging topic and so we have broken down the engagement into sub-topics.

Getting your voice heard

Objectives

Our engagement on this topic was designed to gain insight on the following:

- **Objective 1** – to understand the level of service needed from the Gas Transmission network now and in the future.
  - 1a What scenarios should we build our plans on?
  - 1b What level of service is required now and in the future?
  - 1c Understand stakeholders' views about accessing the network.
- **Objective 2** – to understand stakeholders' views on incentives and the value they deliver
- **Objective 3** – to understand stakeholders' views on how to manage our asset health challenge.
  - 3a The level of risk stakeholders would like us to achieve
  - 3b How we should approach the asset health issues at the Bacton Terminal.
- **Objective 4** – to understand stakeholders' views on resilience of the gas transmission network to the impacts of climate change.

Business as usual (BAU) engagement

We have engaged extensively on this topic through our BAU engagement. Here is a summary of what we've heard. For more information about each channel, please see appendices.

Channel	Who	Outcome
Consumer attitudes research	Regulatory Government and Political Domestic and non-domestic consumers Consumer bodies	Consumers rank 'maintaining and developing a reliable network to make sure gas is available whenever it is needed' as 3rd out of 17 priorities.
Future Energy Scenarios (FES) engagement	650 stakeholders 430 organisations	Scenarios we should use to build our plans. High-level view of what stakeholders and customers want from the gas transmission network in the future.
Gas Future Operability Planning (GFOP)	Entry and Exit Customers	More detailed view of what challenges our customers face and how their needs might change going into the future.
ENA Gas Futures Group (GFG)	Collaborative group of gas networks	Commissioned an independent report of the role gas plays in the future energy system.
Innovation	Networks, customers Supply chain Innovators	Stakeholders have shaped our innovation themes as well as given us feedback on some of our larger innovation projects, particularly around alternative uses and other projects that can support or enhance our work.
GB Gas Market Measures	Customers (shippers)	Customer views on the GB gas market including the impacts of proposed changes.
Industrial Emissions Costs Reopener	Customers (entry) Customers (exit) Customers (shippers)	Stakeholder views on our proposals to meet environmental legislation.
Operational Liaison	Directly connected customers	Tactical customer insight. Also used to share relevant information on topics and gain insight on plans.
Network Output Measures methodology consultation	Gas distribution networks Consumer interest groups Energy network operators Regulators	Stakeholders have shaped our approach for the NOMs (now NARMs) methodology.

GAS ON AND OFF THE TRANSMISSION SYSTEM

Stakeholder landscape

Consumer interest group Total engaged: 11 No of org: 3 Average SH Impact: 5	**Consultant/ supply chain** Total engaged: 77 No of org: 45 Average SH Impact: 3.1	**Customer (entry)** Total engaged: 57 No of org: 26 Average SH Impact: 4.1	**Customer (exit)** Total engaged: 29 No of org: 10 Average SH Impact: 4
Customer (shipper) Total engaged: 69 No of org: 36 Average SH Impact: 3.5	**Energy network operator** Total engaged: 17 No of org: 10 Average SH Impact: 4	**Env interest group** Total engaged: 3 No of org: 3	**Gas distribution network** Total engaged: 49 No of org: 4 Average SH Impact: 3.7
Industry/ trade body Total engaged: 45 No of org: 20 Average SH Impact: 3.9	**Other energy industry** Total engaged: 9 No of org: 7 Average SH Impact: 3.5	**Other Non-energy industry** Total engaged: 11 No of org: 8 Average SH Impact: 3	**Regulator/ Government** Total engaged: 41 No of org: 16 Average SH Impact: 3.7
University/ think tank Total engaged: 24 No of org: 15 Average SH Impact: 3.7	**Major energy user** Total engaged: 67 No of organisations:56	**Domestic consumers** Total engaged: 8621	**Non-domestic consumers** Total engaged: 785

How we engaged

What	Who	Location	Summary
Shaping the future events	Gas distribution networks Energy network companies Regulators Academics/think tanks, Industry trade bodies Supply chain Customer (shipper) Customer (entry) Customer (exit) Interest groups Other non-energy	London, Edinburgh Warwick	Broad engagement events designed to understand stakeholders' priorities for energy now and in the future.
Future needs of network workshops at our terminals	Customer (entry) Other energy industry Government (Local Authorities)	Bacton St Fergus	The regional and terminal one day events which have been central to our RIIO 2 engagement approach. Events included a series of overview presentations followed up with facilitated discussions and voting to capture stakeholders' views.
Future needs of the network workshops - regional engagement	Gas distribution networks Energy network companies Regulators Academics/think tanks, Industry trade bodies Supply chain Customer (shipper) Customer (entry) Customer (exit) Interest groups Other non-energy	Workshop within different GDN boundaries Chester & London (Hull was cancelled due to lack of take up)	
Consumer Listening	Consumers - Domestic	Birmingham	We spent time listening to what consumers want us to focus on now and in the future.
Access review webinar and survey	Customer (entry) Energy network operator Customer (shipper) Consultant	Online	Designed to understand the issues stakeholders experience with access to the NTS and the priority they place on the topic.

What	Who	Location	Summary
Asset Health webinar	Regulator Trade bodies Customer (exit) Customer (shipper) Customer (entry) Energy network operator	Online	We played back what we'd heard from the survey and tested the key issues raised. We also asked how industry should take this forward.
Bilaterals with regulators	EA SEPA HSE	Online	Dedicated sessions with each regulator to cover topics of interest.
Major energy users survey	Major energy users	Online	Designed to understand the key issues affecting major energy users and to gather insights on specific topics.
Oil & Gas UK Trade meeting	Customer (entry) Customer (shipper) Trade bodies Academic	London and Scotland	Targeted sessions to gain stakeholders' views on key topics whilst minimising disruption.
Willingness to pay	Consumers – domestic and non-domestic	Nationally representative	A study to understand consumers' willingness to pay for improvements in services.
Service valuation tool	Consumers – domestic	Nationally representative	A survey based on an interactive online tool that allows consumers to make choices on the level of service they receive and see an immediate impact on their bill.
Acceptability testing	Consumers – domestic and non-domestic	Nationally representative	A survey to understand the level of acceptability of our business plans.
Cultural Analysis	Consumers – domestic	National	Innovative approach to understand why consumers make the choices they do and the influences around them, then looking to the future to see how these will change etc.
Value of the Network study – by Ernst and Young	Interest Groups	Nationwide	A study on the value of the gas National Transmission System (NTS): the role of the network, including the potential for increased gas and electricity costs for end users if the NTS capability were not maintained.
Network Capability, Baseline Review and Incentives Webinars	Customer (entry) Regulator/government Customer (shipper) Customer (exit) Consultant/supply chain Environmental interest organisation University/think tank Industry/trade body	Online	A webinar designed to inform stakeholders on our current thinking around incentives and understand their views. We also wanted to understand how stakeholders would like to be engaged going forward.

Findings

Objective 1 **Understand the level of service needed from the Gas Transmission network now and in the future**

1a. What scenarios should we build our plans on?

GAS ON AND OFF THE TRANSMISSION SYSTEM

Question	Response	Poll
What are your thoughts on our approach to using Future Energy Scenarios (FES)?	• The problem when looking at forecasts is that these scenarios are the extremes. The problem is Future Energy Scenarios give top end scenarios but then price controls are influenced by a scenario within the middle of the extremes – [redacted], exit customer • You have to use something. FES is better than nothing. Everyone should be using one view, but each section is quite well structured. We'll end up somewhere in the middle – [redacted] exit customer • Won't government policy drive which approach you take? – [redacted], supply chain • FES should be tested and linked to output – [redacted] supply chain • FES is a good source as it is normally neutral. In 2019 FES will be the basis of our business plan, as FES explains the big changes year to year although the content could go deeper – [redacted] trade body.	Do you support our approach to using Future Energy Scenarios? • Yes: 67% (36) • Unsure: 33% (18) • No: 0% Total: 54
How should we communicate the outputs of our planning assessments?	**Supply and demand forecasts** • Need to narrow down the (FES) options • A timeline of when things need to happen, or decisions need to be made, to eliminate or indicate possible scenarios would be helpful • Making a case to more actively share information would ensure we make optimal decisions. **Assessing options** • Translate each scenario and investment into the impact on the consumer bill • Need to understand impact through whole costs … to change the network and costs to the consumer, and to convert to different technologies/appliances • 10-year statement could include more on historical and future pressures on the network.	As a consumer: 45% say impact on consumer bill 16% energy security of supply 13% safety Total votes: 82 As a stakeholder: 14% energy security of supply 11% safety 11% consumer bill 10% resilience for unforeseen events Total votes: 98

What we've heard

Customers	Stakeholders	Consumers
• Customers would like to see a single view that the industry can work from • A timeline of predicted changes to help the industry identify which pathway is being played out would be helpful • More information should be shared to help decision making • Potential planning outputs should be communicated by impact on reliability • Our approach is broadly ok.	• Stakeholders would like the outputs to be linked to FES • Government policy should drive which pathway the energy industry should chose • Potential planning outputs should be communicated by impact on reliability and consumer bills • Our approach to using FES is broadly ok.	• Potential planning outputs should be communicated by impact on consumer bills

Trade-offs

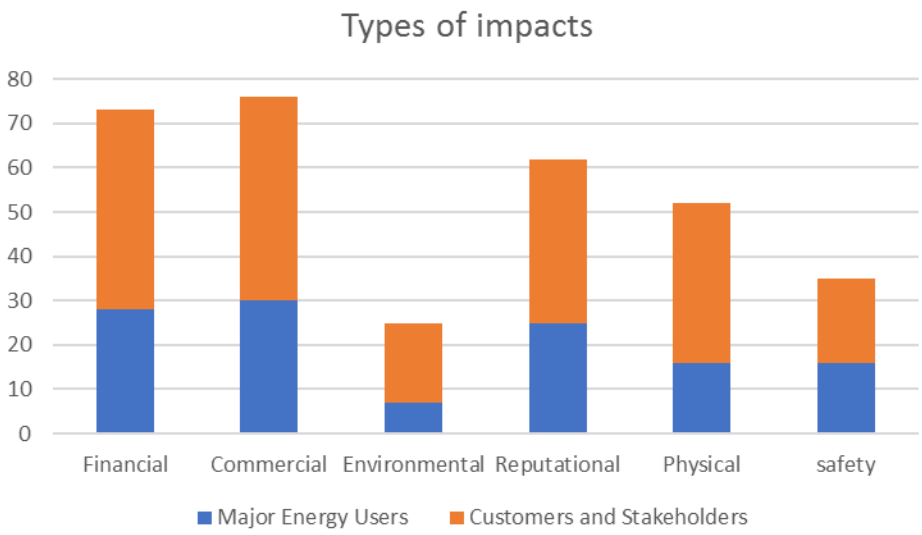
- There is a slight difference of opinion around communicating the outputs of any planning work with customers wanting it communicated in terms of reliability, stakeholders wanting it linked to FES whilst consumers want to see impact on consumer bills. We will articulate the impact on both reliability and consumer bills in the future.
- Customers would like a single view in which industry can plan from, with a clear timeline, whereas stakeholders believe government policy should drive which pathway industry should use.

1b. What level of service is required now and in the future?

Question	Response
If you can't put your gas on or take your gas off when and where you want, what processes are impacted?	• Potential platform shutdowns, and an inability to export – [redacted] entry customer • The long-term risk is that it might mean that people are laid off, assets are shut down and are no longer viable and the business would have to be shut down – [redacted], university/ think tank • There is a commercial impact on shippers due to the impact on the imbalance position if you can't input/offtake when and where you want – unknown • Physical impact: platform would have to shut down offshore. It might be about an hour before shutdown of production – [redacted] entry customer • The customer has a choice between Europe or the UK, they may move to Europe more often. This will impact UK supply security – [redacted], entry customer.
What are the different impacts?	• Combined Cycle Gas Turbines (CCGT) only get 100 starts a year so they could go below sustainable load easily if gas supply is lost - [redacted], exit customer • The inability to produce electricity due to supply or pressure of gas changes, can have financial implications – [redacted] exit customer • CO2 production could be disrupted, needed for food and drinks and stunning animals in food production – [redacted], consultant • We would be effectively shut down whilst there was disruption. The cost wouldn't be proportional to the length of time, it would depend on what customers want. We run when it's low cost to us. If we're restricted to when we can move gas on and off the network it would potentially mean closure of the site – [redacted] customer (shipper) • Have to go to the market, double hit of buying on a rising market. Oil and gas associated so if gas turned off, oil can't be brought on. Reliant on each other, vice versa eg Shetland – [redacted], customer (shipper).

Graph shows impacts felt by stakeholders if there was an interruption to their gas supply

GAS ON AND OFF THE TRANSMISSION SYSTEM



Question	Response	Poll
Under current market conditions, what level of disruption would be acceptable to your business?	• The maximum disruption we could deal with is a couple of hours a day for a week. This is because of potential platform shutdowns and an inability to export. There will be flaring and shutdown - [redacted], customer (shipper) • It is acceptable to not flow to National Grid for at most six hours a day. Any more is not acceptable. If unplanned not acceptable – [redacted], entry customer • Unless stoppage was planned, the most disruption we could manage would be six hours a day for two weeks. Seven -14 days per year acceptable – [redacted] entry customer • Domestic consumers take for granted an uninterrupted supply of gas. • Non-domestic consumers place a high value on the reliability of their gas supply.	What length of interruption would be acceptable to you? Zero - <15 min 55% <1 hr 27% <6 hrs 5% <24 hrs 9% <3 days 5% Total: 22 63% (17) can cope with a level of reduced gas supply 37% (10) CANNOT cope with any sort of disruption to gas supply 62% (16) would accept a longer interruption with notice 38% (10) would not tolerate any disruption even with notice
How do consumers feel about reliability of gas supply?	**Consumer listening** • During our consumer listening session, domestic consumers made it clear that reliability of their gas supply is sacrosanct • *"Because we need to use it. Everybody needs it so it is vital"* • *"I think the implications that there would be an interruption on that network as opposed to distributors network are more far reaching to be effected."* When asked to rank key topics in order of importance, reliable supply of gas comes top. **Willingness to pay study** Domestic consumers would be willing to pay between £6.50 and £8.00 more whilst non-domestic consumers would be willing to accept a 1.5% increase on their bill to maintain the same level of reliability. **Service valuation tool** Between 2021 and 2026, how should National Grid manage the reliability of the gas network? • Increase likelihood of gas supply interruption: 12%	

	• Maintain current likelihood of gas supply interruption: 38% • Reduce likelihood of gas supply interruption: 42% • I don't know: 8% • Not something that is important to me: 0% **Acceptability testing** Safe and reliable network were consistently considered to be the most important area for both household and business consumers. Level of acceptability for 'Managing the gas transmission system' • Agree with proposed investment and impact on bill is acceptable: 65% • Agree with proposed investment but impact on bill is not acceptable: 25% • Do not agree with proposed investment:2% Don't know: 8%

Incentives	Agree
For full information on our incentives engagement please see annex A3.03 Output Delivery Incentives	
Maintenance Should we be financially incentivised to minimise our impact of maintenance activities on customers?	• Yes: 81% • Unsure: 6% • No response: 13% • Total: 16
Have we explained what delivering beyond BAU looks like?	• Yes: 40% • Unsure: 50% • No response: 10% • Total: 10
Residual Balancing Should we be incentivised to balance linepack and minimise the price spread of our actions?	• Yes: 63% • Unsure: 25% • No response: 13% • Total: 16
Do you agree with our RIIO-2 initial position?	• Yes: 38% • Unsure: 28% • No response: 25% • Total: 16

Out of all the services we provide, which aspects could we improve to make your processes more efficient or deliver more value to your business?

High criticality	Medium criticality	Low criticality
• A shorter balancing period • Blending • Demand side response scheme • Higher pressures	• National Grid could have a wider specification allowance of gas quality • Lower pressures • Pressure stability • Supply proofing to meet demand profiles	• Common emissions reduction plan • Maintenance planning

What we've heard

Customers	Stakeholders	Consumers

• Customers value the reliability of the gas transmission network • There are a variety of commercial, financial, environmental and safety impacts of not being able to flow gas when they want • If disruptions are unplanned it increases the severity of these impacts	• Various processes are impacted across stakeholders if they are unable to take gas on and off, all of which are negative, as it causes disruption to business procedures, sometimes causing production to stop entirely • Due to uncertainty in the future, stakeholders want us to maintain flexibility by keeping options open, allowing them to adapt strategies where needed.	• Consumers take for granted an uninterrupted, safe gas supply. It is sacrosanct. It gives them peace of mind, allowing them to focus on other things.

Trade-offs

- Broadly, all stakeholder segments agree that reliability of gas is critical but for different reasons
- Customers indicate that a limited amount of planned interruptions is tolerable and the more notice the better. We will incorporate findings into our outage planning processes including improving notice given
- Consumers do not accept any risk of interruptions to their gas supply.

1c. Understand stakeholders' views surrounding accessing the network

Question	Response	Poll
What change(s) to the commercial regime for accessing the network and acquiring NTS capacity would make the biggest impact on you?	• Sold capacity being moved • Efficient provision of NTS flexibility • User commitment • Simplify the regime and commercial framework • Pooling unsold capacity.	75% prioritise changes to the commercial framework above others 13% make changes to the commercial framework, but not above other changes 13% have no issues to resolve Total: 8
One option under consideration is the pooling of unsold NTS capacity into zones. Would this address any of your concerns and why?	• Possibly - although it needs to be considered alongside the within-day capacity products necessary for within-day balancing – [redacted] consultant • Has the potential to resolve some areas of concern but could also introduce risks to areas of operations. We would be interested in any proposals around the efficient utilisation of capacity, but further analysis and debate will be required before any decision is made – [redacted], gas distribution network • Re-using existing assets is more efficient and available quicker. It would allow us to purchase capacity which we would otherwise not purchase – [redacted], customer (shipper).	Is potentially pooling unsold NTS capacity into zones something industry should focus on? Yes, definitely: 50% Yes, but not a priority: 25% Don't know/maybe: 13% No material issues to resolve: 13% Total: 8
What is your view on the appropriateness of the current user commitment requirements, and why?	• User commitment results in a reduced ability to change flow patterns which conflicts with the need to reduce unused capacity and ultimately reduces our customer bills – [redacted], gas distribution network • Insufficiently flexible and removes much needed judgement and common sense - [redacted], entry customer	

Question	Response	Poll
	• We believe this is too arbitrary in its application and a better reflection would be to apply this only when the increase in capacity results in additional costs - [redacted], gas distribution network.	
Are there any other comments you would like to add regarding NTS access arrangements on entry and exit?	• Temperature dependent capacity as exists in Germany and France is a good way for the network to provide additional capacity (eg at storage connection points) where and when the gas system needs it, without having to invest in new pipelines – [redacted], customer (shipper) • The UK would benefit from a more holistic view on entry and exit capacity – [redacted] gas distribution network.	How should industry progress these topics? Transmission Working Group: 56% RIIO: 6% Other: 11% No response: 28% Total: 18

What we've heard

Customers	Stakeholders	Consumers
• Customers believe that the pooling of unused capacity would address some of their concerns. However, further research must be carried out before the option is implemented.	• There is no consensus on which change to the commercial regime would impact stakeholders the most • Pooling unsold capacity must be considered alongside other products and measures.	• NA – consumers were not engaged on this topic

Trade-offs

- There is consensus across all stakeholder segments that pooling unused capacity would address some problems, but as part of a wider programme that looks across other products and measures
- There is no clear consensus on a problem statement
- Stakeholders are keen to see a more holistic review of the NTS access arrangements
- This topic needs to be addressed. Existing Transmission Working Group the most appropriate format for it.

Objective 2 Understand stakeholders' views on incentives and the value they deliver

Incentives	Financially incentivise	Agree
For full information on our incentives engagement please see annex A3.03 Output Delivery Incentives		
Do you agree or disagree with this statement: "Incentives have driven positive outcomes for customers and consumers during the RIIO-1 period"	• Positive in some areas, negative in others – [redacted] Customer (shipper) • Pressure on personal bonuses always helps – [redacted], Consultant	Yes: 0% Somewhat: 22% (2) No: 0% No response: 78% (7) Total (9)
We are talking to you about how consumer value is delivered by the incentives. Is our current articulation of consumer value working for you?		Yes: 0% Somewhat: 33% (3) No: 0% No response: 67% (6) Total (9)
Have we clearly articulated how the capacity constraint management scheme works?	*"I think that there needs to be more justification of the scheme parameters and the scale of the incentive. How*	Yes: 64% Unsure: 7% No response: 29%

	will changes in patterns of behaviour influence the scheme in the price control period? How will new renewable gas sources influence the scheme?" – [redacted], customer (shipper).	Total: 14
Should we retain a Capacity Constraint Management incentive?		Yes: 50% Unsure: 31% Total: 16
Do you agree with our RIIO-2 initial position?	*"Seems it will drive the right behaviours in terms of managing risk. Making interruptible/off-peak penalty only makes sense too."* [redacted], gas distribution network.	Yes: 29% Unsure: 32% No response: 34% Total: 28

What we've heard

Customers	Stakeholders	Consumers
• There are mixed views on whether incentives have driven consumer value • More work needs to be done to articulate how incentives can add value.	• There is a general lack of interest and willingness to engage on incentives. This may be due to a lack of knowledge of what incentives are and how they are relevant to stakeholders • More work needs to be undertaken to make incentives relevant.	• Whilst this is a complex topic to engage on, during focus groups incentives have been mentioned • Broadly consumers believe that incentivising companies to do better in certain areas is a good thing.

Trade-offs

- More work needs to be done to draw out robust conclusions. We will continue to engage with stakeholders on this topic.
- Some stakeholders believe we should engage with consumers directly on incentives whereas others are clear this topic is too complex and therefore engaging with consumers would add little value. We are working to develop a better articulation and will continue to investigate through our consumer engagement programme whether this is appropriate or not.

Objective 3 **Understand stakeholders' views on how to manage our asset health challenge**

3a. Level of risk stakeholders would like to see on the Gas Transmission System.

Consumer interest group Total engaged: 11 No of org: 3 Average SH Impact: 5	**Consultant/ supply chain** Total engaged: 77 No of org: 45 Average SH Impact: 3.2	**Customer (entry)** Total engaged: 57 No of org: 26 Average SH Impact: 3.9	**Customer (exit)** Total engaged: 29 No of org: 10 Average SH Impact: 4
Customer (shipper) Total engaged: 69 No of org: 36 Average SH Impact: 3.6	**Energy network operator** Total engaged: 17 No of org: 10 Average SH Impact: 3.6	**Env interest group** Total engaged: 3 No of org: 3	**Gas distribution network** Total engaged: 49 No of org: 4 Average SH Impact: 3.5
Industry/ trade body Total engaged: 45 No of org: 20 Average SH Impact: 3.8	**Other energy industry** Total engaged: 9 No of org: 7	**Other Non-energy industry** Total engaged: 11 No of org: 8 Average SH Impact: 3	**Regulator/ Government** Total engaged: 41 No of org: 16 Average SH Impact: 4.1
University/ think tank Total engaged: 24 No of org: 15 Average SH Impact: 3.7	**Major energy user** Total engaged: 64 No of organisations: 56	**Domestic consumers** Total engaged: 3480	**Non-domestic consumers** Total engaged: 785

Question	Response	Poll
Which of the outputs we produce do you value most?	• Stakeholders value all the outputs we produce with reliability and safety ranking highest	
Which options should we develop?	• You shouldn't be increasing your safety risk as this would be classified as an aggregative factor if you did have an accident. National Grid must consider the wider implications of 'as low as reasonably practicable' (ALARP), and be aware of the effect of a serious accident on wider factors – XXXX regulator • Any adverse change in availability/reliability is not acceptable – [redacted], entry customer • You must make as safe as possible. I am more flexible around availability/reliability. A cost benefit analysis could be done with regards to changes in these parameters - [redacted] energy network operator • I don't think you can increase the environmental risk - I don't think it's viable – [redacted] customer (shipper) • I'm very keen indeed on your assessment of a lower cost option for consumers – [redacted], consumer interest group. **Independent assessment (Truth) findings** Three options for an asset health programme should be taken forward and developed further in the next stage of engagement: • Keeping costs to consumers the same as RIIO-1 and no compromise on health and safety (probability of a supply interruption is 1 in 5,750) • Keeping risk the same (probability of a supply interruption is 1 in 12,500) • A 10% reduction in availability and reliability risk (probability of a supply interruption is 1 in 13,750).	
Which option is your preference?	• Future-proofing – [redacted], trade body • Increase reliability by more than 10% or rationalise the network and spend money only on areas where it is needed – [redacted] customer (shipper) • Increased reliability at lower cost – [redacted], exit customer	Which option is your preference? 1. Keeping costs to consumers the same as RIIO-1 and no compromise on health and safety: 7% 2. Keeping risk the same: 39%

Question	Response	Poll
	• There are likely to be some quick wins on efficiency improvement so worth reviewing how these look on a cost benefit basis above a base case – [redacted], entry customer.	3. 10% reduction in availability and reliability risk: 51% 4. None of the above: 2% Total: 41
Should we pursue the reduced cost to consumers option further?	• Further analysis of customer welfare impacts – [redacted] exit customer • Percentage of overall bill from transmission is low. Focus should be on asset management not cost – [redacted], supply chain • A high-quality network needs to be paid for. Additional support for fuel poverty should be addressed independently of this decision – [redacted], supply chain • I need more information – [redacted], other • Non-energy industry cost already minimal as proportion of gas bill – [redacted] academic/innovator.	Should we pursue the reduced cost to consumer option further? Yes: 43% Unsure – more information needed: 22% No: 35% Total: 51
Should we pursue future proofing within these options further?	• Only for areas that are definitely required to be pursued and in the government's energy plans – [redacted] entry customer • A general point is more info needed about the modelling but agree this is a challenge to provide in a simple but meaningful way. Bit concerned it is just another black box – [redacted] energy trade body.	Should we pursue future proofing within these options further? Yes: 76% Unsure – more information needed: 17% No: 7% Total: 59

What level of reliability do consumers want?

Slider tool

Between 2021 and 2026, how should National Grid manage the reliability of the gas network?

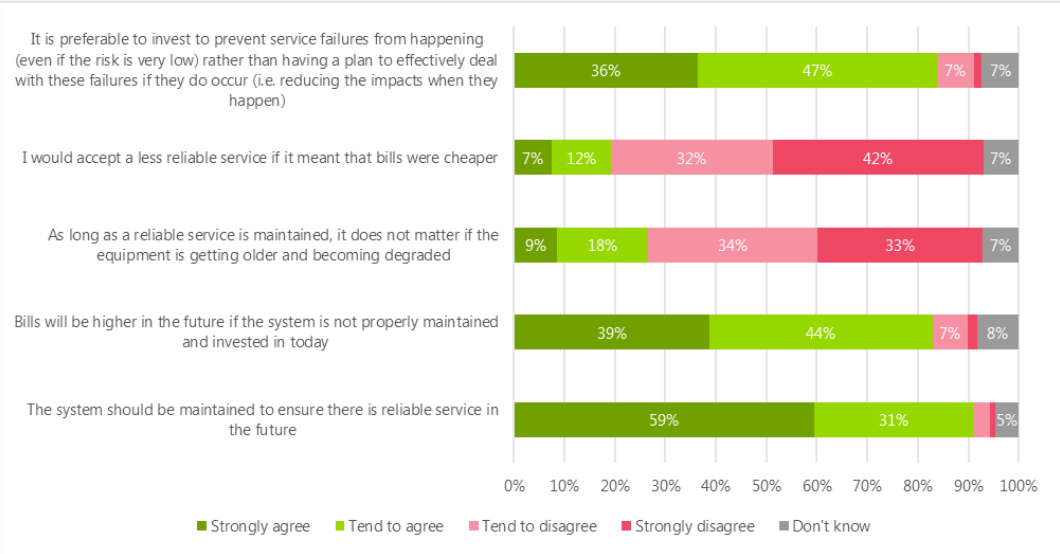
- Increase likelihood of gas supply interruption: 12%
- Maintain current likelihood of gas supply interruption: 38%
- Reduce likelihood of gas supply interruption: 42%
- I don't know: 8%
- This is not something that is important to me: 0%

Acceptability testing

Levels of acceptability for maintaining the condition of pipes and equipment:

- Agree with proposed investment and impact on bills: 61%
- Agree with proposed investment but not impact on bill: 29%
- Do not agree that proposed investment is needed: 3%
- Don't know: 7%

Additional views were sought on asset health considerations:



The overriding observation from the acceptability testing – particularly from the qualitative research – is that consumers are aware of the consequences of deteriorating reliability and support National Grid improving and maintaining infrastructure for the long term.

Participants indicated that they thought it was acceptable to pay the proposed (overall) bill impacts for investment in this area, with several commenting that a safe and reliable network is essential, and (at the time of testing) the additional impact on transmission bills was minimal, especially in the context of the overall energy bill.

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What we've heard

Customers	Stakeholders	Consumers
• Articulation of the impacts needs to be further developed to allow a more in-depth conversation • Future proofing of the network should be considered during asset health works • Some customers want to improve reliability whilst others want to maintain current levels.	• National Grid should minimise the level of risk in the network whilst ensuring high-safety standards. Stakeholders are willing to pay for this minimised level of risk • From polls there is a sense that stakeholders want this risk minimisation to include the future proofing of the network, however some need further analysis for this option to be justified.	• There is no appetite to increase the likelihood of a gas supply interruption • A safe and reliable supply is non-negotiable • Majority of consumers accept our proposals in this area, though a significant proportion (around a quarter) do not accept the costs.

Trade-offs

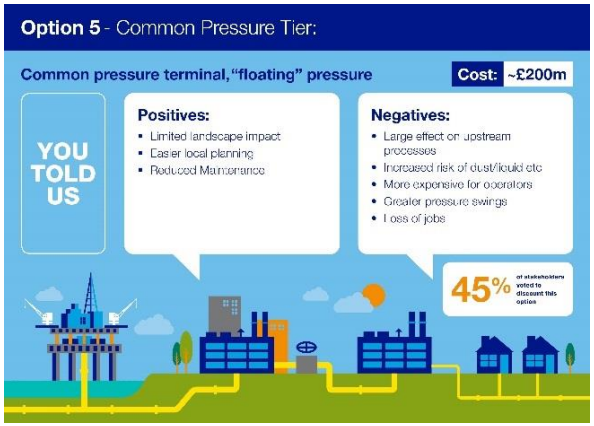
- There is a general consensus that we should maintain the current level of reliability, however some stakeholders believe we should improve reliability by 10%. We have therefore proposed to maintain reliability of the gas transmission system for our asset health investments.
- Consumer interest groups would like to see the reduced cost to consumers option, whereas consumers tell us that reducing the reliability of the network is not an option. We have therefore produced the option for stakeholders to review, but are not progressing this as a credible option
- Some customers believe we should future proof the network during asset health works whilst others disagree. We will investigate costs and practicalities of future proofing during delivery of our RIIO-2 plans

3b. How should we approach the asset health issues at the Bacton Terminal?

Consumer interest group Total engaged: 0 No of org: 0	**Consultant/ supply chain** Total engaged: 3 No of org: 3	**Customer (entry)** Total engaged: 43 No of org: 20 Average SH Impact: 4.6	**Customer (exit)** Total engaged: 3 No of org: 2
Customer (shipper) Total engaged: 4 No of org: 3 Average SH Impact: 5	**Energy network operator** Total engaged: 3 No of org: 2 Average SH Impact: 5	**Env interest group** Total engaged: 5 No of org: 3	**Gas distribution network** Total engaged: 5 No of org: 1 Average SH Impact: 5
Industry/ trade body Total engaged: 5 No of org: 3	**Other energy industry** Total engaged: 0 No of org: 0	**Other non-energy industry** Total engaged: 0 No of org: 0	**Regulator/ Government** Total engaged: 15 No of org: 3 Average SH Impact: 4.1
University/ think tank Total engaged: 1 No of org: 1			

Question	Response
What services provided by the current Bacton Terminal would you like us to preserve, and why?	• Existing commitments on pressure, gas capacity, filtering, gas quality, ensuring the integrity of the system – [redacted], entry customer • The world has moved to short-term bookings, which affect the longer-term view. We have this substitution methodology, there is a danger of assuming that because we don't have the bookings longer term, we won't need the capacity. We need to make sure we don't become complacent; do more joined-up thinking – [redacted] entry customer • How would the terminal cope with an outage near to Bacton that resulted in a large influx into the Bacton terminal that wasn't expected due the short-term nature of booking? – [redacted], entry customer.
What do you need from the Bacton Terminal?	• Consistency/reliability critical for Perenco, and this is currently offered within site – [redacted] entry customer • Will co-operate as long as informed, indirectly affects 22 million people: generates direct employment. In Great Yarmouth and Norwich connection, contractors working on site, direct staff and contractors working on site, the importance of employment supply chain and economy. Electricity generation through Bacton remains important – [redacted] consumer representative • The most important aspect of Bacton for BBL is 100% availability and the flexibility to change flows at short notice. Booking can be received within an hour – [redacted] entry customer • The main request is not to interrupt shippers as this has a large impact into Europe – [redacted], energy network owner or operator • GYPS (Great Yarmouth Power Station) has moved from 100% base load to flex load. Therefore, dependent on market. Long term predictions difficult – [redacted] Exit customer • Bacton is the biggest import/export area in the UK and flows will continue to be seasonally aligned (exporting in summer to build storage in Europe for winter) – [redacted] entry customer • Will be keen to see what employment can be brought to the area. – [redacted] government • It is early to accurately predict field life. However, they have eight producing wells and are drilling further development and exploration wells. It should produce into the mid-2030s, minimum – [redacted], entry customer • We are looking forward to 2040-42 (and beyond for other opportunities) – [redacted], entry customer.

We developed five options for the Bacton terminal and presented them to stakeholders to gain their feedback



During a webinar, we asked: do you support our decision to progress with a re-designed terminal?

- Yes: 67%
- Unsure: 33%

What we've heard

Customers	Stakeholders	Consumers
• Preference is for a re-developed terminal as it provides current levels of service at the lowest cost • Consideration should be given to developing pressure and blending services • Customer have told us they expect flows past 2040 and that Bacton is critical to their operations.	• Stakeholders told us that the re-designed terminal must provide the same commitments as the current terminal, to ensure the integrity of the network • The re-developed terminal must be able to adapt to constantly changing needs of the network ensuring reliability of transmission • The needs of the local community should be considered including local suppliers and employment.	NA – we did not engage with consumers on this topic.

Trade-offs

- There is consensus that a re-developed terminal will deliver the most efficient solution to our asset health problems. We will therefore propose this approach in our business plan
- Some customers would like us to expand our services to include blending and pressure services whilst others disagree. We will further engage with these customers throughout RIIO-1 to develop an agreed approach
- There is consensus that any disruption to service needs to be carefully planned and minimised. We have developed close strategic and operational relationships to ensure open discussions are had to planning works that might cause disruption.

Objective 4 **Gain stakeholder views on whether we should take a proactive or reactive approach to dealing with climate change impacts**

Question	Response	Poll
How should we manage climate change impacts on our network?	• Asset replacement programme should absorb the cost of having assets that are less likely to be affected by climate change – [redacted], supply chain • The only downside of a reactive approach may be public perception. Climate change needs to be taken into account in the short, medium and long term – [redacted] regulator • As long as National Grid justify what their decision is based on terms of which principle is best, then the outcome should be okay – [redacted] consumer interest group • National Grid need to have good risk management, so that they can maintain assets to deliver a reliable network for the customers – [redacted] gas distribution network • Adaptation can be seen as partly negative as that's reactive. Are we covering logistics and supply chain issues? Wellbeing of employees working in these conditions? – [redacted] interest group • National Grid could do a nature-based solution ie flooding. A programme dairy companies are doing is connecting with farms upstream. Look at assets that are at risk of flooding, planting woodland upstream etc to protect downstream assets – opportunity – [redacted], entry customer • As a customer you want to be confident that National Grid is doing the right thing. This would be best delivered with a	Should we be proactive or reactive in managing these impacts? Proactive: mitigate against flooding by investing in flood defences etc: 42% Risk-based: mitigate high risk sites and manage remaining as appropriate: 53% Reactive: insure against these impacts and manage the clean-up: 5% Total: 21

Question	Response	Poll
	proactive approach – [redacted] gas distribution network • Can you relieve the flooding elsewhere by the way you manage your sites? This is linked to net gain and the wider community – [redacted] regulator • If you're in a flood zone, make sure your sites can cope with the floods. We're more interested in the COMAH sites for this – [redacted], regulator • We're aware Kings Lynn has issues, as water levels increase this will only get worse – [redacted], regulator.	

What we've heard

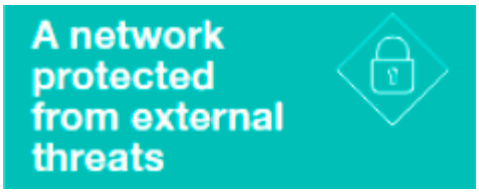
Customers	Stakeholders	Consumers
• A risk-based approach is preferable, but this needs to be reviewed regularly	• Stakeholders believe that we should take an evidenced risk-based approach to climate change impacts • Risk-based approach may result in negative perceptions of National Grid from the public because it may be viewed as a reactionary approach • Stakeholders have also challenged us to think about how we use our land to mitigate the impacts of flooding on assets and local communities.	• Majority of consumers accept our proposals to deliver a resilient network.

Trade-offs

- Customers and stakeholders generally believe we should take a risk-based approach to mitigation. However, there may be a reputational impact if we aren't seen to be proactively protecting the gas transmission system from the impacts of climate change. We are therefore taking a risk-based approach
- Stakeholders have also challenged us to think about how we use our land to mitigate the impacts of flooding on local communities. We will consider this during implementation of any mitigation actions identified through our risk assessments.

I want you to protect the transmission system from cyber and external threats

Executive summary



UK infrastructure is subject to a multitude of security threats, which are increasing in sophistication and persistence. These threats include terrorism, criminality and vulnerability in information technology (IT) and operational technology (OT) systems. Our network is part of Britain's Critical National Infrastructure (CNI), providing an essential service for society. Appropriate protection from threats is therefore essential to underpin the safety, security and reliability of the nation's energy supply. The UK government sets the requirements for the appropriate levels of physical and cyber resilience that are to be achieved in the national interest.

You've told us that managing security threats should be a priority. We understand that this is because you identify with the increasing threat both to society and to your own businesses. You've told us that disruption to the gas network and to your energy supplies would have direct and adverse consequences for you.

Background

We must protect our network from threats that could otherwise disrupt continuity of GB energy supply, with serious consequences for society. We rely upon industrial control systems for control and protection of processes ranging from valves to compressor machinery. Loss or compromise of these systems could pose a serious safety risk – for example, failure to contain gas could result in fire or explosion with a knock-on impact on adjacent assets, people and facilities.

The detailed content of our cyber resilience and physical security plans is security sensitive information. In line with our internal procedures and advice from government, we accord this information our highest confidentiality classification with special handling requirements because of the relevance to Critical National Infrastructure. It follows that there are significant restrictions on the information we can share when engaging with wider stakeholders, including consumers, in relation to our current level of resilience or proposed mitigations to reduce network vulnerability. We have therefore focused our wider stakeholder engagement on understanding stakeholder and consumer views about the topic in general, rather than any specific plans. Our confidential engagement with key stakeholders such as Ofgem, BEIS and the National Cyber Security Centre on the detail of our plans, is documented in a separate confidential engagement log for this topic.

Getting your voice heard

We are engaging with government and industry experts to scope, agree and deliver our cyber and physical security programme. This includes working with up and downstream parties, taking a holistic approach to energy ensuring we mitigate the threats across the whole energy ecosystem.

Objectives

Because of the nature of this topic, our engagement was designed to gain insight on the following: to understand stakeholders' concerns relating to resilience of the transmission system against cyber and physical threats.

Stakeholder landscape

Consumer interest group Total engaged: 3 No of org: 2	**Consultant/ supply chain** Total engaged: 54 No of org: 32	**Customer (entry)** Total engaged: 28 No of org: 14	**Customer (exit)** Total engaged: 19 No of org: 8
Customer (shipper) Total engaged: 40 No of org: 21	**Energy network operator** Total engaged: 15 No of org: 9	**Env interest group** Total engaged: 3 No of org: 3	**Gas distribution network** Total engaged: 31 No of org: 4
Industry/ trade body Total engaged: 32 No of org: 15	**Other energy industry** Total engaged: 9 No of org: 7	**Other Non-energy industry** Total engaged: 9 No of org: 7	**Regulator/ Government** Total engaged: 18 No of org: 8
University/ think tank Total engaged: 20 No of org: 11	**Major energy user** Total engaged: 19 No of organisations: 14	**Domestic consumers** Total engaged: 4411	**Non-domestic consumers** Total engaged: 163

How we engaged

What	Who	Location	Summary
Shaping the future events	Gas distribution networks Energy network operators Regulators Academics Industry trade bodies, Supply chain Customers (shippers) Customers (entry) Customers (exit) Interest groups Other non-energy	London, Edinburgh, Warwick	Broad engagement events designed to understand stakeholders' priorities for energy now and in the future.
Future needs of the network workshops at our Terminals	Customers (entry) Other energy industry Government (Local Authorities)	Bacton St Fergus	The regional and terminal events were one day events which have been central to our RIIO-2 engagement approach. The events included a series of overview presentations followed up with facilitated discussions and voting to capture stakeholders' views.
Future needs of the network workshops - regional engagement	Gas distribution networks Energy network operators Regulators Academics Industry trade bodies Supply chain Customers (shippers) Customers (entry) Customers (exit) Interest groups Other non-energy	Workshop within different GDN boundaries Chester & London (Hull was cancelled due to lack of take up)	
Service valuation tool	Consumers – domestic	Nationally representative	A survey based on an interactive online tool that allows consumers to make choices on the level of service they receive and see an immediate impact on their bill.
Acceptability testing	Consumers – domestic and non - domestic	Nationally representative	A survey to understand the level of acceptability of our business plans.

What	Who	Location	Summary
Cultural Analysis	Consumers – domestic	National	Innovative approach to understand why consumers make the choices they do and the influences around them, then looking to the future to see how these will change etc.

Findings

Objective **Understand stakeholders' concerns relating to resilience of the transmission system against cyber and physical threats.**

Question	Response
What is important to you and your business?	• Outputs need to include cyber security. Full agreement around the table that this definitely needs to be there and funded – [redacted] supply chain • Cyber security - huge impacts as a consumer – [redacted], think tank • If cyber-attack took down transmission network - how would the UK last? National security issue - what are the impacts not just country runs out of gas - power station – [redacted] supply chain • Agree 100% with the critical need to protect the transmission system against cyber and external threats. National Grid need to highlight the minimum expectations of its stakeholders – [redacted] entry customer • All agree cyber safety is essential and non-negotiable. There needs to be risk management and systems need to be put in place – [redacted] regulator • There needs to be innovation – [redacted] supply chain. • Cyber security is something we should be worried about. Legacy IT systems were a great concern in terms of targeted hacks – [redacted] customer (shipper).
How do consumers feel about cyber security in relation to National Grid Gas?	**Listening** • High-standards of cyber-security is paramount for National Grid as the gas network is integral to domestic living - *"Essential considering what's going on in the world these days." "It's a priority."* • As a natural monopoly National Grid may be more prone to more sophisticated attacks - *"Anybody who is serious enough to do that has always got intent. I don't think they would do that for a laugh and it will cost money to throw resource at it".* • Actions that could be taken: more investment in IT, a cyber-security team, continual update of the systems and high levels of security at the lower levels of the company, "*The systems should be secure….", "Continuously update it", "Ensure the strength of passwords of users…", "...have some sort of cyber security team."* When asked if they'd be willing to pay an additional 50p on their bill, consumers said: • Yes: 50%, Unsure: 30%, No: 27%. **Service valuation tool** What level of protection should National Grid Gas employ against external threats? Very High: 35%, High: 33%, Medium high: 17%, Medium low: 5% Low: 1%, I don't think this should be a priority for National Grid: 4%, I don't know: 6%. Those aged 65 or over and respondents from Scotland were significantly more likely than average to favour a very high level of security (43% and 64% respectively) and 18-24s significantly less likely to do so (26%). **Acceptability testing** Most welcomed this as a priority area for investment, providing reassurance that National Grid were taking appropriate measures. However, a few focus group

Question	Response
	participants questioned the credibility of the risks and whether this warranted the level of investment that was proposed. Level of acceptability: • Agree with proposed investment and impact on bill is acceptable: 53% • Agree with proposed investment but impact on bill is not acceptable: 36% • Do not agree with proposed investment: 3% • Don't know: 7% The general view was that the extent of risks faced by National Grid might not be immediately apparent. For example, whilst cyber security was understood to be a growing problem for all types of organisations, few thought National Grid would be a high priority target – mainly because the headline hacking cases tended to involve consumers' personal information which National Grid does not hold (compared to banks, other financial institutions, and retailers). But once discussed in more detail and the potential threats, it was recognised that cyber security is critical and utility networks absolutely need to be protected.

What we've heard

Customers	Stakeholders	Consumers
• A top priority for customers • Legacy IT systems are of particular concern.	• A top priority for stakeholders • Protection against cyber-attacks is a national security issue • Impacts will not just affect gas users but also electricity generation • This should be an area for innovation.	• Consumers have differing views on cyber security with some thinking it is critical and others not seeing it as something we should worry about.

Trade-offs

- Broadly, all stakeholder groups agree that cyber threats are growing but are reassured that we are taking this seriously
- There is a lack of understanding with consumers as to why we are undertaking this work. We are therefore looking at how we articulate the risk that cyber security poses, without unduly concerning stakeholders.

I want you to care for the environment and communities

Executive summary

We care about the environment and the communities we serve. As a responsible business, we are committed to delivering environmental and community benefit, prioritising the issues that matter most to stakeholders.

A key strand in our vision for the future of the energy sector is concerned with limiting the dramatic impacts that climate change could have on our environment and way of life. We believe this is vital if we are to operate as a socially responsible business and play our part in helping Great Britain to meet the challenges of decarbonisation. These challenges have been laid out by stakeholders as they voice their concerns about climate change, culminating in the UK government setting out legally binding targets to achieve 'net zero' carbon emissions by 2050. We will step up to meet this challenge by embedding sustainability in our business strategy and using it to guide the way we work. We are driving more efficient performance and future-proofing our organisation as the environmental and social landscapes change. We want to protect the environment by providing options to reach net zero carbon by 2050 at lowest impact on society.

Our approach in RIIO-2 remains consistent with the UK Government's Clean Growth Strategy, 25-year environment plan and commitments on climate change.

You've said that we have an important role to play in protecting the environment and moving towards decarbonisation, particularly around emissions and air quality.

Background

Our business operates at the centre of one of society's greatest challenges: to build affordable, reliable and sustainable energy systems meeting the needs of current consumers and supplying tomorrow's world with the energy it needs to thrive and prosper. A key strand in our vision for the future of the energy sector is concerned with limiting the dramatic impacts that climate change could have on our environment and way of life.

This topic covers the following:

- Sustainability and leadership for change
- Air quality – compressor emissions
- Climate change - our climate commitment
- Responsible asset use and caring for the natural environment
- Supporting communities where we work.

Getting your voice heard

Objectives

As we progressed through our engagement, our thinking and approach matured as a result of stakeholder feedback. We therefore amended our questions to ensure we got the best outcome we could.

Due to the complex nature of the topic, our environmental engagement is wide-ranging and can be summarised against the following objectives:

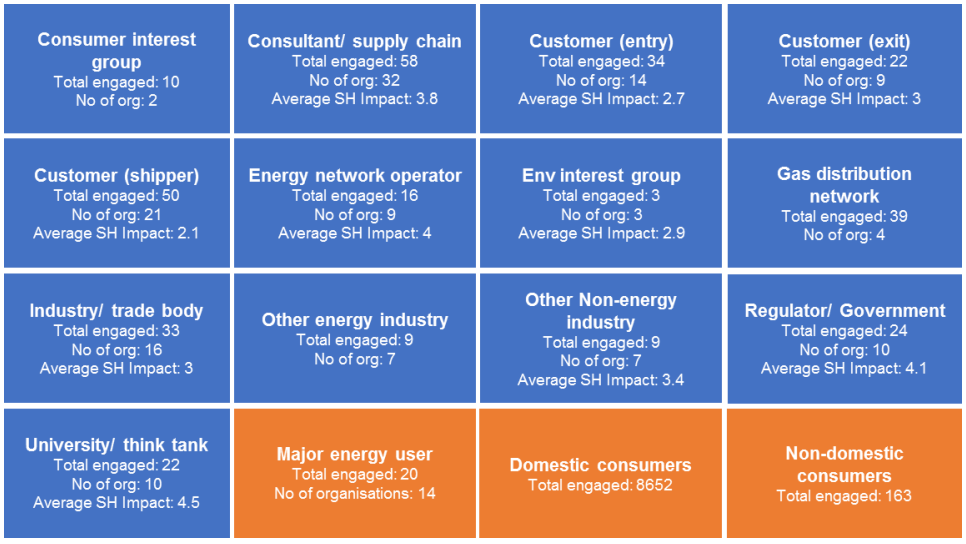
- **Objective 1** air quality – understand stakeholders' views on how we manage nitrogen oxide (NOx) emissions resulting from operating the compressor fleet and becoming compliant with legislation.
- **Objective 2** climate change - understand stakeholders' views on how we manage the greenhouse gas (GHG) emissions resulting from our operations.
- **Objective 3** responsible demolition of redundant assets:
  - 3a - understand stakeholders' views on how we manage the impacts of removing redundant assets from the transmission system.
  - 3b – stakeholders' views on whether current or future consumers should pay for the demolition of redundant assets.
- **Objective 4** environmental stewardship – understand stakeholders' views on environmental stewardship and our role within it.
- **Objective 5** understand stakeholders' views on our role in supporting local communities.

Business as Usual (BAU)

We have engaged extensively on this topic through our BAU engagement. Here is a summary of what we've heard. For more information about each channel, please see appendices.

Channel	Who	Outcome
Consumer attitudes research	Regulatory Government and Political Domestic and non-domestic consumers Consumer bodies	Going beyond its obligations to reduce its carbon emissions in everything it does (from building infrastructure to its day-to-day operations) is ranked 10 out of 17 priorities.
BAU via Safety Health and Sustainability team	Interest groups NGOs Investors	We should embed environment considerations into our decision making. There is a greater focus on the environment in the financial community.
Peterborough/ Huntington compressor replacement projects. Humber pipeline project.	Environmental regulators Local community Local government	Approach must be tailorable to the area. Critical to engage local community throughout. Develop local partnerships to embed local learning and best practices.
Regular BAU with Environmental regulators.	Environmental regulators	Network review is effective. Continued compliance with legislation.
Innovation - NIA and NIC projects. Annual publication LCNI conference.	Other networks Academics /innovators	17 environmental innovation projects will deliver different environmental outcomes.

Stakeholder landscape



How we've engaged

What	Who	Location	Summary of engagement
Shaping the future engagement	Gas distribution networks Energy network companies Regulators Academics/think tanks, Industry trade bodies	London, Edinburgh, Warwick	Broad engagement events designed to understand stakeholders' priorities for energy now and in the future.

What	Who	Location	Summary of engagement
	Supply chain Customer (shipper) Customer (entry) Customer (exit) Interest groups Other non-energy		
Environment Stakeholder Workshop and Edinburgh Stakeholder Workshop	Energy network companies Regulators Interest groups Consumer bodies Supply chain	Surrey and Edinburgh	Targeted environmental events bringing together all the relevant topics. Each section started with a brief overview and followed up with a facilitated discussion and voting.
Needs of the network Workshops at our Terminals	Customer (entry) Other energy industry Government (Local Authorities)	Bacton St Fergus	The regional and terminal events were one day events which have been central to our RIIO-2 engagement approach. The events included a series of overview presentations followed up with facilitated discussions and voting to capture stakeholders' views.
Needs of the network Regional engagement	Gas distribution networks Energy network companies Regulators Academics/think tanks, Industry trade bodies Supply chain Customer (shipper) Customer (entry) Customer (exit) Interest groups Other non-energy	Workshop within different GDN boundaries Chester & London (Hull was cancelled due to lack of take up)	
Bilaterals	Health and Safety Executive (HSE) Environment Agency (EA) /Scottish Environmental Protection Authority (SEPA) Citizens Advice	National	Discussed key areas of interest to gain views including emissions, carbon management, environmental stewardship, responsible demolition, mitigation against climate change impacts and impact on local communities.
Consumer listening	Consumers - domestic	Birmingham	We spent time listening to what consumers want us to focus on now and in the future.
Willingness to pay	Consumers – domestic and non-domestic	Nationally representative	A study to understand consumers' willingness to pay for improvements in services.
Cultural analysis	Consumers - domestic	National	Innovative approach to understand why consumers make the choices they do and the influences around them, then looking to the future to see how these will change etc.
Service valuation tool	Consumers – domestic	Nationally representative	A survey based on an interactive online tool that allows consumers to make choices on the level of service they receive and see an immediate impact on their bill.

What	Who	Location	Summary of engagement
Acceptability testing	Consumers – domestic and non-domestic	Nationally representative	A survey to understand the level of acceptability of our business plans.

Findings

Objective 1 **Air quality – understand stakeholders' views on how we manage nitrogen oxide (NOx) emissions resulting from operating the compressor fleet and becoming compliant with legislation**

Question	Response	Poll
How should we manage our local emissions?	• What is the cost of not investing now? Are cost increases over time in consideration? They should consider this and if feasible just get on with it – [redacted], consultant • National Grid should be considering environmental impacts when the business decides it's the right time after having assessed the project based on different parameters, such as the environment, society and operational – [redacted] gas distribution network • Prioritisation of GHG and NOx. Location will determine priority of many of the other aspects – [redacted], supply chain • How do NG monitor emissions/forecast emissions eg PEMS (predictive emissions monitoring), CEMS (Continuous emission monitoring system) stack sampling, different operating scenarios? Fugitive emissions, drones or other techniques to find these? Is site data available to consumers? What technology eg low NOX is used, who to contact with technology available? Is there national strategy on reductions? - link sites together - [redacted] supply chain • NOx and CO2 reduction systems very high priority and seems National Grid are taking it seriously – [redacted] supply chain • Is there a trade-off with NOx and CO2? - [redacted] network operator • Air quality as an output rather than solely carbon emissions – [redacted] regulator • For best available technique (BAT) - are these weightings still appropriate considering NOx and CO2 have risen in priority over the years? – [redacted] regulator • What impact would it have on the decisions you make if you were to change the priority of these? If none, then it's probably at the right level – [redacted] regulator.	Should we: • Do more to manage emissions: 100% • Continue as is: 0% • Do less: 0% Total: 15 When should we be focusing on managing emissions? Now: 86% 2021 – 2026: 14% 2027 +: 0% Total: 13

How do consumers feel about local air quality?	**Listening** Local air quality is important to consumers due to the health concerns associated with it: • "You are still going to have issues with health if you are pumping that stuff into the air, so anything you can do. You have to commit money to research to try and alter the amount of pollutants you are pumping into the atmosphere" • "It is a health issue. It is something that is going to affect all of us, whether we like it or not' • "Emissions are part of the transmission process…", "They have a duty of care." **Acceptability testing** Level of acceptability for 'improving local air quality around our sites': • Agree with proposed investment and impact on bill is acceptable: 65% • Agree with proposed investment but impact on bill is not acceptable: 27% • Do not agree with proposed investment: 2% • Don't know: 6% Are there any changes to the proposed investments in the plan that would make it more acceptable to you? 44% 'more investment in this area' and 28% 'no change' whilst 19% 'less investment in this area and 13% 'remove investment from the plan.

What we've heard

Customers	Stakeholders	Consumers
• Managing and reducing emissions is very important • Customers want us to assess the impacts of any projects against environment, society and operational parameters.	• Stakeholders value our work on reducing emissions to improve local air quality, and believe we should get on with it as soon as possible • Environment regulators would like us to provide more information on specific sites.	• Domestic consumers generally accept our proposals and there is support for us to do more to reduce our impact • Major energy users are keen for us to keep options open in relation to compressors.

Trade-offs

- There is consensus that all stakeholders value local air quality improvements and want us to get on with it as soon as possible. We are working with innovators and think tanks to identify new technology to help improve local air quality. We are also prioritising our most polluting compressors for replacement as part of our regulatory framework, by utilising the BAT assessment model
- In addition, all segments would like greater transparency on costs benefit analysis
- Domestic consumers would like us to consider doing more in this space.

Objective 2 **Climate change - understand stakeholders' views on how we manage the greenhouse gas emissions resulting from our operations**

Question	Response	Poll
Should we have a consistent approach to managing our carbon footprint across all activities?	• Yes, we should have one consistent carbon price in order to make analysis of these figures easier. This should be a balance between the cost to consumers and highest price for the business yet be ambitious in terms of reducing the impact on the environment. This should allow for benchmarking within the industry - [redacted], regulator • Consistency is key. There is only need for one carbon price – [redacted] gas distribution network • National Grid should have an aligned approach with other companies to prevent misunderstandings between companies. This will reduce confusion - [redacted] consultant.	Should we look to have carbon neutral construction projects? • Yes, you should reduce emissions and offset all construction activity: 73% • Yes, you should reduce emissions and offset on major projects: 13% • You should focus on reducing emissions but not pay to offset: 7% • No, deliver the project at minimal cost: 7% Total: 15
What should our ambition be around reducing our carbon impact?	• Carbon negative. Can we use aspects of infrastructure to facilitate carbon capture? More stuff we can do on carbon sinks. Is offsetting purely focused on carbon reduction or biodiversity? - [redacted] energy network owner • Carbon neutral. Drax Group plc is using biofuel to be carbon negative - [redacted] supply chain • Carbon negative, cautious of companies that do carbon offsetting. Must influence locally. Can we make our land accessible for protected species? Reptiles? Badgers – [redacted] supply chain • Would like to see more focus on methane emissions such as there are in Europe – [redacted], other energy industry.	
Measuring emissions	• You would need funding to be able to deliver low carbon emissions eg through the price control – [redacted] industry trade body • Do you measure fugitive emissions across the NTS? Because you can't incentivise something you don't have data for? Surprised that you aren't incentivised against venting – [redacted], government • Do you record your operational carbon emissions? There should be an incentive to run with low carbon emissions – [redacted] supply chain • Fugitive emissions/venting gas should be assessed – [redacted] customer (shipper) • Support/acknowledgement of NG non-beneficiary targets such as GHG – industry prepared to pay for this but would like to see more granularity on metrics as they cannot interpret them at the moment – [redacted] gas distribution network.	Should we be focusing on all our emissions eg vented and fugitive? 100% yes Total: 5
Managing non-operational emissions	• Electric fleet vehicles as current ones come to end of life – [redacted] supply chain • Set commitment to decarbonise your fleet by 2030 – [redacted] supply chain • An easy one would be fleet vehicles – commute if people are in the same office etc – one of the easier ones to deal with – [redacted] supply chain	For non-compliance activities, National Grid Gas Transmission should? Do more: 79% Continue as is: 21% Total: 14

CARE FOR THE ENVIRONMENT AND COMMUNITIES

Question	Response	Poll
	• What distance do NG fleet vehicles go? Charging vehicles – will every location have a charging point? Is that one piece of kit in a certain location? I would say yes – it's a social responsibility – [redacted], supply chain • Does having renewables on site put you in a conflict of interest? If you export, can money go to a community fund? – [redacted], regulator • It is ridiculous that you are not able to generate energy - even in renewable energy production to reduce carbon on operational sites – [redacted] supply chain • National Grid need to create a business case to change their licence requirements, so that they can capture vented gas and create electricity from it. This would also reduce costs the consumer faces, which would be ideal - [redacted] consultant.	

Incentives	Financially incentivise	Agree
For full information on our incentives engagement please see annex A3.03 Output Delivery Incentives		
Shrinkage **Should we be incentivised on Shrinkage energy procurement?**		• Yes: 63% • Unsure: 19% • No response: 19% • Total: 16
Have we explained what delivering beyond BAU looks like?		• Yes: 70% • Unsure: 10% • No response: 20% • Total: 10
Do you agree with our RIIO-2 initial position?		• Yes: 31% • Unsure: 38% • No response: 31% • Total: 16
Greenhouse gas emissions **Should we be incentivised on GHG?**	*"Limiting the downside seems inappropriate in a world where we are moving towards net zero. Cap/collar would reduce the incentive to limit GHG emissions"* [redacted], Customer (shipper).	• Yes: 69% • Unsure: 0% • No response: 31% • Total: 16
Have we explained what delivering beyond BAU looks like?		• Yes: 31% • Unsure: 25% • No: 6% • No response: 38% • Total: 10
Do you agree with our RIIO-2 initial position?		• Yes: 31% • Unsure: 38% • No response: 31% • Total: 16

Question	Response

How do consumers feel about greenhouse gas emissions?	**Listening** • Consumers want us to collaborate with other networks: "Maybe that could be worked on together… work together to find solutions to the problems" • "They should invest more and people to do research on how people use gas" • We should look at alternative green gases 'maybe expand and look at different ways, they said brewing creates some similar stuff that they need? I don't know what they do to try and implement different ways of providing energy' • I put 'carbon emissions as a highest priority, because of the younger generation and the planet. It would also help everyone health wise in every area. It will help everyone.' Voted No1 out of all other priorities in Edinburgh and 2nd in Birmingham. **Service valuation tool** What should National Grid do about greenhouse gas emissions? • Install renewable technology: 75% • Carbon neutral construction: 64% • Purchase green power: 62% • Invest in low carbon fleet vehicles: 50% • Do nothing: 4% • I don't know: 5% There was strong support for action with fewer than 1 in 10 believing National Grid should do nothing or being unsure what should be done. What should National Grid's target be for carbon neutrality? • We should aim to be carbon neutral by 2050 (government target): 26% • We should aim to be carbon neutral by 2040: 24% • We should aim to be carbon neutral by 2030: 36% • I don't think this should be a priority for National Grid: 8% • I don't know: 6% Respondents from the north east of England were significantly more likely than average to support a 2030 target (56%). **Acceptability testing** Acceptability levels for reducing carbon emissions from our operations: • Agree with proposed investment and impact on bill is acceptable: 75% • Agree with proposed investment but impact on bill is not acceptable: 17% • Do not agree with proposed investment: 2% • Don't know: 6% Are there any changes to the proposed investments in the plan that would make it more acceptable to you? 48% 'more investment in this area' and 24% 'no change', whilst 17% 'less investment in this area and 11% 'remove investment from the plan.

What we've heard

Customers	Stakeholders	Consumers
• Customers would like to see fugitive emissions measured to allow more informed decisions • Reducing our carbon footprint should always be a consideration when carrying out operations, whilst having a minimum impact on their agendas • There is willingness to pay for improvements but would like to see a greater level of granularity on metrics.	• Stakeholders want us to set ambitious goals when it comes to reducing our carbon footprint • Current non-operational emissions should be addressed • Would like to see a change to our licence to allow the generation of energy from renewable sources for our own use • Stakeholders believe getting the right framework for an emissions incentive is important to deliver maximum benefit to consumers.	• Consumers want us to take a proactive approach to tackle climate change, including collaborating with others • Consumers are supportive of us generating our own-use energy and moving to low-carbon vehicles.

Trade-offs

- There is consensus amongst all stakeholder segments that we have a key role to play in reducing carbon emissions and that we should do more than we currently are. We are proposing that we install monitoring equipment on our larger sites and AGIs to allow us to identify leaks in real-time. This will allow us to repair the leak, therefore reducing the amount of methane lost to the atmosphere
- Stakeholders and consumers believe we should be generating our own-use electricity to reduce carbon emissions. We are working with Ofgem to establish an approach to allow this to happen
- There is also an acknowledgement that an incentive to help drive improvement would deliver additional consumer benefit. We are proposing amendments to our existing incentives to drive additional value.

Objective 3 Responsible demolition of redundant assets

3a - understand stakeholders' views on how we should manage the impacts of removing redundant assets from the transmission system.

3b – understand stakeholders' views on whether current or future consumers should pay for the demolition of redundant assets.

Question	Response	Poll
What are the implications of each option of removing redundant assets and who do they affect?	• National Grid need to prioritise high risk projects and maintain remaining assets, as commercially the right answer is to leave it. Yet they should take into account stakeholders and the impact on them, for example, if redundant assets are an eyesore for local communities then it may be best to demolish the asset - [redacted] customer (shipper) • You need to think about the visual impacts of pipelines vs compressors. It makes sense to remove compressors to reduce the visual impact, but why would you dig up a pipe? Leaving assets visible on the surface has a greater impact on reputation – [redacted] customer (shipper) • Repurpose or remove as quickly as possible – if you defer, can be more expensive overall – [redacted] energy network owner • What are the Gas Safety (Management) Regulations (GSMR) implications of removing assets? Focus is on safe management and operation of the network – [redacted] regulator • Cost for consumer a big issue – [redacted] • If you were to defer all works and manage the risk, it may make economic sense - [redacted] entry customer • Deferring decommissioning is storing up trouble – [redacted] supply chain	

Question	Response	Poll
	• There will be a capacity, people and supply chain challenge if you try to decommission all your assets in T2 – [redacted] other energy industry • You can do damage removing assets from the ground – [redacted] entry customer Disposal of asbestos will only get more expensive. Therefore, I think National Grid should prioritise the high-risk projects first. However, a five-year price control period may not be long enough to get rid of them all – [redacted] customer (entry)	
What factors should we consider when we no longer require assets for operational use?	• Can we recycle the assets? Need to prioritise the assets to take out of service and decommission. How could we weight it better? Which other utilities can we engage with to re-life or re-use our redundant assets? Fibre, carbon capture? – [redacted] energy network owner • Need to consider when an asset that couldn't be used in the past can be combined with innovation to bring it into use. This will affect when assets should be demolished. Need to consider that an asset that couldn't be used in the past can be combined with new innovation to bring it into use. This will affect when assets should be demolished – [redacted], consumer interest group • There might be a different option for compressors vs pipelines – [redacted] industry trade body • National Grid need to consider cases such as those offshore. In the North Sea gas pipelines are left on the sea-bed, because it has been decided that it is worse for the environment to move them than to leave them on the ocean floor – [redacted], customer (shipper) • Demolishing assets on land that has been sold has been proven to be an issue in our business, with buildings being built on assets – [redacted] customer (shipper) Using the railway as an example, they decommissioned it and now they want it back (the small routes which were not maintained) – [redacted] consultant.	
Should current or future consumers pay?	• From a societal fairness view you should pay now. Passing on the cost doesn't seem socially fair – [redacted] government • Taxes have been paid over the years. It is the government's responsibility to decommission and to front the costs. It is done with regards to nuclear offshore. The Oil and Gas Authority (OGA) take responsibility, coal is the same – [redacted] other energy industry • Future customers will already be picking up a lot of costs such as decarbonisation – [redacted] gas distribution network • Users for the previous 10 years should be paying for disposal – [redacted], customer, entry.	As a principle, should current or future consumers pay for demolition of assets no longer required for operational use? Increased cost to current consumers: 9% Prioritise projects base on risk and maintain remaining (cost is shared between current and future consumers): 85% Defer all works and manage risk (majority of cost is picked up by future consumers): 3% No response: 3% Total: 63
What do consumers think National Grid should do with redundant assets?	**Service valuation tool** What should National Grid do with redundant assets? • Demolish high-risk redundant assets only, as soon as possible: 38% • Demolish all above ground assets as soon as possible: 37% • Defer all works and manage any risks: 10% • I don't know: 14% **Deliberative engagement** There is a clear, emotional and rational preference amongst bill payers to bear the additional costs of demolition today, rather than putting these off to the future and to future consumers. The reasons for this are generally consistent in that it is fair that users of a service pay their way. The prospect of lower bills in the future also plays a part for some. Preferences remain unchanged when the actual bill increases are explained. There are no differences by region, age or socio-economic profile. **Acceptability testing** Acceptability levels for decommissioning sites and restoring land:	

Question	Response	Poll
	• Agree with proposed investment and impact on bill is acceptable: 66% • Agree with proposed investment but impact on bill is not acceptable: 26% • Do not agree with proposed investment: 1% • Don't know: 7% Are there any changes to the proposed investments in the plan that would make it more acceptable to you? 40% 'more investment in this area' and 33% 'no change' whilst 15% 'less investment in this area and 12% 'remove investment from the plan.	

What we've heard

Customers	Stakeholders	Consumers
• Most customers want us to take a risk-based approach to demolition as delaying demolition will see an increase in cost in the future • Some would like to see us delay the demolition and manage the risk • Current consumers should pay as future consumers will be picking up a lot of cost such as decarbonisation.	• Stakeholders want us to demolish assets on a risk-based approach, prioritising assets that have largest impact on stakeholders • Should consider different approaches for pipelines and compressors • All options should be considered to repurpose equipment before anything is removed • Stakeholders believe current consumers or government should be paying.	• Consumers overwhelmingly support the demolition of redundant assets • There is differing views on what should be done with the land once assets have been removed • There is a clear, emotional and rational preference amongst bill payers to bear the additional costs of demolition today, rather than putting these off to the future and to future customers

Trade-offs

- Stakeholders and customers want us to demolish assets on a risk-based approach, sharing the cost between current and future consumers. Consumers are clear who should pay for the demolition but are less clear on the best approach to do this. We are proposing to demolish all high-risk assets during the RIIO-2 period
- There is consensus that all alternative uses for the assets, in particular pipelines, should be considered before demolition. We are undertaking a robust analysis of alternative options before proposing demolition of assets. This includes alternative uses such as hydrogen and carbon capture and storage.

Objective 4 **Environmental stewardship – understand stakeholders' views on environmental stewardship and our role within it**

Question	Response	Poll
What do you think about our current approach to environmental stewardship?	• Social aspects are important but [we] cannot put a financial value on. How many sites do we have? Would be happy for the additional cost of 0.5p on the consumer bill. Could we do more sites in urban areas? More industrial skills? - [redacted], energy network owner • Should be done but shouldn't be paid for by customers. Investments in the related buildings etc should be self-sufficient, reducing reliance on carbon – notice we had none	Are our environmental stewardship activities relevant and appropriate? • Yes: 80% • Mostly: 20% • No: 0% Total: 15

Question	Response	Poll
	in Scotland. Every one of our sites should be considered - [redacted] supply chain • Provides education and raises profile of the environment which is critical – [redacted], regulator • Do you ask the local community before you do anything? Some others in sector have a charity of the year – whatever they give comes off profits and not off people's bills eg Cancer UK but money from that goes to support England and not Scotland. Need to choose local charities. National Grid should pay for this!' – [redacted] environmental interest group • Look at partnerships with supply chain on national capital projects – [redacted] supply chain • How do you design and how [do] you build in biodiversity opportunities? Not just about doing it the same as before – [redacted] regulator • We need to put more in than we take out in long term. Rather than go for a neutral approach, go for a net gain approach - [redacted], supply chain • It is a tragedy if surplus land is not used for the good of the community. It should be used but care should be taken in choosing and funding projects, as National Grid should not replace local authorities – [redacted] customer (shipper).	Relating to environmental stewardship, National Grid should: • Do more: 87% • Continue as is: 13% • Do less: 0% Total: 15
Environmental Action Plan	Should we be financially incentivised on a wider suite of environmental metrics in principle?	• Yes: 30% • Unsure: 20% • No: 20% • No response: 30% • Total: 10
	Do you think greenhouse gas should be included in this wider environmental action plan scorecard measure?	• Yes: 50% • Unsure: 30% • No response: 20% • Total: 10
What are consumers' views on environmental stewardship?	**Listening** How can National Grid help local communities? What do you think they could use their non-operational land for? • Consumers suggested that this land should be used for either recreational or educational purposes – '*You'd have geography school trips', 'But work with somebody like, I don't know, The Wildlife Trust, or RSPB or, you know, whoever, actually have a partner,'* '*Make it a grass field site, they can go and play sports in fields and have a run, make it little meadows'* **Willingness to pay** • Consumers are willing to pay an additional £3.61 per consumer per year for us to enhance the environment around our sites. • Almost 50% of respondents chose 'protecting the local environment' as their highest priority. **Service valuation tool** What should National Grid's approach be to adapting sites between 2021 and 2026? • Prioritise delivering the greatest overall environmental value from our land: 53% • Prioritise creating important habitats for wildlife, identified by local partners: 25%	

Question	Response	Poll
	• Prioritise giving local communities more access to our land: 10% • Stop doing this type of work: 4% • I don't know: 8% **Acceptability testing:** As the costs for this work is cost neutral, this aspect of our plan was not bought out for consumers to answer questions about. It was talked about during the introduction to the environment category.	

What we've heard

Customers	Stakeholders?	Consumers
• We should do more in this space but should be careful of the role we take, making sure we compliment and don't duplicate what is already available.	• Stakeholders see these projects as being highly valuable to the community and should be done in co-operation with local communities • Stakeholders are mixed on whether the funding should come from consumers.	• Consumers are supportive of our work in this area and would like us to do more to support the local community • Most consumers believe delivering greatest overall environmental value for our sites was a high priority for us.

Trade-offs

- There is consensus amongst all stakeholder segments that there is value in this approach and encourage us to continue.
- Customers and stakeholders would like us to work with local partners to deliver our improvements. We will continue our approach of working with local charities to identify and deliver the most appropriate outcome for the site
- There are mixed views on how this work should be funded. Our proposals will aim to be cost neutral in this area.

Objective 5 **Understand stakeholders' views on our role in supporting local communities**

Question	Response
What should our role be in supporting local communities?	• National Grid should support the local environment and promote social sustainability. National Grid do it in the short term by sponsoring local schools etc, but they do not do it in the longer term – [redacted], academic • It is important to engage communities. As National Grid have the resources to carry out these programmes and local authorities do not, it is their responsibility to. There should be one standard approach across the whole country, therefore, there should be more than just four sites. This would help to impact more people. National Grid should have discussions with the community first to see what would benefit them most in the area before carrying out projects – [redacted], supply chain • Should keep looking out for further opportunities to support communities within the realm of the business – [redacted], gas distribution network • Seems a lot more activities take place that the general public is not aware of. Better communication, have direction of involvement in local communities is positive and should be expanded on but at a 70/30 split of cost to shareholders/consumers – [redacted], consultant.

Question	Response
What do consumers think our role should be in the local communities?	**Listening** Consumers believe we have a role in communities to educate around STEM subjects: *'Well we need to train people up for the future don't we and I think that still women are underrepresented and minorities, they think it's not for them', 'young people who won't go to university, for financial reasons and because it's not necessarily the done thing in their family, so it's just about tapping into those young people who are going to be our future engineers', 'because if you don't teach the young ones, how are they meant to know when they get older.'* Others believe National Grid should have a broader contribution. '*If you could put x percent of your profits into good community causes around the country that would be, I think people would think, okay, well at least you're giving something back.'* **Willingness to pay** Domestic consumers are willing to pay £4.79 to continue the current level of support for community schemes. **Service valuation tool** What type of community and charity work should National Grid focus on? (ranked on a scale of 1-5 where 5 is of high priority): • Supporting vulnerable members of society: 3.72 • Tackling fuel poverty: 3.68 • Promoting education: 3.62 • Helping communities: 3.46 • Supporting charities: 3.12 How should National Grid's community and charity work be funded? • National Grid should pay: 37% • Costs should be shared between National Grid and consumers' bills: 45% • Costs should be shared across consumers' bills: 7% • I don't know: 11%
Do consumers think helping the fuel poor and vulnerable is something National Grid focuses on?	**Listening** Consumers don't think National Grid have a large role to play supporting those in fuel poverty • *'I think it's the duty of your British Gases, your energy people, to deal with that,' 'It's definitely down to suppliers and government', 'it's the government's responsibility'* • Helping the fuel poor and vulnerable consumers ranked 7th out of 7 priorities - not because it wasn't important, but consumers didn't see it as National Grid's role. • '*National Grid has a very clear remit – it shouldn't attempt to solve welfare and community problems but stick to managing and maintaining transmission system.'* **Willingness to pay** There is no willingness to pay to support those in fuel poverty.

What we've heard

Customers	Stakeholders	Consumers
• Customers value the work we do in this area and should make it more visible. • We should continue to look for opportunities to support local communities within the realm of our business.	• Stakeholders would like to see us continue with our work supporting the local communities we operate in • Activities should promote social sustainability in both short and long run. These programmes need to be well advertised to everyone in the community.	• Consumers believe we have a clear role to support the communities where we operate • Particular role around education on the energy industry and how to switch to different tariffs • There is also support around encouraging engineering and STEM subjects in schools.

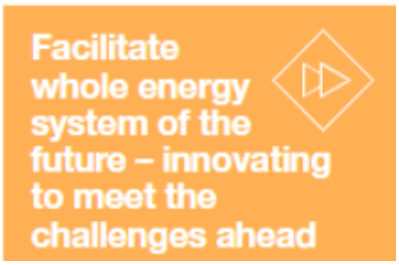
Trade-offs

- There is consensus from all stakeholder segments that they support the work we're currently doing in this area. However, we should improve visibility to allow more groups to get involved. We will review our communications plan around these activities to make them more effective
- Stakeholders would like us to continue to develop our approach by working with local communities and charities. We will continue to develop local approaches to community engagement around our projects to deliver the most value
- There is debate about how this type of work should be funded.

I want you to facilitate the whole energy system of the future – innovating to meet the challenges ahead

Executive summary

We are uniquely placed to drive decarbonisation and digitisation of the gas industry and to play a key role in delivering a sustainable whole energy system for the future. Our definition of the whole energy system includes the interactions and solutions between gas, electricity, transmission and distribution, whilst also taking account of the impacts of the heat and transport sectors.



You have said that you want us to take a leading role in driving and enabling the energy transition. You also want us to be innovative about how we meet the challenges involved, particularly the ones around decarbonising heat.

Background

The current energy system in the UK can be defined by five sectors: gas transmission, gas distribution, electricity transmission owner, electricity system operator and electricity distribution. Each of these has its own unique role to play in the provision of energy and there are also many cross-sector interactions and commonalities on both the commercial and physical aspects of network system operation.

The operation of the gas transmission network impacts upon, and is impacted by, the electricity transmission system, primarily through gas-fired generation, which now makes up ~40% of the energy mix. This impact has become significantly more noticeable with the closure of coal-fired plant and the uptake in renewable generation, particularly wind generation over the past five years.

Through our RIIO-1 stakeholder engagement and the 'listen' phase of the RIIO-2 stakeholder engagement, we have clearly heard that stakeholders expect National Grid Gas Transmission to play a key role in the decarbonisation of the energy sector, collaborating with other sectors and innovating to develop a whole energy system approach.

Getting your voice heard

Objectives

This topic is in the early stages of maturity, so our engagement is focused on understanding and defining the challenges and the potential value delivered by facilitating a whole energy system.

- **Objective 1** - key issues faced by our stakeholders within the context of decarbonising energy
- **Objective 2** - stakeholder views on the role of the UK gas transmission within a whole systems approach
- **Objective 3** –stakeholders views on the level of innovation we should be undertaking
- **Objective 4** - value to consumers and GB plc of a whole decarbonised energy system
- **Objective 5** – stakeholders views about how we might enhance the current capacity and balancing systems and how we might ensure the capacity and balancing gas system is fit for the future

Business as usual (BAU)

We have engaged extensively on this topic through our BAU engagement. Here is a summary of what we've heard. For more information about each channel, please see appendices

Channel	Who	Outcome
Future Energy Scenarios (FES) engagement.	650 stakeholders, 430 organisations.	Scenarios we should use to build our plans on high-level view of what stakeholders and customers want from the gas transmission network in the future.
Gas Future Operability Planning (GFOP)	Entry and exit customers	More detailed view of what challenges our customers face and how their needs might change going into the future.

Channel	Who	Outcome
ENA Gas Futures Group (GFG)	Collaborative group of gas networks	Commissioned an independent report of the role gas plays in the future energy system.
Innovation	Networks Customers Supply chain Innovators	Stakeholders have shaped our innovation themes as well as feedback on some of our larger innovation projects, particularly around alternative uses and other projects that can support or enhance our work.
Consumer attitudes research	Regulatory Government and political, Domestic and non-domestic consumers Consumer bodies	Consumers rank 'using new technologies to deliver a sustainable (ie both reliable and environmentally kind), energy network as 2nd out of 17 priorities.

Building on significant engagement already underway within our business as usual activities - much of which is collaborative with other network companies - we looked to engage with stakeholders we hadn't yet reached, to help underpin and complement the insight already generated or in the process of being generated.

Stakeholder landscape

We recognise that this topic is of interest to all our stakeholders and, therefore, we designed our engagement to incorporate broad activities, allowing many voices to be heard. We complemented this with more targeted activities to engage with those identified as highly affected by the topic.

Who we've engaged to date

Consumer interest group Total engaged: 21 No of org: 7	**Consultant/ supply chain** Total engaged: 105 No of org: 64 Average SH Impact: 3.8	**Customer (entry)** Total engaged: 53 No of org: 25	**Customer (exit)** Total engaged: 29 No of org: 11 Average SH Impact: 4
Customer (shipper) Total engaged: 75 No of org: 36 Average SH Impact: 4.3	**Energy network operator** Total engaged: 30 No of org: 16	**Env interest group** Total engaged: 4 No of org: 4	**Gas distribution network** Total engaged: 48 No of org: 4
Industry/ trade body Total engaged: 60 No of org: 23 Average SH Impact: 4	**Other energy industry** Total engaged: 13 No of org: 9	**Other Non-energy industry** Total engaged: 24 No of org: 19	**Regulator/ Government** Total engaged: 50 No of org: 21 Average SH Impact: 3.5
University/ think tank Total engaged: 32 No of org: 21 Average SH Impact: 4.5	**Major energy user** Total engaged: 64 No of organisations: 56	**Domestic consumers** Total engaged: 8652	**Non-domestic consumers** Total engaged: 785

What	Who	Location	Summary
Shaping the future regional events	Gas distribution networks Energy network companies Regulators Academics/think tanks Industry trade bodies Supply chain Customer (shipper) customer (entry) Customer (exit) Interest groups Other non-energy.	London, Edinburgh, Warwick	Broad engagement events designed to understand stakeholders' priorities for energy now and in the future.
Workshops at our Terminals	Customer (entry) Other energy industry Government (local authorities)	Bacton St Fergus	The regional and terminal events were one day events which have been central to our RIIO 2 engagement approach. The events included a series of overview presentations followed with facilitated discussions and voting to capture stakeholders' views.
Future needs of the network workshops - regional engagement	Gas distribution networks Energy network companies Regulators Academics/think tanks, Industry trade bodies Supply chain Customer (shipper) Customer (entry) Customer (exit) Interest groups Other non-energy	Workshop within different GDN boundaries Chester & London (Hull was cancelled due to lack of take up)	
Energy Networks Association (ENA) Survey and workshop	Interest groups Gas distribution networks New business models, Academics	Nationwide London	Working collaboratively with the Gas distribution networks, we asked Accent to carry out some engagement to understand in greater depth the value of a 'Whole Energy System Approach' and the role of the gas networks in helping to tackle four key challenges across the energy system: heat; power; transport and off-grid gas.
Industry Roundtable	Interest Groups Gas distribution networks Consumer interest groups Regulator Government	London	In partnership with Network Magazine, National Grid sponsored an Industry Roundtable event titled: "Solving future system challenges now". The objective was to arrange a robust and timely discussion centred around solving possible whole energy system sensitivities.
Future of Networks debate	IGEM members Customers Gas distribution networks, Interest groups	Kegworth	The gas network will need to evolve if the UK is to secure its carbon reduction objectives, and there are differing views on how the British gas network may be best used to deliver affordable energy and heat in a decarbonised world.
Consumer listening	Consumers - domestic	Birmingham	We spent time listening to what consumers want us to focus on now and in the future.

What	Who	Location	Summary
Willingness to pay study	Consumers – domestic and non-domestic	Nationally representative	A study to understand consumers' willingness to pay for improvements in services.
Value of the Network study – by Ernst and Young	Interest Groups	Nationwide	A study on the value of the gas National Transmission System (NTS): the role of the network, including the potential for increased gas and electricity costs for end users if the NTS capability were not maintained.
External commentary		Nationwide	This topic has generated a lot of interest and insight from across the stakeholder landscape. This has also been taken into consideration when shaping our business plan.
Major Energy Users Survey	Major energy users	Nationwide	

Findings

Objective 1 **Understand key issues being faced by our stakeholders within the context of decarbonising energy**

Area	Response	Poll
Decarbonisation of heat	• There is a call for a national conversation about the future of heat – ENA survey • There is a need for regional solutions and these must align with a national strategy. This two-tiered approach will be challenging - ENA survey • We need a long-term strategy looking at optionality rather than focusing on near-term outcomes. Ensuring the energy network is future proofed for a decarbonised energy system. Incremental improvements and a focus on short term will be more expensive to consumers – industry roundtable • No rash decisions should be made to decarbonise heat. Large-scale demonstration projects of different models would help inform and align big decisions on heat policy – industry roundtable • Ensure policy doesn't close doors to possible technologies. There are numerous examples where policy in power markets has put the market out of kilter – ie renewables - [redacted], industry body • A range of heating technologies have the potential to support our 2032 and 2050 decarbonisation commitments. We don't yet know which approaches will work best at scale and minimise costs to UK taxpayers, consumers and businesses, but we remain committed to laying the groundwork in this parliament to prepare for decisions in the first half of the next decade about the long-term future of heat - BEIS (December 2018), 'A future framework for heat in buildings'. • The net zero carbon in buildings agenda (see UK Green Building Council [UKGBC]), will encourage more biogas in the short term and move more heating and hot water to non-gas sources in the longer term – [redacted], major energy user.	78% of stakeholders said decarbonisation and the environment are high priority issues for them Total: 78

Area	Response	Poll
Whole energy system	• The energy industry is improving by working together, although there is still some way to go, particularly relating to whole system planning – ENA survey • Effort should be made to create a joined-up approach and focus given to removing barriers – industry roundtable • Large demonstration projects are needed to inform and align a whole energy system framework – industry roundtable • Industry needs better price signals and consistent, accurate data – industry roundtable • There could be better collaboration to gain a 'system-wide view' to get the best future solution - [redacted], gas distribution network • Options need to be kept open and not closed out (ie when government pulled subsidies for CCS (Carbon Capture and Storage). With an uncertain future, it is critical that all options to innovate remain on the table – [redacted], customer (shipper) • Collaboration in whole energy system – going beyond the high-level energy networks. More collaboration between future scenarios. High as critical to whole business – [redacted], gas distribution network The 1st March was a challenge. There was a lack of foresight and the low interactions between the ETO and GT created problems. National Grid need to have a thought process where they can create synergies between the two – [redacted] supply chain.	
Innovation	• There should be long-term investment into research and development (R&D), and innovation that goes beyond price control periods – industry roundtable.	Innovation is a top priority for 86% of stakeholders Total: 78
What are consumers views on the decarbonisation of energy	**Interactive slider tool** Between 2021 and 2026 how should National Grid approach the decarbonisation of energy? • Invest now to meet potential demand: 37% • Invest once there is a general direction: 25% • Wait until there is a clear direction: 29% • I don't think this should be a National Grid priority: 3% • I don't know: 6% **Deliberative engagement** There is a clear, emotional and rational preference amongst bill payers to bear the additional costs for the next generation of assets today, rather than putting these off to the future and to future consumers. The reasons for this are generally consistent in that it is just fair that users of a service pay their way. The prospect of lower bills in the future also plays a part for some. Preferences remain unchanged when the actual bill increases are explained. There are no differences by region, age or socio-economic profile. **Acceptability testing** Acceptability levels for 'working with other organisations to make the overall gas system greener'. • Agree with proposed investment and impact on bill is acceptable: 66% • Agree with proposed investment but impact on bill is not acceptable: 25% • Do not agree with proposed investment: 2% • Don't know: 7% Are there any changes to the proposed investments in the plan that would make it more acceptable to you? 43% 'more investment in this area' and 25% 'no change' whilst 17% 'less investment in this area and 15% 'remove investment from the plan'.	

What we've heard

Customers	Stakeholders	Consumers
• Decarbonisation of heating is going to be a huge challenge • We must keep options open until a pathway is clear • Greater collaboration needed across sectors particularly around scenarios.	• Need a national strategy and local solutions • Must keep options open until a pathway is clear • Would like to see collaboration across industries and sectors • Long term investments in innovation should be implemented that go beyond the RIIO periods.	• Consumers increasingly see decarbonisation as a top priority for everyone • Mixed views around whose role it is, but consumers were relieved that we were taking it seriously and investigating options • Consumers not willing at this stage, to move away from boilers unless significant grants offered.

Trade-offs

- All stakeholder segments agree that thinking around decarbonising the energy system and whole systems are still in the early stages, with heat being one of the biggest challenges. We are undertaking research to understand both technical challenges and consumer attitudes towards different potential heating solutions
- Customers and stakeholders believe that the energy system should work collaboratively to address the problem and that this may benefit from an incentive. We are working across sectors and vectors to understand the various challenges and impacts to help inform our long-term strategy to meet net zero
- There is great uncertainty as to how to achieve decarbonisation and so a long-term view that keeps options open is essential. Our long-term strategy of delivering net zero will be further developed and shaped by stakeholders.

Objective 2 **Understand stakeholder views on the role of UK gas transmission within a whole systems approach**

Question	Response	Poll
Over the past five years, what have you valued and why?	National Grid is preparing in advance to take measures related to the network – [redacted] other energy industry.	
What should National Grid Gas Transmission's role be in the decarbonisation of energy?	Gas is very important for heating in the future – ENA survey Stakeholders wanted future-proofed assets and decision making with the longer-term end goal in mind. They emphasised the need for urgency in putting stepping-stones in place to reach decarbonisation targets – ENA survey I'd like to see more green gas (as a customer). More on reverse flows from distribution to transmission and how is this going to work? More pull from National Grid to encourage these and help the gas distribution networks - [redacted], entry customer No future of gas/decarbonisation outputs – [redacted] consultant Do more to facilitate the emergence of new products and services for new kinds of gas users, eg small-scale reciprocating engines, CNG vehicles – [redacted] consultant National Grid need to be future fit, flexible and innovative – [redacted], industry body In scenarios where heat is fully electrified, there may be a case for decommissioning the gas distribution networks. The gas transmission system could still be useful to provide natural gas to power stations or industrial users (eg for use in combination with carbon capture and storage [CCS]) - CCC (November 2018), 'Hydrogen in a low-carbon economy' If the UK sticks with its current climate policy and carbon budgets, this will constrain gas consumption, initially in the late 2020s in power generation, and then in the 2030s and beyond in buildings. But, if CCS is available, there is an alternative future that uses natural gas to fuel a hydrogen economy and to decarbonise gas-fired power generation to support renewable generation – UK Energy Research Centre U(KERC) (February 2018),' The future role of gas'.	Do you agree with our Net Zero broader perspective? Yes: 59% (16) Somewhat: 26% (7) No: 0% (0) No response: 15% (4) Total: 27 Do you agree with our view of what we are leading, collaborating /facilitating on? Yes: 52% (14) Somewhat: 22% (6) No: 4% (1) No response: 22% (6) Total: 27
What should National Grid's role be in the whole energy system?	DNs can't maintain absorbing local green gas and other DN supply, need to collaborate with National Grid to review commercial framework so that the provider adds gas to the right network either DN or National Grid when setting up a project. Commercial arrangements may be needed to repressurise the gas. – [redacted], gas distribution network Would like to see a unified message from National Grid as well as giving a 'push towards the future' – [redacted], other energy industry Electricity and gas interaction is critical – [redacted] customer (shipper). How well are the gas side of the business engaging with the electricity side of the business especially at critical times like	Service valuation tool: When should National grid invest to deliver a decarbonised energy system: 37% invest now 25% invest when general decision is known 29% when clear direction is given

	the 1st March? It is incredibly important National Grid are efficient and reliable going forward – [redacted] customer (shipper) National Grid and Ofgem to facilitate discussions about whole energy otherwise gas people will keep talking to each other and the same in electric – [redacted] gas distribution network You should incentivise efficient users. On the 1st March high efficiency power generators were restricted in the same way as low efficiency gas generators. Is there a way this can be improved? – [redacted], customer (shipper) While half of electricity generation is fuelled by gas, there is a huge interaction. The choice between gas and electric heating for the future will be interesting – [redacted] major energy user Pricing. Oil price impacts price of gas which in turn impacts price of electricity – [redacted], major energy user.
What new services could we provide that would help with the transition to a decarbonised energy system?	A new service that's of medium criticality in short-term flexibility for power sector, perhaps considering the whole energy system – [redacted] customer (shipper) Increase the volume of low carbon gas by including hydrogen - [redacted] think tank There should be new services for gas in transport - [redacted] energy network owner or operator National Grid need to bring the thinking together and they need to work together within the gas and electricity future markets team. National Grid need to open up interaction and discussion between the two. This could be brought through in the price control for delivery in RIIO-3 – [redacted] industry body National Grid should be a strong encourager of biogas at transmission level – [redacted] regulator The UK's existing gas distribution networks are expected to be suitable for transporting hydrogen at lower pressure tiers. However, use of hydrogen as an energy carrier at scale in the UK is likely to involve building a new transmission network, at a cost of around £0.5bn/year - CCC (November 2018), 'Hydrogen in a low-carbon economy'.

What we've heard

Customers	Stakeholders	Consumers
• Customers would like to see the network be future proofed • We have a role to play in enabling green gases by facilitating reverse flows from the distribution networks.	• There is a disparity about what stakeholders believe National Grid's role should be in the decarbonisation of the network. This is due to the high levels of uncertainty of which energy source will be used in the future • Stakeholders agree that we should facilitate the transition to alternative energy sources, including biogas and hydrogen • National Grid gas and electricity should be unified in the movement towards decarbonisation whilst remaining as efficient and reliable as possible • National Grid should take a more prominent role in facilitating the decarbonisation of gas.	• Consumers want us to work collaboratively with other sectors of the energy industry to deliver a decarbonised energy system • There are mixed views around what our role might be • There are mixed views on when we should invest in decarbonisation projects.

Trade-offs

- There is consensus that there is huge uncertainty about how to meet the challenge of a decarbonised energy system. Most stakeholders believe gas has an important role in the decarbonisation of the energy industry. Further work is required to explore the options and pathways to the energy system of the future, and we will take the lead on hydrogen within the national transmission system. We will also collaborate with others on wider aspects of energy decarbonisation
- National Grid and Ofgem need to work together to facilitate whole system discussions. There are possible alternative uses for the gas transmission system in the future and these should be explored. We are undertaking research to assess the impacts on the gas transmission system of different green gases to help inform government policy. We are working across industry to develop a joined-up approach to resolving this challenge.

Objective 3 Understand stakeholders' views on the level of innovation we should be undertaking

Question	Response	Polls
How innovative should National Grid Gas be?	• Needs to be asset innovation and commercial innovation. Industry parties cannot operate in silos as this creates multiple standards. – [redacted], Gas distribution network • GDN have greater focus on innovation due to Ofgem incentives under RIIO. To continue to innovate you need some form of incentive. Otherwise risk that networks rest on their laurels – [redacted], Gas distribution network • Open Water - companies in water sector are already not sharing. Environment should incentivise sharing and not hoarding of innovation. Network competition would encourage marginal gains not looking at speculative Big Bang improvements – [redacted] Customer (shipper)	Innovation is: • Moving too quickly: 0% (0) • Moving at the right pace: 22% (15) • Moving too slowly and should be prioritised in National Grid and industry: 78% (52)

	• Projects that link across stakeholders eg Hinckley Project - more collaborative approach – innovate across all – Ofgem to fund/facilitate this approach – [redacted], Other energy industry • Options need to be kept open and not closed out (ie when Government pulled subsidies for CCS). With an uncertain future, it is critical that all options to innovate remain on the table – [redacted], Customer (shipper) • Should there be an Energy NIC rather than electricity, gas, transmission, distribution etc – [redacted] Consultant/supply chain • Greater acknowledgement that failure is part of innovation (particularly in Ofgem) – seem only to incentivise projects with almost guaranteed positive outputs – [redacted] Gas distribution network
What do consumers think about innovation?	**Service valuation tool** How innovative do you think National Grid should be as a company? (on a scale of 1-5 where 5 is the most important) • 1 – Not at all innovative: 3% • 2 – 5% • 3 – 22% • 4 – 28% • 5 – Highly innovative: 35% • I don't know: 6% How important to you is investment in innovation in each of these areas (out of 5, 1 being the lowest, 5 being the highest)? • Reliability and maintenance: 4.02 • Safety and engineering: 4 • Environmental impact: 3.93 • Security: 3.9 • Decarbonisation of energy: 3.72 **Acceptability testing** Acceptability levels for 'Innovation projects to trial greener alternatives to natural gas': • Agree with proposed investment and impact on bill is acceptable: 73% • Agree with proposed investment but impact on bill is not acceptable: 17% • Do not agree with proposed investment: 2% • Don't know: 8% Are there any changes to the proposed investments in the plan that would make it more acceptable to you? • 54% 'more investment in this area' and 24% 'no change' whist 11% 'less investment in this area' and 11% 'remove investment from the plan'.

What we've heard

Customers	Stakeholders	Consumers
• Options should be kept open to enable innovation to meet an uncertain energy future • Networks should collaborate and share more widely their innovation projects and outcomes.	• Stakeholders unanimously agree that innovation in the industry should be done collaboratively across sectors to maximise its impact • Continual innovation should be undertaken by National Grid.	• Strong support from consumers for innovation with consumers both believing we should aim to be a 'highly innovative' company being willing to pay to enable effective innovation.

Trade-offs

- All stakeholder segments see the importance of innovation for the gas transmission system and recognise the challenges that this brings. We are proposing a continuation of the existing innovation incentive. In addition, we are working with the wider energy industry to understand the most effective incentive solution to deliver the decarbonised energy system
- Stakeholders believe we should do more to embed innovation into BAU. We are committing an additional 0.75% of our revenue to further innovation projects for energy transition projects.

Objective 4 **Understand the value to consumers and GB plc of a whole decarbonised energy system**

Questions	Response
What value does a whole energy decarbonised energy system bring to society and consumers?	• Stakeholders view the gas networks as important channels of support to customers in vulnerable situations. They expect this importance to increase in the context of an increasingly decarbonised, and therefore potentially complex, energy system – ENA workshop • Recognition that GB is currently ahead of Europe in many aspects and could be the world leader in whole energy system thinking – industry roundtable • Measuring benefits of a whole energy system will be challenging – industry roundtable • Incentives should be designed around consumer benefits to recognise and reward whole energy collaboration – industry roundtable • Continuing to use the gas network offers significant savings compared with alternative heating sources. - KPMG for the ENA (2016), '2050 Energy Scenarios The UK Gas Networks role in a 2050 whole energy system' • It is less that there are distinct interactions between the two, and more that a holistic approach to energy management will be key in the future to ensure value is released and resilience is built into portfolio/estate management. No one technology or innovation will provide answers – [redacted] government • Increased demand on flexible gas-fired capacities, to back up and balance power generation/temporary substitution of gas-fired heating, by power-to-heat solutions/usage of gas pipe system for biogas, power-to-gas storage and transport issues – major energy user • Gas as a back-up to produce electricity – [redacted], major energy user • Consumers rated 'helping the move towards a low carbon economy' as the second highest priority area for us to focus on in the future, second only to 'maintaining a reliable supply of gas' – consumer listening • We find domestic gas customers would require, on average, alternative heating technologies to be materially cheaper than gas boilers for them to be willing, when replacing their existing boiler, to adopt an alternative technology. Between £9k and £20k cheaper – [redacted]
Engaging with consumers on	• Consumers need to be taken on the journey – industry roundtable

decarbonisation of the energy system	• Ofgem and the government need to clearly communicate the likely increase in costs to continue to provide heat – [redacted] academic • Decarbonisation today has happened without impacting end consumers directly, not things like banning the AGA. Things may need to be more disruptive to bring change – [redacted] exit customer.
Do you think that National Grid should be facilitating the transition to a low carbon economy?	• Consumers believe that National Grid is responsible for the emissions that it produces and should implement practices that reduce it - *"So, if they are responsible about producing CO2 along some level then yeah, they have to look at that…"* • Consumers want National Grid to help facilitate the transition towards a more sustainable network by making the network compatible with alternative sources - *"More investment in carbon neutral to protect our usage…"* • Consumers are confused about what actions National Grid can take to move to a low carbon future, with individuals stating that we should transport extracted gas that is reasonably sourced or merge with a supplier to speed up the transition to a low carbon future, if suppliers are being complacent. Disparity between age groups • 45+ are concerned with the potential ramifications for consumers of National Grid assisting in a low carbon future, either through increased billing costs by having to use an alternative fuel, or a reduction in the reliability of the network. "*It would come down to reliability, that's the thing", "It's interesting because to actually change to electricity, it's got a very significant cost associated with it to heat your home."* Disparity between socioeconomic groups • Less affluent groups tend not to understand what low carbon is, or how National Grid contributes to global emissions

What value do consumers put in the decarbonisation of energy?	**Consumer listening**
	• National Grid has a key role to play in the decarbonisation of energy:
	  ○ "It's important, it's our planet - it's our future."
	  ○ *"Because of our children and grandchildren, the planet is everyone's responsibility and they are a big part of it."*
	• Helping the move towards a low carbon economy was 2nd out of 7 priorities.

What we've heard

Customers	Stakeholders	Consumers
• Gas will provide flexibility in power generation • Transparency and clarity are critical to communicate the increase in costs to consumers.	• There is a consensus amongst stakeholders that the decarbonisation of the system will be both beneficial and of high importance • It is recognised that the benefits for the end consumer will be difficult to measure • The gas network can deliver an affordable transition to a decarbonised energy system with minimal disruption to consumers.	• Consumers see decarbonisation as a top priority • There is a clear, emotional and rational preference amongst bill payers to bear the additional costs of the installation of new assets today, rather than putting these off to the future and to future consumers • Consumers have welcomed being engaged on our decision making.

Trade-offs

- There is general consensus that whole energy systems thinking will deliver consumer benefits, but also recognition that it won't be easy to measure this. We will continue to understand and articulate the value the gas transmission network delivers

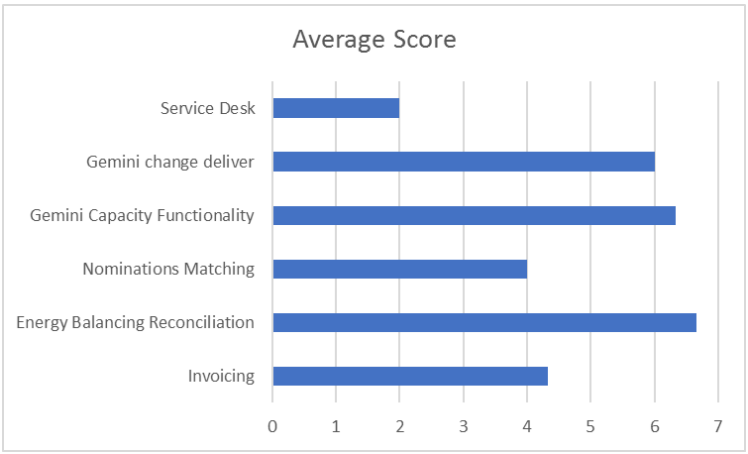
- Customers and stakeholders believe that gas can deliver an affordable transition to a decarbonised energy system with minimal disruption to consumers. We will further investigate the interactions between gas and electricity and how the whole energy system can deliver value to consumers
- All stakeholders believe it vital to engage with consumers on this complex topic. We have set out an extensive consumer engagement programme to inform business plans and wider energy policy as we progress.

Objective 5 **Understand stakeholders' views on how we might enhance the current capacity and balancing systems and how we might ensure the capacity and balancing gas system is fit for the future**

Question	Response	Polls
What is the impact on your business if the capacity and balancing system cannot keep pace with the level of industry change?	Three main themes came out of the feedback to this question: 1. Higher operating costs for National Grid and industry may be incurred if systems cannot support the execution of operational processes, meaning that workarounds would have to be sought 2. There is increased regulatory risk if regulatory obligations cannot be implemented 3. Opportunities will be lost if the UK falls behind other European markets and investments end up going elsewhere as a result.	Do you agree with the anticipated consequence? Yes: 33% Can't say: 66% Total: 3 Do you feel your voice has been reflected in what we've just talked about? Yes: 100% Total: 3
What are your functional and non-functional requirements of a future system?	In response to the question exploring stakeholders' future system requirements in an unconstrained world, the responses can be split into four main categories: 1. Do the basics well 2. Improved information exchange methods, interfaces with users' systems and system security 3. Greater automation of the system and real-time processes. In a 1-2-1 conversation, one user said they employ an additional person due to the lack of automation in the current system. This is a cost that will ultimately be passed on to that stakeholders' end consumers 4. Increased reporting functionality and granularity.	Do you feel your voice has been reflected in what we've just talked about? Yes: 100% Total: 3
What are your priorities when system change is implemented?	In response to the question around stakeholder priorities when system change is being implemented, the following areas were drawn out in order of their prioritisation: 1. Minimise impact on users' systems 2. Quality of change and the ability to test 3. Visible timetable of change 4. Built-in contingency methods.	Do you feel your voice has been reflected in what we've just talked about? Yes: 66% Partly: 33% Total: 3
What are your views on the current capacity and balancing services?	Feedback centred around the following areas: • Invoicing – better granularity and explanation. In 1-2-1 conversations, one user said it was cheaper for them to pay what they believed was an incorrect invoice than it was to investigate what the invoice was for. If this is an action that is happening cumulatively then this may have an impact on end consumers' bills • Energy balancing reconciliations – a quicker process rather than waiting for invoice corrections. A better query management system.	Do you feel your voice has been reflected in what we've just talked about? Yes: 100% Total: 3

	• Nominations matching at IPs – stability, speed and consistency in the matching process, recognising different balancing regimes across Europe. • Gemini capacity functionality – automatic bid process, real-time capacity • Gemini change delivery • Unidentified gas • Service desk.

Please rate the services in order of them needing improvement:



What we've heard from our engagement

- The services we provide need to reflect the emerging market rules and requirements
- Our ability to update our IT systems and services to adapt to the changing energy landscape, is critical in delivering what stakeholders require
- How we deliver these changes is particularly important to our stakeholders as any changes can affect their connected systems and processes.
- There is no trade-off between customers/stakeholder/consumers for this topic.

Further engagement on this topic of future balancing and capacity system and services in annex A17.02.

I want all the information I need to run my business and to know what you do and why

Executive summary

Transparency and information are fundamental to our stakeholders' ability to operate their businesses efficiently and effectively. Our data and insights provide value for consumers by ensuring that the gas market runs smoothly. Our work in this area also promotes competition – allowing participants to plan, prepare and operate effectively. We recognise that our stakeholders need us to provide good quality information and data to inform their business decisions.

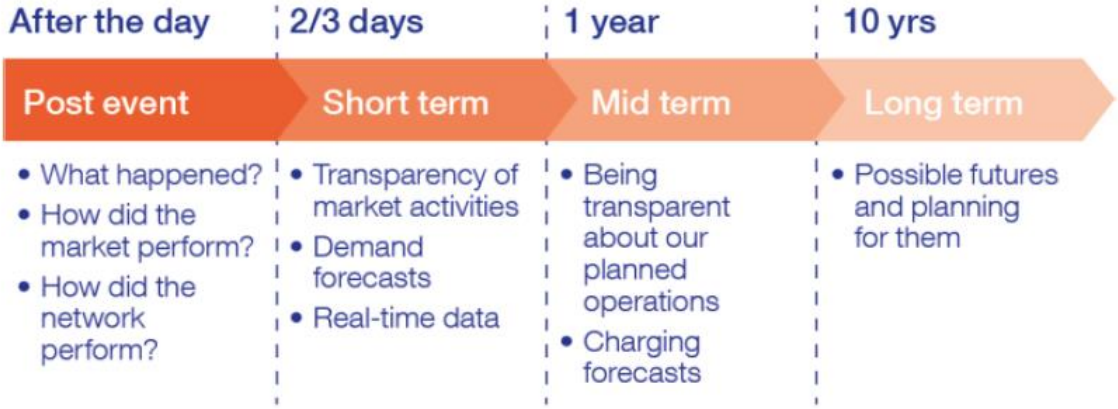
Through our engagement we've developed a more detailed understanding about the information that you value, and what you use it for. You have told us you want more information, faster access to it and an easy way to ask us for new kinds of information.

Background

Our information and data are fundamental to stakeholders being able to operate their businesses efficiently and effectively. The information we share allows market participants to make informed decisions. This might be about the investments they make, how they trade in the market, or how they run their plant and equipment.

We know that transparency is important, particularly how we communicate the actions we take and decisions we make. It allows stakeholders to understand what we do and why. They can understand how we might act when similar events occur in the future and how they could optimise their own operations. Information is crucial to the efficient operation of the gas industry, which ultimately impacts consumer bills. To help us understand more about how the data and information is used, we also engaged with companies that process data on behalf of groups of shippers, known as 'data-manipulators'.

Here's a summary of the type of information we produce:



Getting your voice heard

Objectives

Our engagement on this topic was designed to gain insight on the following:

- **Objective 1** – understand what and how stakeholders use the information and data we provide
- **Objective 2** - understand what is important to stakeholders relating to data and information
- **Objective 3** - understand stakeholders' views on our role in articulating how the energy system works.

Business as usual engagement (BAU)

We have engaged extensively on this topic through our BAU engagement. Here is a summary of what we've heard. For more information about each channel, please see appendices.

Channel	Who	Outcome
Operational Liaison meetings	Customer (entry), Customer (exit)	Customers want to obtain information more quickly in raw data format. There is an interest in pressure forecasting.
Bilaterals	Customer (shipper)	More detailed view of what shippers want and how they use the information and data we provide, including more accurate and timely data.

Who we've engaged with

Consumer interest group Total engaged: 10 No of org: 3	**Consultant/ supply chain** Total engaged: 54 No of org: 32 Average SH Impact: 1.5	**Customer (entry)** Total engaged: 46 No of org: 25 Average SH Impact: 3.7	**Customer (exit)** Total engaged: 23 No of org: 9 Average SH Impact: 3
Customer (shipper) Total engaged: 46 No of org: 24 Average SH Impact: 3.3	**Energy network operator** Total engaged: 16 No of org: 10 Average SH Impact: 1.5	**Env interest group** Total engaged: 3 No of org: 3	**Gas distribution network** Total engaged: 31 No of org: 4
Industry/ trade body Total engaged: 38 No of org: 17 Average SH Impact: 4	**Other energy industry** Total engaged: 9 No of org: 7	**Other Non-energy industry** Total engaged: 9 No of org: 7	**Regulator/ Government** Total engaged: 25 No of org: 15 Average SH Impact: 1
University/ think tank Total engaged: 20 No of org: 11 Average SH Impact: 1.7	**Major energy user** Total engaged: 64 No of organisations: 56	**Domestic consumers** Total engaged: 4461	**Non-domestic consumers** Total engaged: 163

How we've listened

What	Who	Location	Summary
Shaping the future events	Gas distribution networks Energy network companies Regulators Academics/think tanks Industry trade bodies Supply chain Customer (shipper) Customer (entry) Customer (exit) Interest groups Other non-energy	London, Edinburgh, Warwick	Broad engagement events designed to understand stakeholders' priorities for energy now and in the future.
Future needs of the network workshops at our Terminals	Customer (entry) Other energy industry Government (Local Authorities)	Bacton St Fergus	One day regional and terminal events which have been central to our RIIO-2 engagement approach. The events included a series of overview presentations followed up with facilitated discussions and voting to capture stakeholders' views.
Future needs of the network workshops -	Gas distribution networks	Workshop within different GDN boundaries	

regional engagement	Energy network companies Regulators Academics/think tanks Industry trade bodies Supply chain Customer (shipper) Customer (entry) Customer (exit) Interest groups Other non-energy	Chester & London (Hull was cancelled due to lack of take up).	
Operational forum – customer listening	Customer (entry), Customer (shipper)	Warwick	Facilitated session designed to understand customers' needs and wants related to information and data.
Consumer Listening	Consumers - domestic	Birmingham	We spent time listening to what consumers want us to focus on now and in the future.
Deliberative consumer narrative	Consumers - domestic	London	Developed a narrative with consumers for consumers. This explains 'who we are and what we do' to allow us to have a more informed discussion about their preferences.
Major energy users survey	Major energy users	Online	Designed to understand the key issues affecting major energy users and to gather insights on specific topics.
Online collaboration tool	Customer (entry) Customer (exit) Customer (shipper) Gas distribution networks	Online	This tool allows interested parties to engage with us on topics that are of interest to them with minimum disruption to their day.
Acceptability testing	Consumers – domestic and non - domestic	Nationally representative	A survey to understand the level of acceptability of our business plans.

Findings

Objective 1 **Understand what and how stakeholders use the information and data we provide**

Question	Response
What has National Grid done well over the past five years?	• National Grid has provided good transparency, open discussion and published data – [redacted], other non-energy industry • I get a lot of use out of the external publications such as FES and value the transparency and amount of data which is made available to the market – [redacted] customer (shipper) • National Grid provide very useful information to buyers and the right amount of information, especially related to demand – [redacted] consultant.

How do you use the information and data we provide and how can we improve our service?

- I need advanced notification of planned maintenance, even if it is planned in the short term, and any other works. I also want quick sharing of information of any operational constraints of the day. Quality gas measurements would also be beneficial – [redacted] entry customer
- National Grid could help provide real-time gas demand data throughout the day. There should be a new service to provide location pressure information – [redacted] customer (shipper)
- The data is very useful for working out the chain of events that has led to a particular supply pattern – [redacted], customer (shipper)
- Few places where you can see aggregated demand, (NTS/DM/ power at aggregated level) – [redacted] customer (shipper)
- Gemini data is especially useful in peak periods – [redacted] customer (shipper)
- Any capacity for data that would help in blend analysis – [redacted] entry customer
- Information provision with regards to gas quality standards widening, we need information about what we get so we can do something about it before it happens. Particularly with regards to power generation – [redacted] consultant
- A new service that's of low criticality is for supply chain to be informed on more projects – [redacted] supply chain
- I think information flows should be an incentive. There should be flows on pressure and gas quality. People need to know what to expect in terms of the gas they are going to get. National Grid need to say expected pressure in real time as well as information about other components. National Grid also need to have a future forecast. There should be an output measure on this as it will cost a lot of money – [redacted], consultant
- Sharing of safety information is important – [redacted], exit customer
- Would be good to pictorialise the long/short position throughout the day, as this feeds the traders' decisions – [redacted] customer (shipper)
- APIs used to scrape data continuously –[redacted], customer (shipper)
- Do you process the API data? Day ahead nomination data is inconsistently published, should be at 15:00 each day but is not always available at this time. This impacts our decisions for the next Gas Day - [redacted], exit customer
- Need a better, more comprehensive data dictionary – Engie, customer (shipper)
- Why publish after the day data in six-hour chunks? Would be better to have hourly breakdown – [redacted] customer (shipper)
- Prevailing view is a good example of something we use to support our commodity risk management – [redacted] major energy user
- I use daily snapshots to see what gas is flowing, demand levels, any shutdowns etc – [redacted] major energy user
- Heathrow is aware of the data we use which is produced by National Grid. What would be helpful is to have a full breakdown of the information collected by National Grid and how we access this information. With regards to the data utilisation, Heathrow will tend to use data to manage demand in order to identify poorly performing assets which we can replace – [redacted] major energy user
- Info on storage, usage, UIG and major retailers are used for budgeting and supply decisions – [redacted], major energy user
- I look at the Daily Summary Report and Instantaneous Flows Report on a daily basis. This gives me an idea of how the gas and electricity markets will be reacting, depending on how well supplied the system is, where the flows are coming from etc – [redacted] major energy user
- Data analysed daily by analysts and traders - [redacted] major energy user
- If we move into a state where the gas supply may be interrupted on a regular basis, we would expect a robust warning system to be implemented – [redacted] major energy user
- Require information on composition of gas as we react some of it – [redacted], major energy user.

Comments from [redacted]

- [redacted] values the Grid Gas Data provision service and ranks it at a similar level to the Fluxys Gold Standard.
- Login to access National Grid would be detrimental to Fluxys due to internal compliance constraints on public domain data.
- Request for National Grid to avoid any data restructures at the start of the Gas Year or at the end of the month
- If National Grid restructure data, please back-populate with two years of historical data
- [redacted] scrapes the previous 30 days-worth of data
- Additional within day demand data at lower aggregations is more useful than total real time NTS demand
- Capacity data is useful to the extent it helps identify constraints at key points such as the interconnectors.

Comments from [redacted]

- [redacted] would prefer National Grid to leave missing data blank and not try to extrapolate a value
- [redacted] is interested in National Grid providing volume and energy data
- Would appreciate an updated data dictionary of data sets
- [redacted] uses the manual data download functionality as well as APIs to download the data.

We also received specific insight via our online collaboration tool:

Organisation	Topic	Comment
[redacted]	Day in brief	(1) Demand data provides insight into how National Grid coped with these days and helps us to better predict how it will manage future events, thereby managing our storage assets more effectively (2) Without the data it is hard to predict how future events will play out (3) To date we have been using our own modelling with our own data instead (4) Our desired granularity for day in brief is just comments with graphs if necessary to highlight points (5) Frequency only necessary if there is a particular interesting day.
	Alerting system	REMIT or other market alerts have a big impact on trading, so it is vital to have this information as events occur. If the industry does not have the data the market reaction and the price increases can financially impact customers. Currently we have to monitor multiple websites for REMIT alerts and we use the Bloomberg system.
[redacted]	Day in brief	A day in brief helps determine other impacts from UIG variability. Not currently having this information affects end consumers as it is harder to improve models. This increases wholesale cost volatility which has a direct feed to end consumers. Without the data we make assumptions on whether we should model the impacts or not. We would really appreciate increasing day/day in brief granularity at an LDZ level. We would want this information as soon as possible.
	Instantaneous demand	This data is key to the supply and demand balance and to understand the linepack swing, therefore, necessary for market participants to contribute effectively towards a balanced end of day position. The lack of this information currently can impact the end consumer as less efficient market balancing means more volatility and more cost to manage a portfolio. Currently without this data we rely on the daily forecast demand provided by National Grid. The granularity we would appreciate is at least hourly, but ideally two minute categories LDZ, DC, CCGT and split by LDZ, DC, CCGT. Frequency hourly.

Organisation	Topic	Comment
[redacted]	Within day trading	Transparency of actions taken by National Grid would allow the market to receive indications that are not currently available. Knowing that National Grid are trading would provide guidance to the market that there are concerns. This lack of information currently impacts the end consumer as there are no drivers to react to price triggers if all transactions look like they are with other market counterparties. Without this information we track SMPB and SMPS from other sources. The granularity we would like is at the time of the event and each subsequent event.
[redacted]	Gas quality	It would be helpful to monitor Calorific Values (CV) at terminals and multi junctions to provide insight that would help forecast target CV for biomethane sources and minimise CV capping. Lack of this information affects the end consumer as there is the risk of CV capping for biomethane sites as these sites have intermittent flows but feed into the flow weighted average calorific value (FWACV) calculation. Without this information we can't do the analysis. The level of information required would be a tracking graph with option to download on excel giving historical gas day. We would require this daily.
[redacted]	Regional linepack	This information could help us stay within the spec required by National Grid. When pressure rises or drops it can cause us to go off spec so advance notice of the pressure change means we can start to make changes in advance to prevent this from happening. This affects end consumers because not having this information as a Terminal Flow Advice (TFA) means having to shut down the oil rigs as there is no export route. Without this information currently, we can only react if it happens. The information required is what is the extent of the pressure change and the duration so we can make plans for the plant. We would like the information as soon as there is a change of pressure at the Bishop Auckland compressor.
[redacted]	Day in brief	This would be a useful overview. It impacts the end consumer currently as there is a lack of the information. Instead at present we get market summary reports from suppliers. We would appreciate this information daily or weekly.
[redacted]	Day in brief	Essential to understand what National Grid believes the state of the system to be in. Currently we make this assessment based on other data. We would require the data system wide with detail on entry and exit point issues. We would want this information daily.
	Alerting system	Fundamental data to make trading decisions. Lack of data impacts end consumers as poor information leads to poor trading decisions. At present we calculate data from other available information. We would want this at entry and exit point level and as soon as National Grid becomes aware of it.
	Trading information	Useful to know when actions are being taken to balance the system. Currently we wait for the after the day reports. We would like trade volume and price. We would like this information as close to when it happens as possible.
	Instantaneous demand	Supply provided currently is only half the picture and so demand would complete this. It currently impacts end consumers as it is impossible to know whether a nomination to inject or export is real and thus impacts it will have on the linepack. Being able to see it in real time would allow a calculation on the validity of nominations. Without this, at present we assume the validity of nominations. Same level of granularity as currently provided for supply. Would like it to be instantaneous.
	Regional linepack	On time linepack would be useful, maybe not regionally. Please just publish at the same time each hour rather than different times within the 10-minute window.

INFORMATION PROVISION

Organisation	Topic	Comment
[redacted]	Trading information	Need better visibility of when National Grid takes buying/selling actions and exact time of transaction, volume and price. It impacts end consumers because the signals that National Grid are sending to the market are not transparent - we have poor visibility of National Grid actions within the day. The only way we know if National Grid have taken action is if their action sets SMP (system marginal price) buy or sell. Without this information we query DIE (data item explorer) balancing summary. We need the information when it happens.

What we've heard

Customers	Stakeholders	Consumers
• Customers place a lot of value on the information and data we provide, using it to make business and investment decisions • Customers would like us to provide a consistent and frequent stream of data to allow them to plan their business activities, both strategic and operational • Information should also include any planned disruptions made by National Grid.	• Some stakeholders would like to see information provision be part of an incentive mechanism.	• Major energy users would like to be provided data in real time, as they are currently more inclined to use information available from third-party members.

Trade-offs

- Customers rely on the information and data we provide and use it to plan their business activities both operational and strategically. We are proposing an open data sharing model across the energy industry and will collaborate across network companies to build a whole system view.
- Major energy users also use the information supplied by us to inform their processes. We will further explore how non-customers use our data to enhance our services

Objective 2 **Understand what's important to stakeholders relating to data and information**

Question	Response
What additional data would be useful?	• Academia would encourage GTO to make more data available to academia and the public domain – [redacted] academic • There is a differentiation between data required for a specific site rather than data required within the market as a whole. If only one party will benefit from it then they should be charged for it – [redacted], customer (shipper) • The supply and demand data sets are fragmented – [redacted], industry body • We don't always understand some of the information and it takes money to raise issues – [redacted], customer (shipper).
What's important to you relating to how you receive the data?	• The amount of data National Grid produces is highly valuable. However, the accuracy of this data is often questionable – [redacted], customer (shipper) • People freak out not because of data, but because it changes – [redacted], customer (shipper) • Used to seeing a screen and navigating around – therefore useful tool due to being familiar. If going to redesign, then might be done differently – [redacted] exit customer • All data on prevailing view should be correct. You should have an incentive around data quality – [redacted], exit customer • Transparency needed on 'I want all the information….' priority – [redacted], customer (shipper) • More instant from a trading point of view – [redacted], customer (shipper) • We look at National Grid's systems over our own systems. We really value the data that's on them – [redacted], entry customer • There should be a data transfer service – [redacted], supply chain • Customers dependent on automated data extractions, meaning if MIPI (Market Information Provision Initiative) goes down all their processes stop working – [redacted], customer (shipper) • Preference to improve the quality of existing data rather than increase the amount of data available – [redacted], customer (shipper) • If National Grid data is not available for whatever reason this can cause disruption to customers' back-end systems, as they are configured to receive specific data items (at certain times) – [redacted], customer (shipper) • More desire for a pull rather than a push of data from National Grid as it allows for commercial advantage. There is a desire to obtain data ahead of competitors – [redacted] customer (shipper) • It would help if National Grid created scripts on how to utilise the data and how to automate it once received – [redacted], customer (shipper) • Preference to get raw data quickly rather than formatted data at a slower rate – [redacted], customer (shipper) • Raw data can be manipulated by back-end systems to suit individual needs – [redacted] exit customer. [redacted] • Value lowest possible data granularity (offtake point) and consistency • Data quality an issue but at European level, data quality only needs to be good enough. [redacted] • National Grid should focus on data transparency and data provision and limit its activities in data visualisation • Happy for National Grid to provide cleansed data • Reload the data once a month • Data consistency very important along with clear data definitions.

[redacted]

Data consistency is very important and [redacted] try to reduce the Residual Supply Demand imbalance where possible.

Changes to field names (such as the change of use by Rough Storage), cause problems to data procurement as scripts need to be re-written. [redacted] would appreciate notifications of these types of changes

- Value transparency of market data and additional data at a microlevel.

What do consumers think about our proposals

Acceptability testing

Level of acceptability for 'providing information to allow the gas transmission system to run efficiently':

- Agree with proposed investment and impact on bill is acceptable: 53%
- Agree with proposed investment, but impact on bill is not acceptable: 36%
- Do not agree with proposed investment: 3%
- Don't know: 7%

The lower levels of priority for this investment area – and to some extent support for the bill impact – is likely due to the lower familiarity that consumers have with the gas system operator role.

Whilst potentially the findings for this investment area are subject to greater uncertainty concerning consumer understanding – and might warrant more effort to educate and inform consumers – the overriding view was that the bill impact was minimal and that National Grid was trusted to deliver what was required in order ensure the smooth running of the gas system.

Should we be incentivised to improve our demand forecasts?

Webinar

- Yes: 50%
- Unsure: 0%
- No: 0%
- No response: 50%
- Total: 6

What we've heard

Customers	Stakeholders	Consumers
• Information provided can be incomplete or incohesive • Customers would like us to focus on increasing the accuracy and timeliness of the data we already produce • Customers would like to be notified when there are any changes made to the format of the data provided.	• Stakeholders want the provided data to be transparent and standardised to reduce confusion • More data should be available to academics • There needs to be closer links between supply and demand data sets.	• NA – consumers were not engaged on this.

Trade-offs

- Customers would like to see an improvement in the accuracy, timeliness and consistency of information rather than an increase in information itself. We are proposing investments to enhance our systems and to take advantage of new technology to further improve data quality
- Customers and stakeholders have asked that any changes or amendments to data structures need to be carefully managed and communicated. We will work collaboratively through our online portal to ensure any changes are managed effectively

- Accessibility to a broader range of stakeholders will help accelerate transition to a decarbonised energy system. We are proposing open data sharing and governance model to allow more stakeholders to access our data.

Objective 3 Understand stakeholders' views on our role in articulating how the energy system works

Question	Response
What is the current level of understanding of the energy industry	• General lack of understanding of roles of various parties. More to do with gas distribution networks (GDNs). People don't understand roles of each organisation If the business plan is to be informed by end consumer, then they need a reasonable understanding of the organisational structure and what we do – [redacted] gas distribution network Engage with end consumers more – help them understand where their energy comes from and the importance of National Grid in the value chain – [redacted] consultant.
What do consumers believe our role is in articulating the energy system?	**Listening** Consumers are uninformed about the roles within the energy system • *"I thought that they did everything."* When asked "How can National Grid help the public?" consumers answered: • *"Raise awareness of role"* • *"Let us know who they are"* • *"To help members of the public understand… produce a leaflet that shows the price of gas and what you actually do and what you are worth and what percentage you take from the bills, and then the public will feel more aware of what goes on."*

What we've heard

Customers	Stakeholders	Consumers
• National Grid must explain its role in the energy industry before any consumer engagement can be undertaken.	• Stakeholders tend not to understand what roles members of industry play in the transmission of gas • Members of the industry, including National Grid, need to be more proactive in explaining their roles in the industry - especially if the business plan is based on stakeholder priorities.	• National Grid have a role to play in educating consumers about the energy industry and our role within it • There are mixed views about our role in educating consumers on how to be more efficient with energy use.

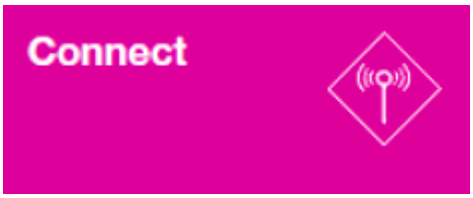
Trade-offs

- There is consensus that we need to be more proactive in articulating our role in the energy system. We have developed a simple animation to support engagement with consumers and continue to be more present on social media.

I want to connect to the transmission system

Executive summary

We connect, modify or disconnect new and existing sources of gas supply and demand as customers' requirements change. Our connections service is essential to the effective working of the competitive wholesale energy market. It is an enabler for decarbonising the gas and electricity systems and can make it possible to connect new biomethane sources.



You have told us you want it to be quicker and cheaper to connect and for us to be more transparent in our processes. You want our connections service to enable decarbonisation, decentralisation and future energy systems transition.

Background

Our network connects supplies from nine gas importation facilities to nearly 100 offtakes for distribution networks, power stations and interconnectors, as well as eight storage sites.

As well as the physical connections, we manage the processes customers use to reserve capacity to flow gas on the network. If there isn't enough existing network capability, load-related reinforcement of the network may be necessary to provide additional capacity. Sometimes, we also divert parts of our network to make way for other national and local infrastructure developments - for example road, rail and housing developments. The costs are met by the relevant developers.

We engage regularly with customers who are connecting to our network on a one-to-one basis to allow us to explore their needs and wants in detail.

Getting your voice heard

Objectives

Our engagement on this topic was designed to gain insight on the following:

- **Objective 1** - understand stakeholders' views on the current connection service
- **Objective 2** - understand how this might change in the future.

Stakeholder landscape

Consumer interest group Total engaged: 9 No of org: 2	**Consultant/ supply chain** Total engaged: 54 No of org: 32	**Customer (entry)** Total engaged: 38 No of org: 14	**Customer (exit)** Total engaged: 21 No of org: 9
Customer (shipper) Total engaged: 48 No of org: 25	**Energy network operator** Total engaged: 16 No of org: 10	**Env interest group** Total engaged: 3 No of org: 3	**Gas distribution network** Total engaged: 37 No of org: 4
Industry/ trade body Total engaged: 33 No of org: 15	**Other energy industry** Total engaged: 10 No of org: 8	**Other Non-energy industry** Total engaged: 11 No of org: 8	**Regulator/ Government** Total engaged: 26 No of org: 12
University/ think tank Total engaged: 20 No of org: 11	**Major energy user** Total engaged: 19 No of organisations: 14	**Domestic consumers** Total engaged: 1330	**Non-domestic consumers** Total engaged: 163

How we've engaged

What	Who	Location	Summary

Shaping the future events	Gas distribution networks Energy network companies Regulators Academics/think tanks Industry trade bodies Supply chain Customer (shipper) Customer (entry) Customer (exit) Interest groups Other non-energy	London, Edinburgh, Warwick	Broad engagement events designed to understand stakeholders' priorities for energy now and in the future.
Future needs of the network workshops at our terminals	Customer (entry) Other energy industry Government (Local Authorities)	Bacton St Fergus	The regional and terminal events were one day events which have been central to our RIIO-2 engagement approach. The events included a series of overview presentations followed up with facilitated discussions and voting to capture stakeholders' views.
Future needs of the network workshops - regional engagement	Gas distribution networks Energy network companies Regulators Academics/think tanks Industry trade bodies, Supply chain Customer (shipper) Customer (entry) Customer (exit) Interest groups Other non-energy	Workshop within different GDN boundaries Chester & London (Hull was cancelled due to lack of take up)	
CLoCC engagement	Customer (entry), Customer (exit)	Numerous workshops and webinars	Stakeholders have helped shape this project, sharing their frustrations, needs and wants for the future.
Connections journey engagement	Customer (entry), Customer (exit)	Online and Warwick	A number of workshops and interviews to understand the pain points around the connections journey.
Acceptability testing	Consumers – domestic and non-domestic	Nationally representative	A survey to understand the level of acceptability of our business plans.
Value of the network study – by Ernst and Young	Interest Groups	Nationwide	A study on the value of the gas National Transmission System (NTS): the role of the network, including the potential for increased gas and electricity costs for end users if the NTS capability were not maintained.

Findings

Objective 1 **Understand stakeholders' views on the current connection service**

Question	Response
What have we done well over the past five years and why? **What could we improve?**	You have taken steps to increase customer engagement and have improved connections process but could do more (CLoCC is good) in terms of explaining the connection and capacity process (I'd give it a five out of 10). There are over 10 documents, 1000 pages + to read – [redacted], customer (shipper) Good change that there are lots more connections to distribution parts. Not sure framework now accommodates the change that's coming – [redacted], gas distribution network.
What would you like us to be measured against?	• What is the availability of the transmission system? How efficient is it? How many new entrants are there? – [redacted] exit customer The end customer will want to connect even when not currently the means for them to do so. National Grid should make gas more accessible – [redacted], supply chain • Transparency should be the umbrella over this priority – xxxxx customer (shipper) Bit more than providing fast quick connections as people in the fuel industry see it as a barrier as the gas industry is not familiar – more tailored service for unconventional new entrants - [redacted], energy network owner.
Insight gained through project CLoCC that will shape our connections strategy going forward	• NTS connections take too long and are too expensive • We'd like more predictable costs • We would like to be offered more services than just a Minimum Offtake Connection • Why do I need an ROV (remotely operated valve) on my connection? • Why is the application fee so large? • More payment flexibility would be very useful • We'd like to have more information on our connection progress • We need capacity and connection application processes better aligned • The oxygen specification for connections to the NTS is prohibitive for biomethane entry projects.
Insight gained through Connections customer journey work that will shape our connections strategy going forward	• Your website is hard to navigate and difficult for us to find the right information we need • We find it difficult to know who we need to contact • You often expect us to fill in multi-page forms with little guidance or support • You don't provide enough information on costs prior to an application • You don't proactively alert customers about upcoming deadlines • We want you to be more open and transparent about the process • You don't provide transparent cost breakdowns • Your process feels unnecessarily formal and rigid.
Should we be financially incentivised to continually improve the experience we provide our broad spectrum of customers?	• Yes: 67% • Unsure: 8% • No: 0% • No response: 25% • Total: 12
Do you agree with our RIIO-2 initial position?	• Yes: 75% • Unsure: 8% • No: 0% • No response: 17% • Total: 12

What we've heard

Customers	Stakeholders	Consumers
• Customers recognise the improvements we've made to the connections process but also state there is more to do • There is concern that the current system is not set up to cope with a decarbonised energy future and the increase in green gases.	• Stakeholders believe it is our role to make the gas networks more accessible to new types of gas.	• NA - Consumers were not engaged on this topic.

Trade-offs

- Customers would like greater visibility of capacity for new connections across the gas transmission system to allow an easier assessment of potential connection locations. We are proposing to rollout the CLoCC portal to capture all new connections.
- There is consensus that we need to do more to understand and prepare for new green gases in the gas transmission system. We are conducting research to understand the impact of hydrogen on the gas transmission system. We are also collaborating with other networks to develop a hydrogen strategy.

Objective 2 **Understand changes in the future**

Question	Response
What other services could we offer?	• A service that could be improved would be the connection process for gas transport ie buses and heavy goods vehicles (HGVs). There should be a tailored service for new entrants – 'Future Needs of the Network' event Biomethane – do what we can to support new connections – this should be a real driver – [redacted], industry body • You need to explore if you can put gas onto the NTS – [redacted],, consultant • Do more to facilitate the emergence of new products and services for new kinds of gas users, eg small-scale reciprocating engines, CNG vehicles – [redacted] consultant • I can see the lights from Bacton at my house, but I am off grid. The pipeline is just a few 100 meters away - [redacted], Government • There is a need for self-laying pipe under 7 bar (industry-wide) - [redacted], customer (entry)
What do consumers think about our proposals?	**Acceptability testing** Level of acceptability for 'new pipelines and equipment for new connections to the transmission system: • Agree with proposed investment and impact on bill is acceptable: 75% • Agree with proposed investment, but impact on bill is not acceptable: 16% • Do not agree with proposed investment: 2% • Don't know: 6%

What we've heard

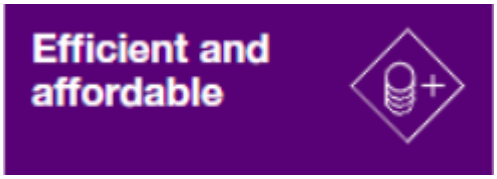
Customers	Stakeholders	Consumers
• Customers would like the gas network to be more flexible in new connections.	• Connecting smaller, unconventional parties to the Gas Transmission System will play a key part in decarbonising the energy system • We need to remove as many blockers to this as possible.	• Enable net zero.

Trade-offs

- There is consensus that more, smaller, unconventional parties will be connecting to the Gas Transmission System in the future and that these will play a key part in decarbonising the energy system. We are rolling out the improvements made through project CLoCC.

I want you to be efficient and affordable

Executive summary



We strive to keep our impact on domestic and industrial consumer bills low and we work with our customers to keep energy affordable.

The current RIIO framework gives us a strong incentive to deliver our target outcomes as efficiently as possible, but we can't cut costs at the expense of customer service. We invest in asset health and asset management to ensure our ageing assets are safe and reliable and we have introduced greater competition when we choose suppliers to achieve keener pricing and more innovation in both purchasing and delivery.

You have told us we must help to keep energy affordable for domestic and industrial consumers and this is one of our priorities. We work hard to keep our impact on bills low – the services we provide currently adds about £10 to the average annual domestic energy bill.

Getting your voice heard

Objectives

Our engagement on this topic was designed to gain insight into the following:

- **Objective 1** – understand stakeholders' views in relation to how efficient and affordable the service we provide is
- **Objective 2** – understand how stakeholders want to work with us to deliver an efficient and affordable service
- **Objective 3** – understand if consumers believe we deliver value for money
- **Objective 4** – understand stakeholders' views on how long we should test our business plans for, to demonstrate benefit to consumers.

Stakeholder landscape

Who we've engaged with

Consumer interest group Total engaged: 14 No of org: 2	**Consultant/ supply chain** Total engaged: 79 No of org: 47 Average SH Impact: 3.6	**Customer (entry)** Total engaged: 67 No of org: 27 Average SH Impact: 3.7	**Customer (exit)** Total engaged: 28 No of org: 11 Average SH Impact: 4
Customer (shipper) Total engaged: 70 No of org: 29 Average SH Impact: 3.7	**Energy network operator** Total engaged: 20 No of org: 12 Average SH Impact: 3.7	**Env interest group** Total engaged: 5 No of org: 5	**Gas distribution network** Total engaged: 47 No of org: 4
Industry/ trade body Total engaged: 46 No of org: 20 Average SH Impact: 3.75	**Other energy industry** Total engaged: 10 No of org: 8 Average SH Impact: 3	**Other Non-energy industry** Total engaged: 11 No of org: 8	**Regulator/ Government** Total engaged: 38 No of org: 16 Average SH Impact: 2.5
University/ think tank Total engaged: 28 No of org: 14 Average SH Impact: 4	**Major energy user** Total engaged: 20 No of organisations: 14	**Domestic consumers** Total engaged: 6702	**Non-domestic consumers** Total engaged: 785

Findings

Objective 1 **Understand stakeholders' views in relation to how efficient and affordable the service we provide is**

Question	Response

EFFICIENT AND AFFORDABLE

Over the past five years what have you valued and why?	• Good stakeholder considerations into business planning – [redacted], gas distribution network • Better at collaboration than ever before, particularly commercial interests – [redacted], customer (shipper).
What's important to you that you'd like us to be measured against?	• Systems should be as efficient as possible given the scenario – [redacted], customer (shipper) • "I want you to be efficient and affordable" - National Grid should do more justifying and explaining its performance, rather than exploring and asking for input for learning – [redacted], customer (shipper) • The energy bill should be affordable. This will minimise energy price volatility through working with flexible providers – [redacted], customer (shipper) • There should be clarity on what customers are paying for and what is driving the changes – [redacted], supply chain • Efficiency and affordability. There is no alternative. National Grid gives a price: customer has to pay – [redacted], exit customer • Reliability and cost, especially at St Fergus. St Fergus is looking more expensive to bring gas on compared to other options – [redacted], customer (shipper).

What we've heard

Customers	Stakeholders	Consumers
• Customers would like to see more transparency of performance and cost.	• Stakeholders would like to see more clarity on what customers are paying for and what drives the changes.	• Consumers feel that keeping the gas bills down is not the main responsibility of National Grid – reliability of gas supply and moving towards low carbon economy takes precedence.

Trade-offs

- Customers and stakeholders want more transparency and predictability on costs and would welcome metrics or greater visibility on this. We are committing to incorporate customer and stakeholder views into our governance processes and this includes transparency of decision making.
- Consumers don't believe it's our role to keep gas bills down whereas customers and stakeholders believe we have significant impacts to their costs and profitability if we don't provide a consistently reliable service. We will continue to deliver the current level of reliability of service and work closely with our customers to plan any interruptions early to minimise impacts.

Objective 2 **Understand how stakeholders want to work with us to deliver an efficient and affordable service**

Question	Response	Poll
Over the past five years what have you valued and why?	• Pleased National Grid has started to move from a command and control 'tell' approach, to allowing the market to correct itself. Stakeholders are savvier than in the past and need to be worked with – [redacted],, customer (shipper) • National Grid enables customers and stakeholders to feed back into its processes to solve issues – [redacted],, supply chain • Need more transparency of costs across sectors and incentives should cover the whole supply chain – [redacted], gas distribution network • GTO could have supply chain days like Jaguar Land Rover to share innovation and improvement opportunities – [redacted], supply chain Could innovation be better if needs of GTO are clearly articulated to supply chain? – [redacted], think tank.	
What would you like National Grid to improve?	• Impact of interruption to service is significantly reduced if advance notice is given. This could lead to large avoided costs. Insight given from producers, terminals and major energy users • If we had sufficient notice we could manage this as we have time down even if it was every day. The key is to have the notice to manage the situation – [redacted], entry customer • How much notice depends on the length of interruption – [redacted], major energy user • Discuss any potential outages due to scheduled maintenance or similar planned events to allow for our input into the timing of disruptions to minimise impacts – [redacted], major energy user • A service that could be improved. Should be more collaboration with regard to network design and the future of energy – [redacted], exit customer • You could invest in supply chains to ensure sustainability – [redacted], think tank • You could have a closer tie with suppliers for business opportunities long-term – Future Needs of the Network event • There should be an open way of supply chain communication, so that the supply chain are aware of future plans – [redacted], supply chain • Joined-up thinking across the gas networks and supply chain is key – [redacted] regulator.	62% would accept a longer interruption with notice
What role can consumers have in our plans?	**Service valuation tool** • 'Very interesting survey and well done to National Grid for taking the time to ask consumers what they think. Thank you.' • 'If a one-off payment from customers who could afford it, could make so much difference then it should be made. Great survey experience. The most innovative survey I have done in years' **Acceptability testing** How easy or difficult was it to answer the questions in this survey:	

Question	Response	Poll
	• Very difficult: 0% • Don't know: 0% Did you think this survey was (select all that apply) • Interesting: 75% • Too long: 9% • Difficult to understand: 3% • Educational: 31% • Unreaslitic/not credible: 1% • Other: 1% None of these: 1% • Very easy: 57% • Fairly easy: 35% • Neither easy nor difficult: 6& • Fairly difficult: 0%	

What we've heard

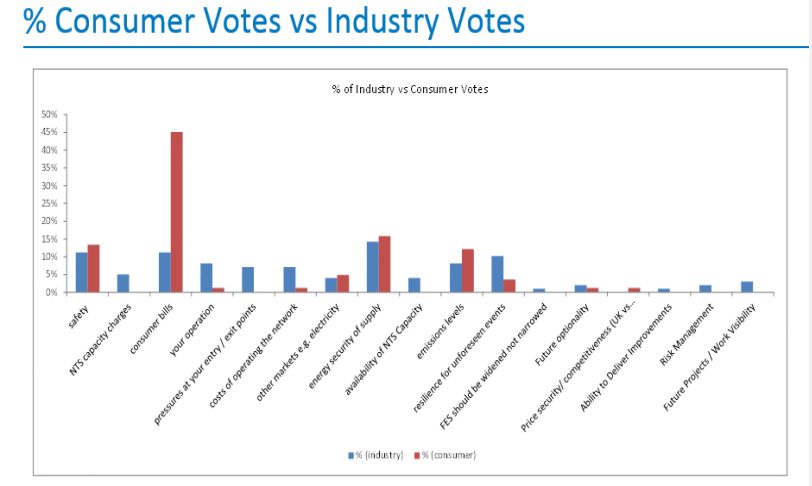
Customers	Stakeholders	Consumers
• Customers recognise improvements in our approach to working with customers • Customers would like greater visibility of when there will be disruption to the supply of gas as this significantly minimises any negative impact.	• Stakeholders recognise improvements in our approach to working with stakeholders • Stakeholders would welcome greater visibility of our strategy and plans to allow: ○ The supply chain to efficiently cater for needs ○ Greater innovation and collaboration.	• Consumers appreciate being engaged and found taking part in the various research studies as 'interesting' or 'educational'.

Trade-offs

- Stakeholders would welcome greater visibility of our strategy and plans to allow:
  - The supply chain to efficiently cater for needs
  - Greater innovation across the supply chain.
- Customers would like to work more transparently with us to develop outage plans. We will continue to work collaboratively with customers to develop a longer-term outage plan. This will deliver additional benefits for us and wider stakeholders.

Objective 3 Understand if consumers believe we deliver value for money

Question	Response	Poll
What would you like National Grid to improve?	• Why not show National Grid element of the bill so people can see where we fit in? - [redacted] customer (shipper) • What is the impact of UAG (Unaccounted for gas) on my bill? – [redacted], interest group • The fuel poverty story is not being told – [redacted], supply chain • All the consumer cares about is the impact on their bill and security of supply – [redacted] consultant	

Question	Response	Poll
	• National Grid should better differentiate themselves from others to demonstrate the reasonably small costs to the consumer gas bill. They should also inform how they foresee minimum 'real term' increases in the consumer bill from RIIO-2. There was a surprise about the National Grid cost contribution, compared to utility companies. – [redacted] supply chain .	
How should we articulate the impact of the investments we make?		45% of consumers wanted to see impacts articulated via change in consumer bills
Do consumers think keeping gas bills down for everyone is something that National Grid should be focusing on?	• There is a general confusion amongst consumers about the role that National Grid has in the process of gas, from extraction to delivery. Most of the time National Grid's role is confused with suppliers and providers. • Majority of consumers believe that the responsibility of affordability falls on the suppliers or in some cases Ofgem - *"…suppliers and providers should be able to associate costs"* • Consumers believe that it is important that National Grid should help contribute to lower bills. However, our influence is limited - *"It's such a small percentage on our bill I'm not quite sure of the effect that National Grid's reducing costs would have on our bill because its only 1.6% anyway. So, if they halved it, it's not really going to make much of a difference, or much notice to us"* • National Grid's contribution to affordable energy bills should not come from cost-savings that result in the deterioration of network's reliability - *"They should be trying to get the best value for money"* • When mentioned, consumers are surprised by the percentage charged (being lower than expected), and some responses being that the price they pay for the service is fair - *"I think it's fair for what they're offering"*	Keeping bills down was rated 3rd out of 4 areas

Question	Response	Poll
Do consumers believe we deliver value for money?	**Listening** When mentioned, consumers are surprised by the percentage charged (being lower than expected), and some responses being that the price they pay for the service is fair. – *"I couldn't believe to be honest, how low your percentage was. If somebody had asked me, I'd have said that actually it would have been a lot higher - 20% - but actually it's very low in comparison to what you do really."* **Service valuation tool** To what extent do you agree or disagree that you currently receive value for money from National Grid? • Strongly agree: 20% • Agree: 44% • Neither agree nor disagree: 24% • Disagree: 5% • Strongly disagree: 4% • I don't know: 4% **Acceptability testing** There is a high level of acceptability for the National Grid business plan - over 80% of business consumers and almost 90% of household consumers stated that the overall plan and bill impact (+£0.54 per year by 2026 for household consumers) was 'acceptable': • For household consumers, the acceptability of the business plan was largely driven by perceived affordability of the transmission bill. For business consumers (+1.75% on current bill by 2026), the need to maintain current high levels of reliability was also an important factor alongside the affordability of National Grid's proposals. The high levels of acceptability are, though, subject to limited changes in overall energy bills: • The 'limit' within which the business plan proposals were acceptable, was around a 2% change in overall energy bill. For a dual fuel household consumer with an average bill (approx. £1,100 per year), this is approx. +£23 on the annual current bill • The 'switching-point' from "acceptable" to "unacceptable" for the transmission component of the bill for household consumers was about +£11 on top of the current amount paid • For business consumers the equivalent 'limit' and 'threshold' were +7% and +2% on top of the respective bill amounts. The business plan proposal is therefore well within both constraints for household consumers: for business consumers there is less headroom with respect to the switching point threshold (ie +1.75% vs 2% constraint).	

We asked participants, as part of the Willingness to Pay study, to rank topics in order of priority to them

Non-Domestic	Domestic
1. Fighting climate change **2. Minimising gas bill** 3. Supporting innovation 4. Minimising disruption to gas supply 5. Protecting the local environment 6. Supporting local communities	1. Protecting the local environment 2. Fighting climate change 3. Supporting innovation 4. Supporting local communities 5. Minimising disruption to gas supply **6. Minimising gas bill**

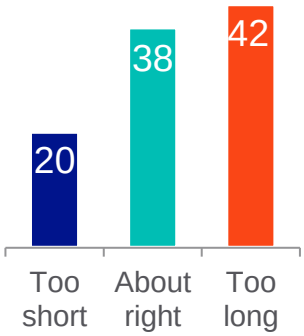
What we've heard

Customers	Stakeholders	Consumers
• Customers believe that National Grid have a role to play in articulating their impact on consumer bills.	• Stakeholders believe that National Grid should differentiate themselves by informing more consumers of the impact that gas transmission adds to energy bills • There is a lot of uncertainty, confusion and distrust around energy bills. Consumers aren't engaged about who they're paying, for what.	• Once roles and responsibilities are explained, consumers believe we deliver value for money • Disparity between domestic and non-domestic consumers on whether minimising energy bills should be what National Grid should focus on. Domestic consumers believe we should focus more on delivering a reliable service, and that minimising the gas bill is the responsibility of shippers/suppliers.

Trade-offs

- There is consensus that we have a role in educating consumers about the wider energy system and helping them be engaged in the discussions. We will continue to engage with consumers over the RIIO-2 period and beyond.
- Non-domestic consumers believe we have a role to play in reducing gas bills and rate it as a high priority for us, whereas domestic consumers believe it's the responsibility of others. We are committing to keep our impact on the consumer bill at, or lower than £10 per year. We will drive efficiencies and continue to benchmark ourselves against our peers to make sure we are as efficient as possible.

Objective 4 **Understand stakeholders' views on how long we should test our business plans for, to demonstrate benefit to consumers**

Question	Response	Poll
Over what time period should we test our investment plans to demonstrate benefit to consumers?	• Increments of time the same length of the RIIO period would be ideal – [redacted], entry customer • None of the options consider wider costs, only costs to National Grid – [redacted], entry customer • Period of time for customer welfare based on however long you think that benefit will last. Justify accordingly – look at benefit to society. Discount the rate over 25 years so that the benefit reduces through the years • Do as long as you want – [redacted], exit customer • I think the period of time should be shorter to around 10 -15 years as there are so many uncertainties. – [redacted], gas distribution network • Maybe longer than 25 years because the current network is 40 years, but hydrogen/electrification will be game changers – [redacted], regulator • I'm not sure of the future plan of [redacted] that far ahead – [redacted], entry customer.	

What we've heard

Customers	Stakeholders	Consumers
• Customers generally believe a shorter period of time is appropriate due to the uncertainty in energy.	• Stakeholders believe a longer period of time should be used as hydrogen and other low carbon technology could be game changers.	• Consumers believe current consumers should pay for demolition and new assets rather than put them off to future consumers.

Trade-offs

- There is a real mix of views on the right length of time to assess our plans against, due to the uncertainties around the future decarbonisation of the energy system.
- There is an emerging feeling that shorter timescales would be preferred. We are proposing a move to a 25-year payback period.

Next steps

Our engagement doesn't end here. We are committed to continually evolve and shape our plans with stakeholders to ensure they continue to reflect your views.

We will

- Continually engage on network capability, ensuring we use the new framework to link customer requirements to the levels of network capability you need
- Compile lessons learned from our engagement to ensure learning gets incorporated into future engagement
- Implement our enhanced engagement approach into BAU to ensure stakeholder views continue to be at the heart of decision making
- Continue our consumer engagement programme to develop deeper understanding about consumer views on specific topics.

Appendices

BAU Stakeholder engagement

- Future Energy Scenarios (FES)
- Future of Gas programme (FOG)
- Gas Future Operability Planning (GFOP)
- Energy Networks Association (ENA) Gas future group
- National Grid heat programme
- Innovation programme
- Online collaboration tool
- External commentary

RIIO stakeholder engagement

- Shaping the future events and playback webinars
- Needs of the network events and playback webinars
- Environment events
- Bilaterals
- Gemini workshop and playback webinar
- Trade body meetings
- Energy Networks survey
- Energy Networks Conference
- Industry Roundtable – Whole system
- Future of gas Networks – alternative futures?
- Approach to estimating long-term benefits of the NTS study
- Gas Operations listening session (Info provision)

Consumer engagement

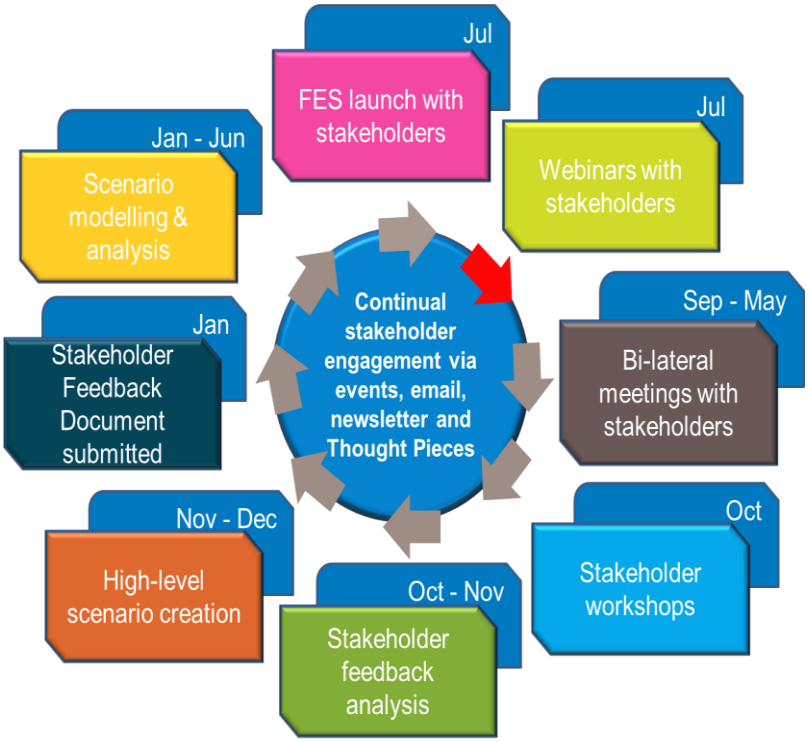
- Major energy users survey
- Consumer and MP survey
- Consumer listening
- Willingness to pay
- Consumer narrative development
- Interactive slider tool
- Acceptability testing

Case studies

- Asset Health Engagement
- Bacton Engagement

Future Energy Scenarios (FES)

Our Future Energy Scenarios (FES) represent transparent, holistic paths through the uncertain energy landscape to help our stakeholders make informed decisions. These scenarios are not forecasts, instead they show a range of plausible and credible pathways for the future of energy, from today out to 2050. As well as detailed analysis, the annual development of the Future Energy Scenarios includes extensive cross-sector stakeholder consultation. The engagement involves over 650 stakeholders, 430 organisations, webinars on a range of subjects, workshops across four locations as well as thought pieces and newsletters to a mailing list of 7,400. As well as the application of the scenarios themselves, the feedback gathered as part of the FES engagement is an essential element of stakeholder insight that will continue to inform our RIIO 2 business plan.



The FES process also involves technology scanning; continually looking to identify new technology and changes which could help decarbonise the energy sector. We use 'spotlights' in the FES publication to highlight these changes and get further industry insight on these views. These spotlights are cross-sector and we get good feedback and good challenge to these ideas.

In addition to our use of FES, Ofgem's Challenge Group have recently requested that all network companies agree the use of a single scenario to develop their business plans.

The scenario will help Ofgem and other stakeholders to understand different network company views and allow us to determine areas of uncertainty in our plan. RIIO 1 mechanisms have already covered many key uncertainty areas so will use this work to confirm if these are still applicable and check whether further mechanisms would be in the interests of customers and consumers.

We are working with the other networks to agree which assumptions in the FES process will materially impact on our RIIO 2 business plans and to identify how we will deal with uncertainty in a common way. We have presented to the Challenge Group alongside the other network companies the work undertaken to date.

There were a number of points discussed at the meeting, including how all networks are working together to achieve the best outcomes for consumers – i.e. network companies facilitating whole energy system thinking and not just generating solutions within traditional silos. There was also discussion on differing views between companies and different regional considerations that need to be accounted for.

The Chair of the Challenge Group subsequently written to all network companies setting out the following timeline:

- Before the end of December, providing the key drivers that most materially impact the plans in RIIO-2 and subsequent price control time-frames, together with supporting evidence, interdependencies, and numerical ranges behind the assumptions (e.g. for EVs, 'medium' may equal 4-6%); also provide details of where there are differing views

- By end January 2019, provide an updated range of scenarios and assumptions that are being developed to obtain a consistent view of the future
- During February 2019, meeting to discuss further how these scenarios and assumptions will feed into a proposed common view for business plans
- By March 2019, provide a common view of the future with a set of scenarios and assumptions, together with an independent commentary by the SO on how these fit with latest FES analysis.

Future of Gas (FOG)

Future of Gas was an engagement programme that ran from November 2016 to March 2017, designed to develop insights on the future role of gas from a transmission system perspective. It looked to pull together a wealth of information including analysis by the GB gas distribution networks; FES, scenarios and reports produced by the energy industry and academics, combined with our system operator expertise and input from our customers and stakeholders. The programme looked to facilitate debate and to provide a view of how gas can support a low-carbon future.
The programme consisted of seven key events:

Event	Date	Number of Stakeholders	Stakeholder Segments
Gas Seminar: The Future of Gas	November 2016	48	Interest groups, consumer interest groups, innovators and academics, gas distribution networks, energy network owners, regulators, government, customers (shippers)
Stakeholder Workshop: Gas/ Electricity Interaction	February 2017	22	Interest groups, consumer bodies, innovators and academics, network companies, regulators, government, customers (shippers)
Stakeholder Workshop: Heat	March 2017	28	Interest groups, consumer interest groups, innovators and academics, gas distribution networks, energy network owners, regulators, government, customers (shippers)
Stakeholder Workshop: Supply	March 2017	17	Interest groups, consumer bodies, innovators and academics, regulators, government, customers (shippers)
Stakeholder Workshop: Industrial Demand	March 2017	17	Interest groups, consumer bodies, innovators and academics, gas distribution networks, energy network owners, regulators, government, customers (shippers)
Stakeholder Feedback Workshop	September 2017	18	Interest groups, innovators and academics, gas distribution networks, energy network owners, customers (shippers)
Future of Gas: How gas can support a low carbon future	March 2018	89	Interest groups, consumer bodies, innovators and academics, gas distribution networks, energy network owners, regulators, government, customers (shippers)

The stakeholder workshops were centred around the four key themes: gas/electricity interaction, heat, supply and industrial demand. We asked a number of questions pertinent to each:
Gas/electricity interaction

- What does successful interaction between gas/electricity by 2030 look like?
- What are the barriers that are preventing success?
- What do you believe is the cause of these problems?
- What impact will this have on your business?

Heat

- To what extent is the future of heat likely to involve regional rather that national solutions?
- What public policy is need and by when?
- How do we encourage and bring forward innovation?
- How do we balance consumer disruption with meeting the challenges of the trilemma?

Supply

- How will the GB Gas Market interact with the European and Global gas markets in the future?
- What are the likely triggers for accelerated growth in unconventional and new indigenous gas sources (biogas, shale)? Will growth be national or localised and what drivers may influence this?
- What role will storage play in GB's energy future as we progress towards 2050?

Industrial Demand

- What impact will current and future emissions legislation have on the way you sue gas?
- With regards to your gas supply what would you change and what would you want to protect?

The stakeholder workshops were very well attended by representatives from numerous stakeholder segments.

Gas/Electricity Interaction	Heat	Supply	Industrial Demand
• London Energy Consulting • MAJOR ENERGY USERS COUNCIL (MEUC) • New Power • Energy Networks Association • Pöyry Management Consulting • Centrica • EDF Energy • Statoil.com • Chemical Industries Association • BEIS • DNV GL • E3G • Lagoni engineering • Inflection Point Energy Consulting • Citizens Advice • Energy UK • OFGEM • Imperial College • ESB	• BEIS • CCS Association • Centrica • Chemical Industries Association • Citizens Advice • E.ON • E4tech • EDF Energy • ENA • Energy Networks Association • Energy UK • Eon UK • HSE's Health and Safety Laboratory • Imperial College • Inflection Point Energy Consulting • KPMG • National Infrastructure Commission • New Power • Npower • Ofgem • SGN	• ICIS • London Energy Consulting • Energy Networks Association • Centrica • Statoil.com • BEIS • Imperial College • Centrica E&P - UK Shale Gas • Gazprom • Anaerobic Digestion and Bioresources Association	• Major Energy Users Council (MEUC) • British Ceramic Confederation • Centrica • EDF Energy • E.ON • ESB • National Grid Distribution

The key themes that emerged from the programme were the decarbonisation of heat, transport and industry, whole energy system and future networks and markets. Stakeholders also told us that Carbon Capture Usage and Storage (CCUS) is critical to the decarbonisation and the ongoing use of gas. For each theme we set out the scale of the challenge, the potential solutions, what National Grid will do and made public policy recommendations. We also included potential timelines for policy decisions and actions. A more detailed description of the insight is presented below:

1. National policy – uncertainty around direction and timing of future decarbonisation and energy policy for the UK. A timeline for decision may provide clarity to enable investment. In the absence of national policy, indications are that a patchwork of regional approaches may emerge.
2. Innovation and technology- to reliably and affordably meeting the UK's future energy needs and deliver the 2050 climate targets, innovation is required in the gas industry. A more coordinated and expanded approach may be helpful. Technology can benefit consumers and willingness to pay considerations are key to keeping long term projects on track. Resolving the UK's approach to carbon capture and storage is a priority.
3. Consumer experience - Consumer buy in is key. This means end consumers need to be part of the energy debate, not told the answer. Gas industry could do more to explain to consumers the role of gas. Policy makers and industry players should consider the impact of disruption to end consumers as well as affordability and the impact on consumer bills.
4. Integration of energy systems- Current market design may not provide the right signals for long term solutions. Running gas and electricity markets in isolation may lead to inefficient solutions or cause insufficient investment. It would be beneficial to understand cross market interactions and the impact of a patchwork of regional diversity. It may be appropriate to consider new approaches such as removing barriers to integration, sharing modelling or planning processes and introducing greater consistency and alignment of policies.
5. Affordability and economics -Greater regional diversity will open the debate about targeted costs versus socialising costs nationally. Industrial users are concerned about being the 'last on the pipe' bearing the full

cost of the network but no alternative to gas. Global economics play a role in attracting gas supplies. Changing regimes in the future should encourage security of supply.

6. Optionality for the future- Uncertainty around the future decarbonised energy landscape means options for future use should be kept open as far as possible and economical to do so. A timeline of policies and framework revisions would be helpful in providing greater investment confidence. An approach to identify and incentivise no regrets investment should be taken in the meantime. Projects should be identified which reduce barriers to market and support emerging technology.

This engagement has been one of the key building blocks of our whole energy systems approach. Stakeholders indicated the role of gas is likely to be a critical one for some time to come and that there is an opportunity for National Grid Gas Transmission to drive a greener future by facilitating the use of greener gases such as hydrogen and biogases along with natural gas. Following the conclusions reported in The Future of Gas programme, we have continued our engagement with stakeholders to build on our policy recommendations. We have participated in the CCUS Task Force to promote the role CCUS can play to meet a practical decarbonisation pathway at lowest cost, and in the Ministerial CCUS Council, a small group of influential leaders advising government on shaping its emerging approach to CCUS.

We have also progressed one of the actions committed to in the FOG conclusions document, to work with industry, BEIS and Ofgem to develop a long-term gas market change plan (Gas Industry Change Plan) to ensure we are developing the markets appropriately. This collaborative plan will capture the agreed gas market challenges of the next two to ten years, their level of impact, work package triggers, focus areas, interdependencies and timings. It will be informed by industry participants and potential new entrants in transmission and distribution activities. Over the summer, we heard a unanimous view from stakeholders that a forum to discuss and agree such a plan would advance the energy transition, with strong support for National Grid Gas Transmission developing the plan and for engagement with the Gas Industry Change Plan framework to be open to a broad group of current and future industry participants. While we will initiate the first version of the GICP, based on insights from stakeholders during the FOG programme, on-going liaison with industry, and interactions with customers, we will be just one voice at the table. An early version of the GICP engagement log was circulated to the stakeholder group in July 2018 and we expect to publish a first, high-level version of the GICP in early 2019.

Gas Future Operability Planning (GFOP)

The Gas Future Operability Planning (GFOP) document is published by National Grid in our capacity as Great Britain's System Operator and through which we aim to

- Assess a range of views of the future through the lens of National Grid's Future Energy Scenarios
- Act as a vehicle for all market participants to discuss and quantify their future gas transmission network needs
- Describe the operability challenges we could see in the future
- Set a clear direction for the development of commercial options (rules), operational arrangements (tools) and physical investments (assets) to ensure we continue to deliver.

The GFOP allows stakeholders to challenge our assumptions about future uncertainties, share what they want from the gas transmission network and collaborate with us to better understand the operational risk posed to the wider energy system and develop new and innovative solutions. The regular interaction with our stakeholders enables us to identify solutions that balance all stakeholder priorities. The GFOP is published every quarter and each publication has four phases of engagement which includes bespoke meetings, webinars and workshops as well as a release of an Operability Insight piece on our website.

Each publication is directed at a different stakeholder group therefore the mode of engagement differs. Our February 2018 publication had one stakeholder group meeting and one webinar with 89 participants; while June publication generated five different stakeholder group meetings. Overall there is a mailing list of 2,400 who receive our publications and operability insight pieces and there were almost 800 publication downloads in June 2018. Traffic to our webpage for information has seen an increase of 600% this year.

Energy Networks Association (ENA) Gas Futures Group

National Grid Gas Transmission participate in a number of ENA groups, and the Gas Futures Group (GFG) is one particularly relevant forum for collaborative engagement with the other gas network companies on the topic of 'Whole Energy Systems'. The GFG have been focusing on developing their long-term gas strategy and a proposal has been developed entitled the ENA Gas Decarbonisation Pathways Project which looks to develop a strong coordinated voice on the future energy pathways and viability of gas. The project has three parts:

1. **Assessing the pathways:** An externally led project to consider the deliverability of the various pathways and the value associated with their delivery.
2. **Developing future work plan:** Develop a clear vision of the coordinated activity required to deliver the pathways; identifying barriers and changes required, assessing impact.
3. **Industry engagement:** Involving as many groups in this project as possible, the project will act as a hub to engage with on the pathways and set up advisory groups to focus on future activities.

The initial engagement is just ran until December 2018, primarily targeting BEIS and Ofgem. The project then began a process of wider stakeholder engagement from February to March 2019, with joint workshops with national stakeholders to discuss RIIO 2 related issues. There was a launch event in Spring 2019, presenting initial vision and project plan, with the aim of developing more stakeholder interactions, encouraging feedback and participation and generating media interest. There was then a process of identifying priorities and work streams with the project report issued in October 2019. The project presented a joint vision for decarbonised gas across the gas network companies and a coordinated plan to deliver.

National Grid heat programme

National Grid have recently started to identify opportunities and develop stakeholder interactions with the aim of influencing policies on decarbonisation of heat. We believe industry and government must work together to decarbonise heat in a way which works best for consumers, meeting carbon targets whilst minimising cost and disruption.

Currently, 80% of the UK's 26 million homes use gas for heat. The optimal pathway for decarbonising heat is unclear. There is no single solution, a combination, including both electricity and gas, will be the most cost effective and best meet the needs of consumers in different areas. A whole energy systems approach is therefore pivotal, with optimisation required, not just between fuel for heat but also across transport and other industry needs. Options that need to be considered include decarbonised gas, hydrogen, carbon capture and storage, heat pumps, heat networks and energy efficiency however the exact combination, or optimal pathway, remains uncertain, and optimal solutions will vary by location and housing stock.

We will be seeking stakeholder support for immediate investment in innovation, commercialisation and trials at scale to inform policy decisions in the early 2020s. Our plan currently includes engagement with Ofgem, the Department for Business, Energy and Industrial Strategy (BEIS), consumer groups, National Infrastructure Commission (NIC), Committee on Climate Change (CCC), think tanks and other industry stakeholders in 2019 both directly and through industry associations and partnerships. We are also developing a consumer engagement programme. Current activity already underway within our Heat Campaign includes input into the 'Energy UK: Future of Energy Series' of which decarbonisation of heat is a particular area of focus.

Innovation Programme

We have collected insight from a range of stakeholders through our existing Network Innovation Allowance (NIA) and Network Innovation Competition (NIC) programmes:

Project Title	Collaborative Partners	Supplier	Total Sanctioned Spend (£)
Spatial district heating analysis and impact on gas and power demand	Cadent Gas Limited National Grid Electricity Transmission	Buro Happold	136,000

Energy Map	Cadent Gas Limited Northern Gas Networks SGN Wales and West Utilities	Energy Networks Association KPMG	193,314
Hydrogen in the NTS – foundation research and project roadmap	N/A	Health Safety Laboratory (HSL)	228,809
Integrated electricity and gas transmission network operating model	National Grid Electricity Transmission	Manchester University Photon Science Institute	200,000
Feasibility study into 2% hydrogen blending at St Fergus and H2 pipeline and hub at Aberdeen	SGN and National Grid Gas Transmission	Pale Blue Dot Energy and subcontract partner ERM.	143,000
			758,123

We have actively participated in a range of projects looking into the transport of hydrogen in the gas network. As part of the 2016 NIC, we also entered a project proposal to look at hydrogen blending on the NTS – Haven Energy Bridge – in partnership with the Milford Haven Port Authority and Costain. The project looked to demonstrate the injection of hydrogen into the National Transmission System (NTS). With hydrogen generated through the conversion of electrical energy via electrolysis the project was intended as an enabler to deliver a 'greener' energy solution via existing network infrastructure. The project was not taken forward to the next stage of the competition due to a number of limitations associated with the technology readiness. However, the key learning about focus areas and issues for transporting hydrogen on the NTS has been used as the basis for the recent 'Feasibility of a Hydrogen Ready NTS' NIA project.

We participated in the early development of NGN's H21 project. H21 is now at a stage where it has a predominantly gas distribution network focus but we will continue to maintain an interest in the project as it progresses. National Grid Gas Transmission also sit on the Hydeploy Advisory Board. Hydeploy is a NIC project led by Cadent and Northern Gas Networks to run a live trial of blended hydrogen and natural gas on part of the private gas network at Keele University campus. These projects all involve engagement with a range of stakeholder segments such as customer – connected, network companies and suppliers. Our interaction with other network companies is particularly important for this topic, participating in a knowledge sharing capacity is more effective than formal financial collaboration. Whilst National Grid Gas Transmission haven't led on large scale hydrogen projects such as H21, or Cadent's Hydeploy and Hynet, through the ENA and other bilateral engagement we work collaboratively with all the gas distribution networks and continue to share learning as solutions for transporting hydrogen in the existing network infrastructure develop. Our work on Hydrogen is now being driven through one central hub – the Hydrogen hub- which is a cross department group providing the focus for our hydrogen related activities.

More generally, we issue an annual call for ideas via the National Grid website and the Energy Networks Association (ENA) for bids into the Network Innovation Competition (NIC), receiving 24 bids from third parties last year.

We are a key player in the ENA gas transmission and distribution innovation – the Gas Innovation Governance Group (GIGG) – which ensures we continually share learning and ideas with the other gas networks on a range of technical and governance issues. Our work with GIGG resulted in a joint Gas Innovation Strategy published earlier this year. 'Future of Gas' is one of the key themes, incorporating a number of the whole energy system aspects. The annual Low Carbon Networks and Innovation (LCNI) conference is an innovation focussed conference attended by all networks, gas, electricity, transmission and distribution. Typically attracting up to 1000 attendees we use this event, not only to get feedback from stakeholders on projects we are undertaking but also as an opportunity to gather new ideas from potential suppliers and other networks and third parties.

Looking to the future we are looking to develop a number of other innovation projects within the RIIO 1 timeframe, specifically considering several looking at hydrogen.

Online collaboration tool

Another challenge was being satisfied that we are discussing and collaborating to establish the correct requirements with the right individuals in the industry. The implementation of the collaboration site has ensured that we have reached out to industry individuals that we would not have engaged with otherwise – these are analysts and traders that are based in generally shipper and trading organisations that utilise our data for decision making on a daily basis. This method for engagement has also enabled us to establish a fairer playing field for smaller and new entrants that cannot attend face to face meetings but can influence the rate and scope of change.

Here are the outputs we've received so far:

Organisation	Topic	Comment
[redacted]	Day in brief Alerting system	(1) Demand data provide insight into how grid coped with these days and helps us to better predict how it will manage future events thereby managing our storage assets more effectively (2) Without the data it is hard to predict how future events will play out. (3) Up to date we have been using our own modelling with our own data instead. (4) Our desired granularity for day in brief is just comments with graphs if necessary to highlight points. (5) Frequency only necessary if there is a particular interesting day. REMIT or other market alerts have a big impact on trading, so it is vital to have this information as events occur. If the industry does not have the data the market reaction and the price increases can financially impact customer. Currently we have to monitor multiple websites for REMIT alerts and we use the Bloomberg system.
[redacted]	Day in brief	A day in brief helps determine other impacts from UIG (Unidentified Gas) variability. It impacts end consumer not currently having this information as it is harder to improve models. This increases wholesale costs volatility which has a direct feed to end consumers. Without the data at the moment we make assumptions on whether we should model the impacts or not. We would really though appreciate increasing day/day in brief granularity at an LDZ (Local distribution zone) level. We would want this information as soon as possible.
	Instantaneous demand	This data is key to the supply and demand balance and to understand the linepack swing, therefore necessary for market participants to contribute effectively towards a balanced end of day position. The lack of this information currently can impact end consumer as less efficient market balancing means more volatility and more cost to manage a portfolio. Currently without this data we rely on the daily forecast demand provided by NG. The granularity we would appreciate is at least hourly but ideally 2 minutes categories LDZ, DC, CCGT and split by LDZ all DC all CCGT. Frequency hourly.
[redacted]	Within day trading	Transparency of actions taken by NG would allow the market to receive indication which are not currently available. Knowing that NG are trading would provide guidance to the market that there are concerns. This lack of information currently impacts the end consumer as there are no drivers to react to price triggers if all transactions look like they are with other market counterparties. Without this information we track SMPB and SMPS from other sources. The granularity we would like is at the time of the event and each subsequent event.
[redacted]	Gas Quality	It would be helpful to monitor CV at terminals and multi junctions to provide insight which would help forecast target CV for biomethane sources which could minimise CV capping. Without this information this impacts the end consumer as there is the risk of CV capping for biomethane sites as these sites have

Organisation	Topic	Comment
		intermittent flows but feed into the FWACV calculation. Without this information we can't do the analysis. The level of information required would be a tracking graph with option to download on excel giving historical gas day. We would require this daily.
[redacted]	Regional Linepack	This information could help us stay within the spec required by Grid. When pressure rises or drops it can cause us to go off spec so advance notice of the pressure change means we can start to make changes in advance to prevent this from happening. This affects end consumers by not having this information as a TFA means we have to shut down the oil rigs as there is no export route. Without this information currently, we can only react if it happens. The information required is what is the extent of the pressure change and the duration so we can make plans for the plant. We would like the information as soon as there is a change of pressure at the Bishop Auckland compressor.
[redacted]	Day in brief	This would be a useful overview. It impacts the end consumer currently as there is a lack of the information. Instead at present we get market summary reports from suppliers. We would appreciate this information daily or weekly.
[redacted]	Day in brief	Essential to understand what NG believes the state of the system to be in. Currently we make this assessment based on other data. We would require the data system wide with detail on entry and exit point issues. We would want this information daily.
	Alerting System	Fundamental data to make trading decisions. Lack of data impact end consumer as poor information leads to poor trading decisions. At present we calculate data from other available information. We would want this at entry and exit point level and as soon as Grid becomes aware of it.
	Trading information	Useful to know when actions are being taken to balance the system. Currently we wait for the after the day reports. We would like trade volume and price. We would like this information as close to when it happens.
	Instantaneous demand	Supply provided currently is only half the picture and so demand would complete this. It currently impacts end consumer as it is impossible to know whether a nomination to inject or export is real and thus impacts it will have on the linepack being able to see it in real time would allow a calculation on the validity of nominations. Without this at present we assume the validity of nominations. Same level of granularity as currently provided for supply. Would like it instantaneous.
	Regional Linepack	On time linepack would be useful maybe not regionally. Please just publish at the same time each hour rather than different times within the 10 minute window.
[redacted]	Trading information	Need better visibility of when NGG takes buying/selling actions and exact time of transaction , volume and price. It impacts end consumer by not having data as the signals that NGG are sending to the market are not transparent - we have poor visibility of NGG actions within the day the only way we know if NGG have taken action is if there action sets SMP buy or sell. Without this information we query DIE Balancing summary. We need the information when it happens.

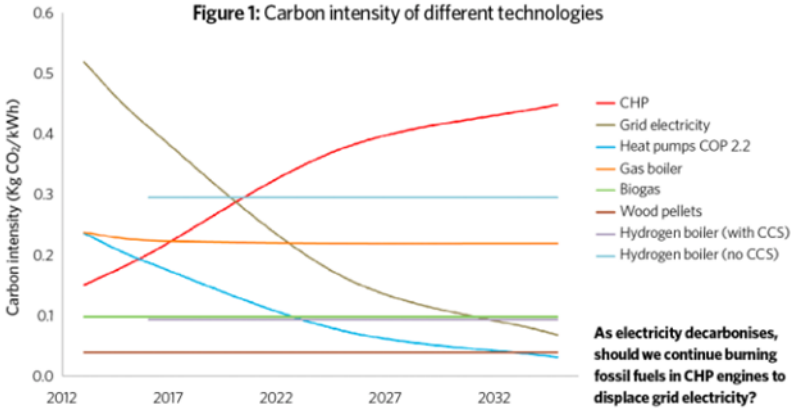
External commentary

To make a balanced evaluation of stakeholder views, presented below is an overview from a number of stakeholders who don't support investment in the gas network, predominantly seeing the ongoing use of a fossil fuel such as natural gas as not being the path to true decarbonisation.

Chartered Institution of Building Services Engineers (CIBSE)

An article from the CIBSE Journal references a quote from CIBSE in 2017 "after the future decarbonisation of electricity – CHP will become the worst option in terms of CO2 reduction". In August, the CIBSE Homes for Future Group held a debate on heating for modern homes, outlining different visions of a gas or electric future, which left the audience divided. CIBSE also reference a TÜV SÜD calculation on the carbon intensity of different technologies. As the carbon factors for grid electricity are expected to reduce, it is no longer sensible to continue burning fossil fuels in CHP engines to displace grid electricity that is dominated by renewables and nuclear power.

Figure 1: Carbon intensity of different technologies



WWF

WWF has recently spoken out against gas generation with a report in May 2018 that planned large scale gas projects aren't needed and renewable generation will surpass coal's contribution to the energy mix by 2022. WWF say that investment in gas generation will result in "expensive, white elephant infrastructure" as renewables become the primary source of power generation. A quote from Gareth Redmond King, WWF Head of Climate and Energy is provided below:

> "The UK government is leading the way and has set an international precedent by sending coal to the dustbin of history. However it is essential the Government does not substitute one dirty power source for another.
>
> "We need to continue to look forward, doubling down on investment in renewables and targeting our efforts on long term energy storage. We should focus next on removing gas from the energy mix altogether."

Green Party

The Green Party have a number of policies in which natural gas would not play a long-term role in the future energy landscape. For example:

> EN011 Continuity of supply will be ensured by using the UK's renewable energy sources and a variety of storage technologies, links to other countries' grids and minimal use of natural gas to balance demand and supply, and consistent with meeting demand in real-time.

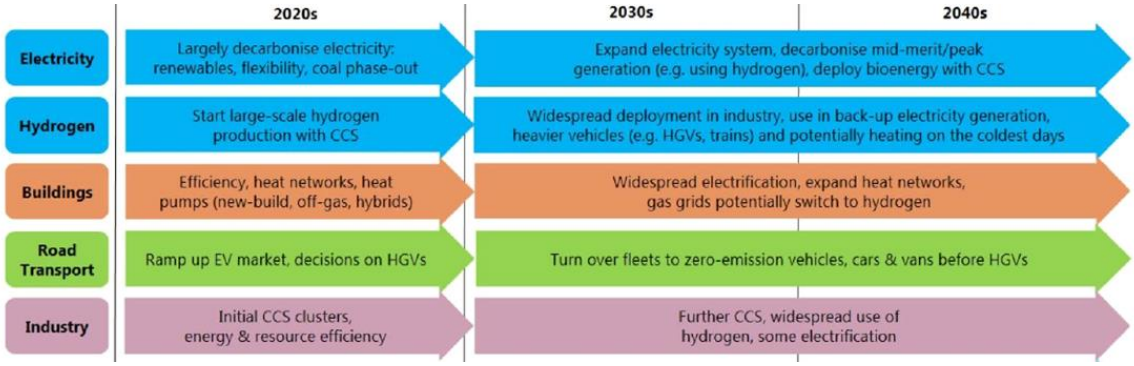
In 2015, in response to the government commitment to replace the UK's coal-fired power stations with gas, the Green MP Caroline Lucas was quoted as saying:

> Green MP Caroline Lucas said: "This switch from coal to gas is like trying to go dry by switching from vodka to super-strength cider - it entirely fails to seriously address the real challenge at hand. Investing in renewables and energy conservation would be far more effective economically, environmentally and in terms of energy security. We must begin weaning ourselves off gas as quickly as possible."

Committee on Climate Change (CCC)

The CCC have also previously stated that the shift away from coal fired generation should not drive a 'dash for gas' in the power sector. They have said that it is appropriate to invest in a portfolio of low-carbon power generation and "a continued fall in low carbon generation costs that further power decarbonization, is likely to be no more expensive than higher carbon pathways for the power sector".

In their recent publication, "Net Zero – The UK's contribution to stopping global warming" published in May 2019, the CCC recommended a new emissions target for the UK: net-zero greenhouse gases by 2050, and that target should cover all sectors of the economy. The report emphasizes decarbonisation of the energy sector, through hydrogen for heat, transport and electricity generation.



University of Exeter Energy Policy Group (EPG)

The Energy Policy Group at the University of Exeter works on the economics and politics of energy focusing on sustainability and change in energy policy and governance. In response to a recent Ofgem consultation the EPG have responded saying:

> "If following further research gas grid decarbonisation is proven not to be a realistic approach (which in our view it will not be), heat decarbonisation will need to be based around major demand reduction and known technologies of district heating, solar thermal and electric heating using heat pumps."

Critical Voices Summary

In summary, the insight in this section reinforces the level of uncertainty around the topic of whole energy system and the further work required to explore the options and pathways to the energy systems of the future.

RIIO stakeholder engagement

Shaping the future events and playback webinars

London	Warwick	Edinburgh	Webinar
• Cadent Gas • Centrica • ChamoConocoPhillips • Corona Energy • Cosmo Tech • CVSL • DNVGL • E3G • EDF • ENA • Energy UK • Engie • ENI • Eon Energy • GERG • Imperial College • IUK • Manufacturing Technology Centre • New Power • NGN • Ofgem • Oil and Gas UK • SGN • UKOOG • WWU Total: 29	• Baker Hughes • Blizzard Utilities • Cadent Gas • Calor Gas • Chamois Metrology Ltd • CNG Services • Costain • DNVGL • ENA • Energy and Utilities Alliance • Enzen • Fisher German • Health and Safety Laboratory • NIC • Sheffield University • Storengy • Wood PLC • WRC Plc Total: 21	• AMEC • CAS • ENSTOG • Fast flow • Juran • Ofgem • Pale Blu • Repsol Sinopec • SEPA • SGN • Wood PLC Total: 15	• Cadent Gas • CBI • Cosmo Tech • DNVGL • Energy Uk • Engie • Eon Energy • Equinor • INEOS • Juran • Mineral Products • NGG LNG Ltd • Northern Gas Networks • RWE • SGN • Sheffield University • Shell • SSE • WWU Total: 35

Objective To understand what's important to our stakeholders now and in the future. From this insight we created our stakeholder and consumer priorities that would shape our business plan and future stakeholder engagement.

Overview These workshops were designed to gather broad insight. Gathering insight from a broad a range of stakeholders, we asked broad, open questions targeting all stakeholders who have previously engaged with us via other means. We also publicised the events via social media and sent out targeted emails from key contacts across the business to ensure we got good representation.

Due to the broad nature of the events, it was important we structured them to allow stakeholders enough time and context to engage in an informed way. When developing the content this was at the forefront and so each session wse structured to give an overview of the topic, we then asked some open questions and held facilitated table discussions. Each table had two knowledgeable national grid people, a scribe (to capture all sentiment) and a table facilitator (to ensure each participant had an opportunity to get their voice heard and to guide the table through the sessions). A detailed briefing was given to ensure these roles were clearly understood, emphasising that we are in 'listening' mode. This means we capture all comments and understand the reasons for them, but we will not lead or respond to these unless to aid understanding on a specific topic. We also had topic experts roaming the room to answer any questions as they arose.

The table facilitator summarised the findings of their table for the rest of the room.

At the end of each discussion, we held a number of polling questions to clarify understanding on specific areas.

Stakeholders have told us London based events aren't accessible to all, therefore we decided to run geographically dispersed events that cover all topics to minimise disruption to stakeholders.

Topics we covered include:

Section	Overview

How we've performed	We shared an overview of our performance so far during the RIIO-1 period, updating on each of our outputs and the reasons for our performance.
How we plan the network	We gave an overview of how we plan the network, why we do it, the documents and outputs produced for our customers and stakeholders.
Future of gas	Shared a summary of the programme, it's objectives and the conclusions we've found.
Valuing risk	A session to understand our stakeholders' attitudes to risk on the network
Compressor strategy	An update on progress with our compressor work to become compliant with IED and MCP.
Innovation	A session to understand stakeholders' views on a number of areas for innovation and how we can accelerate progress.

We played back our findings to stakeholders via a webinar to clarify what we'd heard and proposed our consumer and stakeholder priorities.

We asked: Do these priorities reflect your needs of the gas transmission system?

- Yes: 89%
- Partially: 9%
- No: 2%

We published all our materials on the www.nationalgridgas.com website for stakeholders to reference.

Needs of the network events and playback webinars

London	St Fergus	Bacton
• Ancala Midstream • ENA • Engie • Gas Networks Ireland • HSE • IGEM • London Business School • Power Site UK • RWE Supply and Trading • SGN • Shell Energy Europe Total: 14	• Aberdeen City Council • BP • Pale Blu • Px Limited • SSE • Total Total: 7	• EEEGR • ENI • EU skills • Halli Burton • Neptune Energy • Perenco • SMS Alderley • UK coal Total: 8

Chester	Webinar	
• DNVGL • Charley Rattan • Costain • Energy UK • ESB • Health and Safety Laboratory • HSE • Inprovagroup • National Grid • Poyry • Storengy • Swagelok Manchester • Uniper Energy • Wardell Armstrong Total: 14	• Association for Decentralised Energy • BP • Costain • DNVGL • ESB • EDF • EEEGR • Energy UK • ENI • Equinor • EU Skills • EUA • GMSL • Green Alliance	• IGEM • MEUC • Neptune Energy • Oil and Gas UK • Power Site UK • Poyry • PX Limited • Robin Hood Energy • RWE • Shell • SSE • Storengy • Total • UK Power Net Total: 31

Objective: To gain detailed insight on specific topics to inform our business plan.

Overview: These workshops were designed to gain specific insight from targeted stakeholders. We therefore held these workshops in the areas that were most convenient to our targeted stakeholder groups.

To reach these previously hard to reach stakeholders, we sent targeted emails from our Terminal operations managers to their local stakeholders. This approach helped to broaden the range of stakeholders attending and ensured the right people from the businesses were in attendance.

The structure and set up of these workshops was very similar to our previous events with one exception. We used SLIDO to manage the polls aspect. This allowed us to ask stakeholders quantitative questions whilst removing the opportunity for them to be swayed by others voices in the room. It also allowed stakeholders to view the responses of the other participants once they had submitted their response, making the process more transparent.

Each table had a facilitator and scribe who was fully briefed to ensure everyone had their voices heard whilst at the same time, minimising potential bias from some participants.

Topics we covered include:

Section	Overview
Future of gas update	We introduced the concept of the Gas Industry Change Plan and asked for views on the concept, format and process to develop it going forward.
How we're measured	This section covered an overview of our performance and the outputs we report against. We then discussed and gained views on what measures we should have for RIIO-2 that would support the delivery of stakeholders' business strategy.
Scenarios and our planning assumptions	We gave an overview of how we'll use the FES scenarios to underpin our business plan for RIIO-2 and discussed stakeholders' views on the topic.
I want to move gas on and off the network	Building on the questions we asked during our earlier workshops, we wanted to understand the impacts of not being able to move gas on and off when needed.
Asset management	Referencing our previous workshops, we introduced the asset health challenges currently being experienced on the gas transmission system. We then explored which options stakeholders' would like us to cost up and engage on further.
Responsible removal of redundant assets	We gave an overview of the process we follow and the potential options available to us. We then spent time exploring stakeholders' views on: • which factors we should consider (from consumer, local community and stakeholder perspective) • whether current or future consumers should pay for the demolition of redundant assets.
Information provision	We shared an overview of the information and data we supply to stakeholders then explored what and how stakeholders use the data.

We played back our findings to stakeholders via a webinar to clarify what we'd heard. We asked if stakeholders felt they'd had their voice heard:

Enablers	Gas on and off	Environment	Information Provision
• No response: 3 • Yes:17 • Partly: 3 • Not Applicable: 8	• No response: 5 • Yes: 17 • Partly: 2 • Not Applicable: 7	• No response: 4 • Yes: 9 • Partly: 0 • Not Applicable: 18	• No response: 3 • Yes : 16 • Partly: 1 • Not Applicable: 11

We published all our materials on the www.nationalgridgas.com website for stakeholders to reference.

Environment events

Attendees

London event	Edinburgh event
• Skanska • Northern Gas Networks • Citizens Advice Bureau • Ofgem • Gasrec • Bureau Veritas Total: 6	• AAF • Scottish Forum on Natural Capital • Ingen Ideas • SSE • RPS Group • Natural Gas Solutions (UK) Ltd • Keep Scotland Beautiful • Stuart Burke Associates • Sniffer • SP Energy Networks Total: 12

Objective: To gain stakeholder insight on specific environmentally related topics.

We recognised that this topic will be of interest to stakeholders that are common to both gas and electricity. To minimise the impact, we collaborated with National Grid Electricity transmission (in England) to allow stakeholders to attend one event and give input to both business plans.
We reached out to the electricity transmission networks in Scotland but unfortunately, we couldn't arrange a collaborative workshop.
These workshops were targeted at those who had an interest in environmental topics and were structured in the same way as our other workshops. We were able to improve our engagement based on feedback on our first workshop with support from Frontier economics.

Suggestion	Change
Have objectives and structure of the workshop upfront	• Included overall objectives upfront and added an objectives slide prior to each topic to make it clear what outcome we were looking for. • We also shared the structure of the workshop and timings.
Simplify the language	• We removed technical language and where we felt we needed to keep it in, we included explanations.
Show the size of the impact of the topic	• We created a chart with all the topics showing the size of the impact e.g. high, med, low.
Be careful that stakeholders aren't been influenced by the loud voices on the table	• Polls and qualitative discussions were structured to reduce the opportunity for this. • Introduced cards for stakeholders to record their thoughts on each topic. • Strong facilitation on each table

We asked participants: Using the 1 – 10, where 1 is not at all likely and 10 is very likely, how likely are you to recommend today's workshop to a friend or colleague?

- First event in Surrey: NPS score of 0
- Second event in Edinburgh: NPS score of 64

We structured the day around the decision lifecycle covering the following topics:

	Section	Overview
Strategic	Our Contribution	We gave an overview of our sustainability strategy and the targets we've set ourselves. We then asked if there was anything else they'd like to know about, anything else we should be thinking about and which areas were most important to them.
Operating the network	Emissions management	Following an overview of the emissions generated from operating the gas transmission system, the impact these have and our past performance, we discussed what more information stakeholders would like to see, what's important to them and whether it should be a focus for innovation.
	Mitigating environmental impacts to our network	Following a brief overview of the impact of extreme weather conditions on the gas transmission system, we discussed whether we should take a proactive or reactive approach.
	Environmental Stewardship	We gave an overview of our approach to environmental stewardship and asked for stakeholders' views towards this. We also discussed who should pay for this type of activity.
Making the right investment	Compressor emissions	Following an overview of the project lifecycle and how we make investment decisions for compressors using BAT (Best Available Techniques) we asked stakeholders which impacts were most important to them and how they would prioritise them.
	Other investment areas	Recognising we have other areas of impact, we discussed what this are and asked stakeholders to discuss how we might mitigate these impacts, including applying a carbon price.
Construction	Reducing the impact of construction	We shared an overview of the impacts a construction project can have on the environment including carbon and biodiversity. We then discussed stakeholders' appetites for us to manage and reduce these impacts.
Responsible demolition	Responsible demolition of redundant assets	We gave an overview of the process we go through and an indication of the costs associated with the different options. We asked stakeholders to discuss the benefits and risks against each one and whether current or future consumers should pay for this type of project.

We published all our materials on the **www.nationalgridgas.com** website for stakeholders to reference.

Bilaterals

We recognise some of our stakeholders prefer to talk to us on bilateral basis for a number of reasons:

- The conversation is confidential, allowing more sensitive discussions to take place
- Less impact on their time as topics are always relevant to the stakeholder
- We held many of these over video conferencing to further reduce the time required

The following bilaterals took place:

Customer (entry)	Customer (exit)	Regulator
• Gas Uni • BBL • Independent Oil and gas • Neptune Energy • IUK • Shell	• RWE	• Scottish Government x 2 • HSE x 2 • EA x 2 • SEPA x 2 • Oil & Gas Authority • North Norfolk County Council

Consumer interest group	Gas distribution network	Energy network operator	Other non-energy industry

• Citizens Advice x 2	• SGN • Cadent • Wales and the West Utilities • Northern Gas Networks	• Fluxys	• New Anglia Local Enterprise partnership

Gemini workshop and playback webinar

Workshop	Webinar
• BP • Centrica • EDF Trading • ENI • Equinor • Gazprom • Green Energy Plc • Juniper Energy • Macquarie • Orsted • RWE • Scottish Power • Shell • SSE Total: 18	• RWE • ENI • EDF Trading Total: 3

A dedicated workshop to understand customer and stakeholder needs relating to future capacity and balancing systems and services. The workshop objectives were:

Session	Objective
Short term system provision	To update stakeholders on the progress of the Gemini re-platforming project and discuss and agree the pain points stakeholders feel when dealing with the system.
Long term system provision	To understand the drivers for long term system provision and discuss stakeholders' functional and non-functional requirements of a future system.
Implementing system change	To understand stakeholders' priorities when system change is implemented and the impact of those on their businesses.
Capacity and balancing service provision	To understand the critical and non-critical services in this area to stakeholders and what they would like to see improved. To understand potential new services that might be required in the future.

Why was a workshop chosen?

Due to the nature of the topic, gathering users into a room to discuss and share experiences seemed the most effective form of engagement. It allowed us to give a broad overview to set the context and share an update on progress with current improvements underway. We then facilitated discussions to explore users' needs and wants for a future system.

Playback webinar

To confirm what we'd heard, we held a webinar to playback our findings, confirm it represented their views and share next steps.

We published all our materials on the www.nationalgridgas.com website for stakeholders to reference.

Trade body meetings

Attending existing trade body meetings was identified as an effective way to engage with key stakeholder groups whilst minimising time impact to stakeholders.

Here is a summary of the meetings we've attended and the topics we've shared:

Meeting	Topics discussed	Stakeholder groups
Transmission operators best practice forum x 3	Engagement approach	Electricity transmission owners, electricity system operator
Gas operations forum x 3	Information provision, network capability, Bacton terminal	Gas distribution networks, customer (shippers), customer (exit)
South North Sea operators forum	Network capability, broader RIIO-2 plans	customers (entry), industry trade bodies, other energy industries
Oil and Gas UK Trade meeting x 4	Blending, scenarios, network capability, asset health, future of gas	customer (shippers), customers (entry), customer (exit), industry trade bodies, academics
Energy utilities alliance	Challenges to the NTS, asset health	Industry trade bodies, interest groups, gas distribution networks, academics, customer (shipper), regulator /government
Major energy users group	Who we are and what we do, Network capability	Major energy users, industry trade bodies
Energy intensive user group	Who we are and what we do, network capability, broader RIIO 2 plans	Major energy users, industry trade bodies
Energy UK x 4	Information provision, network capability	Industry trade bodies, major energy users
South North Sea managing directors forum x 3	Bacton terminal, network capability, broader RIIO 2 plans	Customers (entry), regulators, Industry trade bodies

Energy Networks survey

Objectives

- To avoid stakeholder fatigue, we have collaborated with the other gas network companies to jointly engage with national stakeholders.
- The research covered a broad range of stakeholders from across the full spectrum of Gas Distribution and Transmission networks' operation.
- Rather than engaging stakeholders on predefined topics, we wanted to allow stakeholders the opportunity to tell us what they wanted to talk about and how they would like to be engaged.
- This is the first stage of a two-stage engagement process. The findings of this research will give clear guidance on the topics national stakeholders wish to discuss in Phase 2 and the mechanisms that will allow us to do so effectively.

Research summary

Stakeholder group	All	Consumer and fuel poverty groups	Government and regulatory	National associations /utility industry peers	Private/ commercial	Think tanks/ academics/ innovation	Other
Number of participants	78	3	4	34	24	10	3

72 companies completed telephone interviews, 6 companies completed online questionnaire

The questionnaire was designed to:

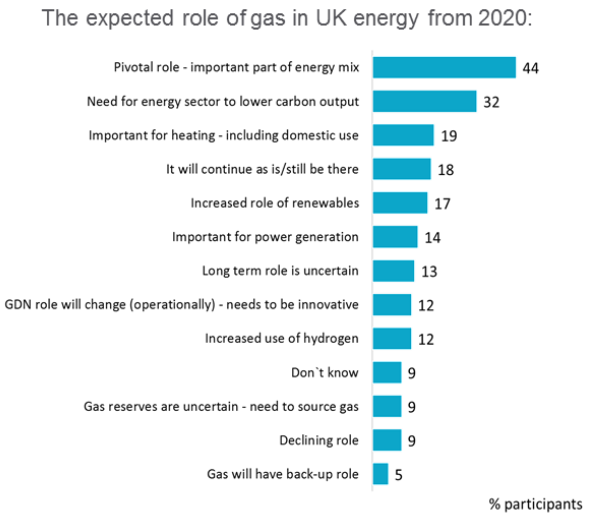
- Capture quantitative measures alongside more detailed responses

- Allow stakeholders to set the tone of their response and comment on areas important to them

Findings

Stakeholders see an important role for gas in UK energy from 2020 onwards, but in an evolved form

- Without prompting, stakeholders express a variety of views on the future role of gas, which fall into three broad themes:
  1. The role of gas is seen as pivotal for the energy mix or important for specific kinds of consumers
     a. Far more think this than those believing that the industry has an uncertain, declining or increasingly back-up role.
  2. Many comments centre on sustainability of gas in terms of environmental impact and sources of supply.
  3. Some stakeholders recognise the need for Gas Networks to be innovative as their roles change.



Stakeholders want gas networks to cover a wide range of topics when developing business plans

As might be expected given the wide spectrum of stakeholders, they express a variety of views on what topics are important for RIIO-2 business plans.

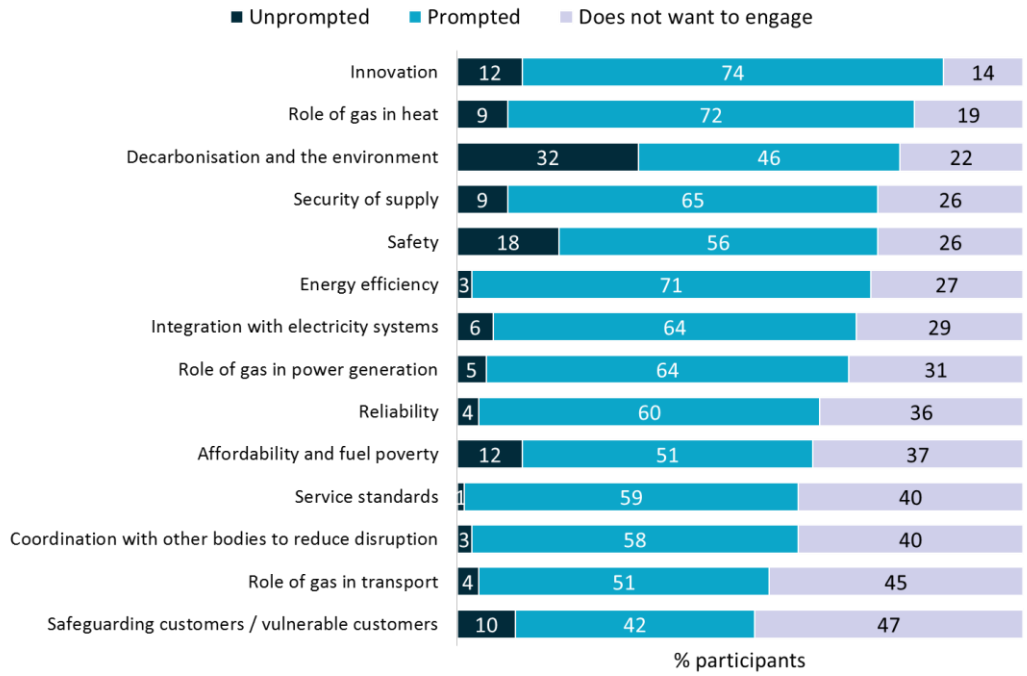
- The most commonly raised theme is of decarbonisation, highlighted by one in three
- There are many other mentions of environmental topics, including the sustainability of gas; gas alternatives; renewables; reducing use and the environment more broadly.
- Value for money is also a key theme, mentioned by one in five.
- Investing in infrastructure to ensure asset integrity and safety (both 17%) are also strong themes.

Prompted and unprompted views on the topics stakeholders want the networks to engage with them on

To understand the full range of topics of interest to stakeholders, and to provide a quantitative measure of interest in each, participants were asked to confirm the topics they would be interested in engaging on. This also gave them the opportunity to consider the relevance of topics they did not previously raise.

This showed that:

- The broad engagement themes are similar to those that are top of mind for stakeholders
- There is interest among a majority of stakeholders in engaging on all themes
- It is difficult to devise a hierarchy of themes as, for most topics, a large majority of stakeholders want to engage on each of them
- Future engagement must allow for stakeholders to input on the issues that matter to them while allowing for the full range of themes to be covered.



Stakeholders want to engage in a variety of ways but favour those involving direct contact

Stakeholders have a strong desire for personal contact.

- Stakeholders seek the opportunity for one-to-one contact, with over half looking for email or phone contact, or a face-to-face meeting.
- Just under half would like to be involved in a workshop forum.
    - This is higher among those that have engaged as part of RIIO before (65% vs 40% with no prior engagement).
- One in three would like to take part in a consultation or call for evidence.
- Less personal methods such as surveys, webinars and newsletters are less popular. However, stakeholders who have previously responded to a survey are more likely to want to engage in this way again (14%).

Engagement will need to be coordinated between national and local levels, as the majority want to input at both

- Two in three stakeholders would like to input at both a national and local level
- It will therefore be important that opportunity is given to stakeholders to do so at both levels.
- Engagement will need to be coordinated to prevent duplication
- A quarter would prefer to engage at a national level only, while one in ten want to engage solely at a local level.

The desired outcome of engagement is as much about the relationship between stakeholders and Gas Networks as it is about the shape of the business plans

The desired outcomes of the engagement fall into two broad categories:

- Strengthened relationships between stakeholders and networks:
- Clear communication, collaboration, being helpful, better understanding, views listened to, transparency

- Content of the business plans:
- Future proofed plans, safety, appropriate pricing, affordability
- Improved communication and provision of clear feedback is an overriding requirement of stakeholders, with over a quarter expecting this as an outcome of engagement.

For the full report, please contact Jennifer.pemberton@nationalgrid.com

Energy Networks Conference

Attendees

- Anaerobic Digestion & Bioresources Association
- ARUP
- Association for Decentralised Energy
- BEIS
- BUUK Infrastructure
- Citizens Advice
- Delta-EE
- EEF, the manufacturers' organisation
- Element Energy
- Energetics-UK
- Energy & Utilities Alliance (EUA)
- Energy Policy Group, University of Exeter
- ESP Utilities Group
- Gas Safe Charity
- Green Frog Gas Utilities
- Green Gas Certification Scheme (GGCS)
- Renewable Energy Assurance Ltd (REAL)
- Grid Edge
- HSE's Health and Safety Laboratory
- IGEM
- Imperial College London
- NEA
- Ofgem
- REA (Greenlane Biogas)
- REA (Iona Capital)
- REA (Quila Energy)
- REA (Xergy)
- Siemens
- Sustainable Energy Connections Ltd
- University of Birmingham
- Xoserve

Total: 37

Objective

To understand stakeholders' views of how the gas networks should individually and collectively support the decarbonisation of heat through their RIIO-2 business planning.

Overview

Following on from the questionnaire, a three-hour workshop was held on 6th February 2019 involving participation of 37 stakeholders representing 30 different organisations.

The workshop included a mix of plenary sessions (including discussion, presentation of information relating to gas network activity and the RIIO-2 regulatory process) and breakout sessions in smaller groups.

To enable for more involved discussion and to allow contribution from all participants, the majority of the workshop was conducted in breakout sessions.

Discussions were facilitated by table facilitators and all sessions were audio recorded for analysis purposes.

Session	Aim
Understanding stakeholder priorities	To gain a clear understanding, in the context of working toward an integrated energy system/decarbonised future, of what stakeholders' feel are priority areas for the gas networks • Definition of a whole system approach • Areas that the gas networks should be prioritising in their planning for 2021 – 2026 • What are the challenges or blockages to achieving these aims
Achieving stakeholder priorities	How do stakeholders' feel the networks can deliver the priorities identified? What are the enablers to facilitate collective working to achieve them? • How the networks can achieve the priorities stakeholders' have identified • How networks can work collaboratively to achieve these goals • Funding of decarbonisation

For the full report, please contact Jennifer.pemberton@nationalgrid.com

Industry Roundtable – Whole system

Objective

Discuss the following: With the breakneck speed of change, can we help system challenges of the future with what we have now on a whole system basis?

We jointly hosted a Chatham House rules industry roundtable with Network Magazine.

Attendance**:** The attendees were senior representatives of the following organisations:

- Centrica
- Citizens Advice
- Ofgem
- BEIS
- Grid Edge
- Energy UK
- Energy Systems Catapult
- Innovate UK
- Ofcom
- WWF
- Western Power Distribution
- Wales & West Utilities
- Imperial College London
- Northern Gas Networks

Total: 14

This idea of whole system has come about because the energy industry needs to stay ahead of the changing world that we live in. And with whole system thinking on our minds how do we increase transparency and coordination between distribution network operators (DNOs), gas distribution networks (GDNs) independent distribution network operators (IDNOs), gas & electricity transmission owners (TOs), system operators (SOs) and the wider energy community as required. As an example: with the intermittency of wind and solar generation, can the networks have a role to play in bridging this gap with a whole system approach. That is why we need to consider a range of solutions to deliver the best value for consumers including:

- a coordinated approach across the whole system
- investment in smart technologies, transmission and distribution infrastructure
- commercial approaches that considers consumer behaviour change
- how to remove potential perceived blockers.

Future of Gas Networks – Alternative Futures?

IGEM House, 13 December 2018

[redacted] Chief Executive, IGEM

The gas network will need to evolve if the UK is to secure its carbon reduction objectives, and there are differing views on how the British gas network may be best used to deliver affordable energy and heat in a decarbonised world.

The purpose of the event was to invite discussion on key technology and policy issues, including what needs to happen in the next seven years (i.e. to the end of “Riio 2“, the next regulatory price control) to progress towards a decarbonised gas network.

PRESENTATIONS

Tony Nixon, Head of Regulation (Gas), National Grid:

We have to acknowledge our starting point…

- Gas provides three times the amount of energy provided by electricity each year; it is the primary source of heating in homes and offices, specialised industries depend on it, and provides the lowest-cost energy for consumers in the short and medium term.
- Gas has already played a part in decarbonisation by displacing coal from the energy mix, and provided 40% of electricity generation in 2017 – it provides the flexibility which has enabled growth and further development of renewables, and has the opportunity to continue this role in future whole energy systems.

We must also acknowledge consumer priorities.

- Domestic and industrial consumers' priorities can be summarized in three statements: "I want an affordable energy bill"; "I want to use energy as and when I want" and "I want you to minimise disruption to my life".

Substantial change will bring substantial challenges:

- There will be further changes in volume/direction of flows, with higher LNG use and supplies from interconnectors;
- If electrification of heat were to reach the rate required to meet 2050 emissions targets, it would have to take place more rapidly than any other such change in British history: both central heating and double glazing have taken 50 years to reach 90% consumer take-up.

Under all scenarios gas will be used until at least 2045: investment now keeps options open and reduces long term risk at minimal cost. We are working with stakeholders to determine:

- the type of network they need;
- to understand how the network contributes to keeping energy prices low;
- to determine required network capabilities;
- to test consumer willingness to pay to keep options open.

Postscript: Ofgem published its sector-specific consultation on Riio-2 on 18 December 2018 and is open to responses until 14 March 2019. Visit www.yourenergyfuture.nationalgrid.com for National Grid's content and updates on the Riio-2 process.

[redacted]**, Director of Policy, National Infrastructure Commission:**

The National Infrastructure Commission delivers a National Infrastructure Assessment once in every Parliament, setting out the NIC's assessment of long-term infrastructure needs with recommendations to the government. It covers a wide remit comprising transport; digital; energy; water & waste water; flood risk; and solid waste.

The energy industry has reached a point at which it needs to consider all the bases in progressing to a low-carbon network capable of meeting emissions targets by 2050. The Commission's starting point is that "it will not be possible to continue to use natural gas – which is carbon-based – to heat the UK's buildings and provide hot water in the long term. There is low public awareness of this. Options exist to change the UK's heating supply, but they are all disruptive and will all require investment. A large-scale change in how the majority of buildings are heated in the UK will not happen without Government intervention."

- The gas industry also has to be ready to contemplate getting to net-zero greenhouse gas emissions – if government moves to mandate this - rather than reducing them by 80%
- Evidence so far had shown that gas industry can be too focused on working out how to sustain natural gas infrastructure, rather than thinking about the wider options.
- All choices on energy interact: cost, behavioural and technical uncertainties mean that no decarbonisation route for heat can currently be identified as being the best route for decarbonising heat in the UK.
- All routes to decarbonising heat are more expensive than maintaining the status quo, although the cost of heating as a proportion of GDP in 2050 reduces in all scenarios.

A series of questions need to be addressed, if hydrogen is to be part of the answer:

- Is a mixed system feasible? What volume of hydrogen do you need to transport to keep the gas grid economically viable?

- How low carbon can you actually get the hydrogen production?
- What does all of this mean in a net zero emissions world?
- How do we reduce the costs? Where are the big areas for innovation?
- How do we engage with people about this future change?

The Commission has recommended the following to government in pursuing zero carbon heat:

- Establishing the safety case for using hydrogen as a replacement for natural gas, followed by trialling hydrogen at community scale by 2021
- Subject to success of community trials, launching a trial to supply hydrogen to at least 10,000 homes by 2023, including hydrogen production with carbon capture and storage
- By 2021, government should establish an up-to-date evidence base on performance of heat pumps within UK building stock and the scope for further reductions in the cost of installation.

GROUP DISCUSSIONS

Below is a brief summary of discussions which took place within smaller discussion groups.

Technologies:

Which technologies are going to help us achieve emissions targets: e.g. biogas, hydrogen, electrification? What are the primary obstacles?

- We must push all the currently available mainstream technologies as far as they will go (sensibly and affordably), if we are to get anywhere near the 2050 climate targets.
- Government strategy and approach towards the available technologies is unclear; one proposal was a ranking system for the full existing range of technologies and their respective benefits/ drawbacks.
- Hydrogen would be as much a cultural challenge as a technological one – consumers would be using a fuel which would behave differently (e.g. no more blue flame, water emissions). Other initial obstacles include:
    - Government strategy unclear, although positive signs emerging from BEIS on investigating hydrogen;
    - No clear allocation of costs or pricing framework;
    - No framework of measures to ensure safe operation, or training to ensure this;
    - Feasibility/availability of carbon capture, where steam methane reformers used.
- Hydrogen needs ‘ground-testing’ in homes to test for consumer acceptance; a good starting point would be whole new housing developments, but this would require changes in existing planning policy and surrounding infrastructure. Parallel infrastructure is not affordable.
- Data from the 2021 Census could be used to establish the base case for such developments
- Full electrification – is enough known about peak loading, if this route is chosen?
- Mustn’t forget the opportunity to tackle transport emissions too (transport is now the largest source of emissions in the UK): the immediate focus is on HGVs to start the transition from diesel to gas or LNG, to help deliver clean growth strategy and cleaner air quality.
- Which agency will ‘promote or prohibit’ large-scale projects across new technologies?

Incentives:

How can we incentivise the energy industry and other agencies to decarbonise heat fast enough to have a timely impact on carbon emissions?

- Need to know more about the emerging technological decisions to make the right choice of incentives: incentives should be based on hard evidence of what will make the biggest positive difference to consumers
- Incentive framework should be acceptable to consumers – we should learn from our experiences of how consumers have viewed incentive payments in the past
- Incentives must make sense across the value chain, from generators to transmission networks to distribution networks, and must include the supply chain
- Any regime should incentivise change towards operational readiness for biomethane and hydrogen, rather than small-scale innovation projects.

Regulation:

What can be done over the next seven years, up to the end of RIIO-T2, to progress a decarbonised gas network – what are the obstacles we can overcome in that time?

- Fundamentally, we need enough hard evidence on whether technologies will work - how they will drive change and with what impact, and whether regulatory levers can promote effective introduction;
- A safety Case needs to be established for each new technology;
- Joined-up strategy required across electricity and gas, to enable trials to be expedited, including hybrid models and funding;
- Regulation has a role in incentivising better storage (all types, both within the existing transmission network, distribution networks, large-scale battery storage and other emerging solutions).
- Move from 'what's probable?' to 'what's possible?' when stimulating innovation (incentivise different thinking)
- Regulation not all down to Ofgem: UK should change building regulations promptly, where it is required to enable Riio-2 innovation to be fully effective – in some cases, building changes may need to be forced on developers rather than relying on good practice.
- Regulation can continue to enable technology expansion through NIA and NIC initiatives.

Approach to estimating long-term benefits of the NTS study

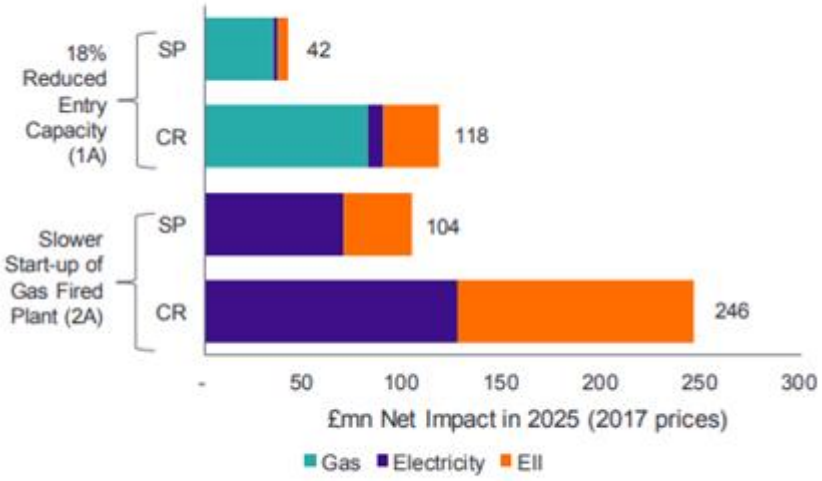
This study explores some of the economic benefits of the NTS to the UK by estimating the impacts on energy consumers of reductions in the capabilities of the NTS relative to current levels on gas prices, power prices and on the value of production by energy intensive industries (EIIs).

The study suggests that a failure to maintain the existing capability of the NTS could have significant impacts on GB energy costs. Two main cases were investigated. The first one was around a reduction on entry capability to the network by 18% (380GW to 306 GW capacity) (Scenario 1A).

The second one was looking at the impact of reducing the ability for gas fired power station to ramp up quickly (Scenario 2A). Typically, we allow power station to ramp up within 30minutes. However, we have modelled a restriction on ramp up rate of four hours for a 50% increase and two hours for a 25% increase in capability. The impacts in both scenarios were modelled over two time frames, 2025 and 2035.

As shown in Figure 2 below, the annual benefits identified from maintaining the networks capability in 2025 ranged between £42m and £118m per annum for Scenario 1A and between £104m and £246m per annum under Scenario 2A.

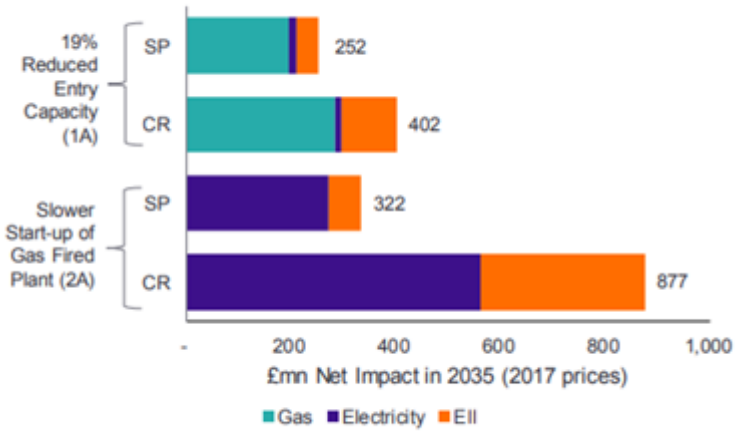
Figure 2: Impact in 2025 of reductions in NTS capability



Source: EPRG gas and electricity market modelling, EY analysis of economic impact on EIIs

As shown in Figure 3 below, impacts are expected to increase by 2035, ranging between £252m and £402m per annum under Scenario 1A, and between £322m and £877m per annum under Scenario 2A. The primary reason for the increase in impact in 2035, is whilst annual gas demand is lower, the volume of intermittent renewable generation increases, the NTS has an important role of supplying gas to gas-fired power plants, so they can respond quickly to the volatility in supply and demand for power.

Figure 3: Impact in 2035 of reductions in NTS capability



Source: EPRG gas and electricity market modelling, EY analysis of economic impact on EIIs

These impacts are principally driven by increased gas wholesale prices in the case of Scenario 1A and increased electricity wholesale prices in Scenario 2A. Alternative scenarios, including a greater reduction in network capability, are possible, implying potentially greater impacts on GB. It is clear from the analysis presented in this study that the potential benefits for GB of maintaining the current capabilities of the network could be significant where a reduction in the supply options for gas could lead to increased gas and electricity prices.

Gas Operations listening session (Info provision)

Attendees:

- Engie
- Gazprom
- RWE
- Storengy
- EDF Trading
  Total: 5

Engagement

During an existing Gas Operations Forum, we took the opportunity to talk about the information and data we produce with a view to understand how we can deliver a better service in the future.

We decided to add a dedicated session on to the end of the forum to:

1. Minimize impact on stakeholders as they would already be at an event so wouldn't take additional time out of their diaries
2. Not take up time on the agenda for the forum as this was already very busy
3. Allow those who weren't interested in the topic to leave

The session was split up into two areas. 'Insights' and 'What data/how do you access it?'

Each table had a facilitator and a scribe to capture the sentiment of the conversation. All stakeholders got to input into both topics.

The questions and structure were developed with the help of Frontier to ensure stakeholders could engage from an informed position.

Session	Overview
Information and data insights	Following a short overview of the scope of the topic and what information and data we provide (to ensure everyone has a similar level of base knowledge), we explored with stakeholders what and how they use the data. This insight will help us deliver an improved service to them in the future as well as allow us to focus on the value adding improvements.
Additional information and data	This session explored what additional data and information stakeholders would like us to produce.

The outcome of this event has been added to the 'I want all the information I need to run my business' section.

Consumer engagement

Major energy users survey

Consumer and MP survey

Consumer listening

Willingness to pay

Consumer narrative

Interactive slider tool

Pay now, pay later – deliberative engagement

Acceptability testing

Major energy users survey

Recognising this group of stakeholders were often underrepresented in engagement and found it difficult to engage due to time commitments we developed a targeted survey that could be completed as and when suited.

Before developing the survey, we contacted the Ceramics Confederation and the Energy Intensive User Group to understand what topics were of interest to their members. We also held a webinar (ceramics industry) and presented at the EIUG industry meeting to give an overview of NGGT and articulate why they should get involved.

We then issued the invite to participate in the survey via the relevant trade body contacts.

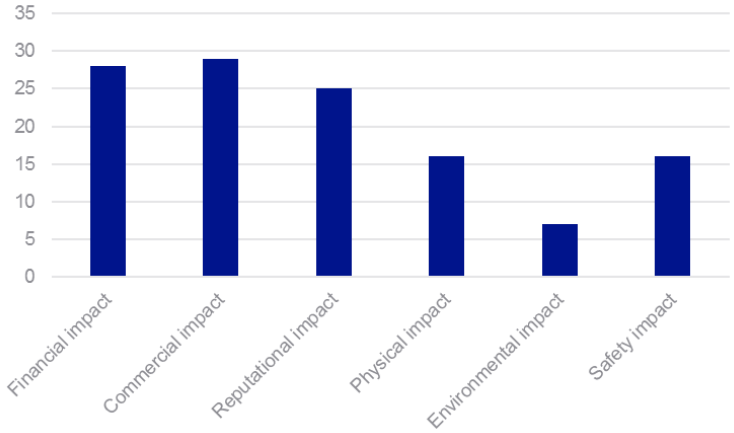
Objective: To understand major energy users wants and needs of the Gas Transmission system now and in the future.

Stakeholder Group	No
Major energy users	46
Government	7
Energy industry trade body	2
Customer (shipper)	1
Customer (exit)	1
Consumer interest group	2

Topics included:

- I want to move gas on and off the network as and when I want
- I want all the information I need to run my business
- I want you to facilitate the whole energy system of the future – Innovating to meet the challenges of an uncertain future.

Question	Response
What impact will you see if you can't use gas when you want?	• "irreparable damage to the facility…financial and reputational impacts." • "24/7 production requirements" • "Gas is used as a process input as well as for combustion and as such is crucial to us." • "Space heating and cooking" • "impacts on biogas generation through difficulty with running anaerobic digestion without gas boilers" • "Without gas many schools could be forced to close during winter"



<table>
<tr><th>Question</th><th>Response</th></tr>
<tr><td>Is there a difference in impact between total shutdown and reduced service?</td><td>

“it could be the difference between schools and public buildings being forced to close or not.”
“If we have enough gas to keep furnaces and kilns warm it will prevent major damage.”
“this would depend on time of day and season”
“Reduced availability may interrupt processes although it is possible it allows to operate at reduced rate. Reliability and certainty of delivery is key for most processes.”
“No difference as production requires a full gas supply”
“No, both equate to business failure”
“we use gas for heating and without full pressure the system won't work, and we have to shut it down”.

63% can cope with a level of reduced gas supply
37% cannot cope with any sort of disruption to gas supply
</td></tr>
<tr><td>If your service was interrupted, what length of time would be acceptable to you?</td><td>
<table>
<tr><th>Time</th><th>% of respondents</th></tr>
<tr><td>0 - <15min</td><td>55%</td></tr>
<tr><td><1hr</td><td>27%</td></tr>
<tr><td><6hrs</td><td>5%</td></tr>
<tr><td><24hr</td><td>9%</td></tr>
<tr><td><3days</td><td>5%</td></tr>
</table>
82% would accept less than 1 hour interruption to their gas supply
</td></tr>
<tr><td>Do any of your answers change depending on how much notice you are given before an interruption?</td><td>

“How much notice depends on the length of interruption”
“discuss any potential outages due to scheduled maintenance or similar planned events to allow for our input into the timing of disruptions in order to minimise impacts.”

62% Would accept a longer interruption with notice
38% Would not tolerate any disruption even with notice
</td></tr>
<tr><td>Are you aware of the data and information that we provide?</td><td>

“to support our commodity risk management”
“we use it to inform our energy forecasting”
“manage demand in order to identify poorly performing assets which we can replace.”
“I use daily snapshots to see what gas is flowing, demand levels, any shutdowns”
“Used to feed information to end users where relevant.”

46% Yes
54% No
</td></tr>
<tr><td>How do you define whole energy system?</td><td>

“I guess one where supply and demand for both gas and electricity are brought closer together and without necessarily depending on market forces.”
“it needs to consider energy source, production, conversion, monitoring, transportation/delivery, storage, use and waste.”
“Provision of energy supply from fuel, generation, storage, delivery and consumption”
“All aspects of energy sources and their distribution / availability / efficiency”
“All energy provided by all methods - gas, electricity (from fossil fuels, renewables, nuclear etc)”
“As a variety of developing systems and policies that are facilitating a push towards decarbonisation, decentralised supply, demand management and a focus on renewables to meet future behaviours and demands defined by technology.”
“Renewables backed up by Carbon technologies”

</td></tr>
</table>

What interactions do you see between gas and electricity?	• "It is less that there are distinct interactions between the two, and more that a holistic approach to energy management will be key in the future to ensure value is released and resilience is built into portfolio/estate management. No one technology or innovation will provide answers." • "While **half of electricity generation is fueled by gas**, there is a huge interaction. **The choice between gas & electric heating** for the future will be interesting." • "The **net zero carbon in buildings** agenda (see UKGBC) will encourage **more biogas in short term** and move more heating and hot water to **non gas sources in longer term"** • "increased demand on **flexible** gas fired capacities to **backup and balance** power generation / temporary substitution of gas fired heating by **power-to-heat** solutions / usage of gas pipe system for biogas, **power-to-gas storage and transport issues"** • **"Pricing**. Oil price impacts price of Gas which in turn impacts price of Electricity." • "Gas as a **back up** to produce electricity."

Consumer and MP survey

A research study was initiated in November 2017 with the objectives to:

- Understand the broader views, discussions and priorities among industry stakeholders, consumers, and MPs to establish the current 'state of play' as well as what they are focussing on over the coming 5 to 10 years.

The research consisted of 47 stakeholder interviews including:

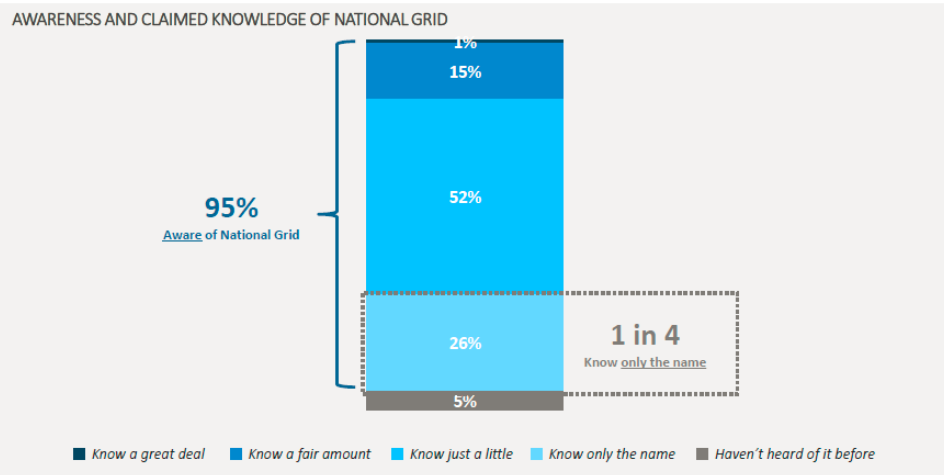
Category	All	Government (inc. officials, opposition, MPs, devolved)	Commentators (inc. think-tanks, academics, consultants)	Infrastructure (inc. engineering, business)	Campaigners (consumer, environment)	Media
Number of interviews	47	14	15	8	3	7

And 2081 consumer surveys

Results:

Most adults have heard of National Grid, but familiarity with the company is limited

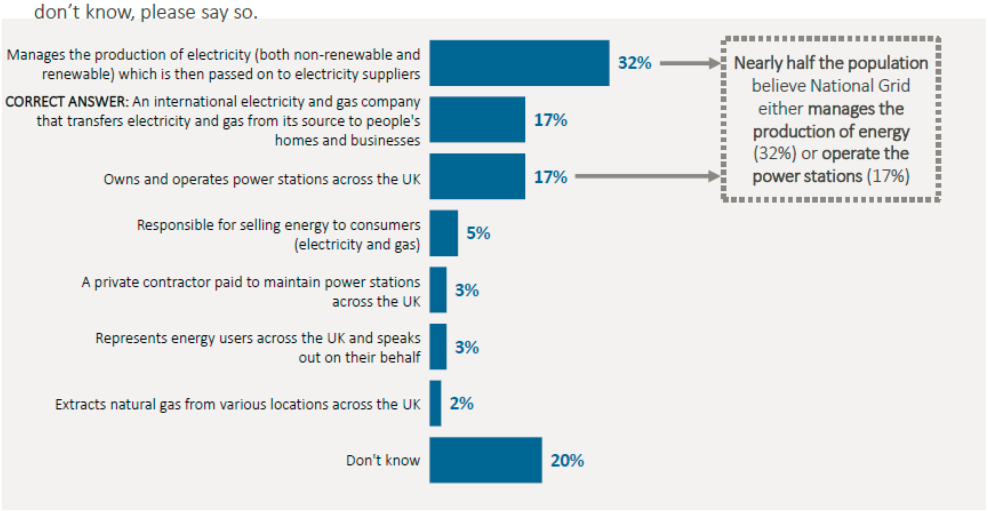
Q. How much do you know about National Grid?



Populus | nationalgrid 1. Base: all respondents (2,081) 98

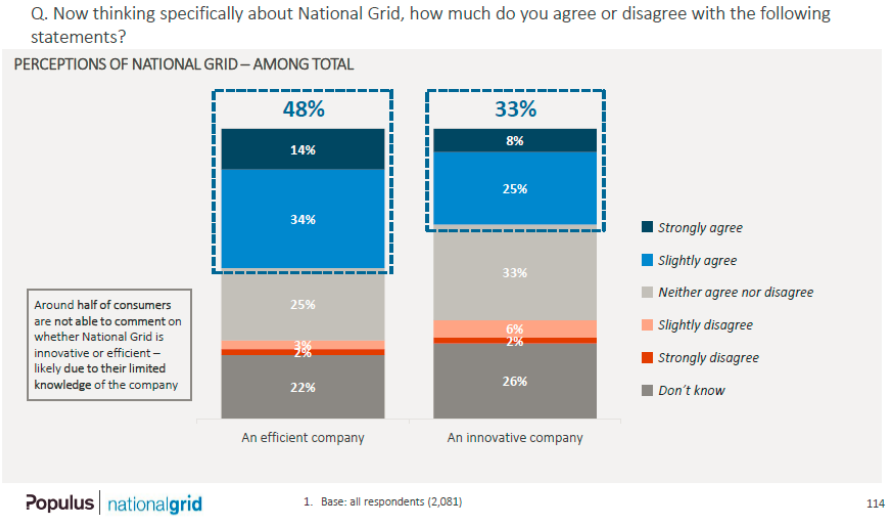
This is substantiated by the level of actual knowledge –fewer than one in five consumers select the correct definition to describe National Grid

Q. To the best of your knowledge which of the following best describes what National Grid does. If you don't know, please say so.



Populus | nationalgrid 1. Base: all respondents (2,081) 100

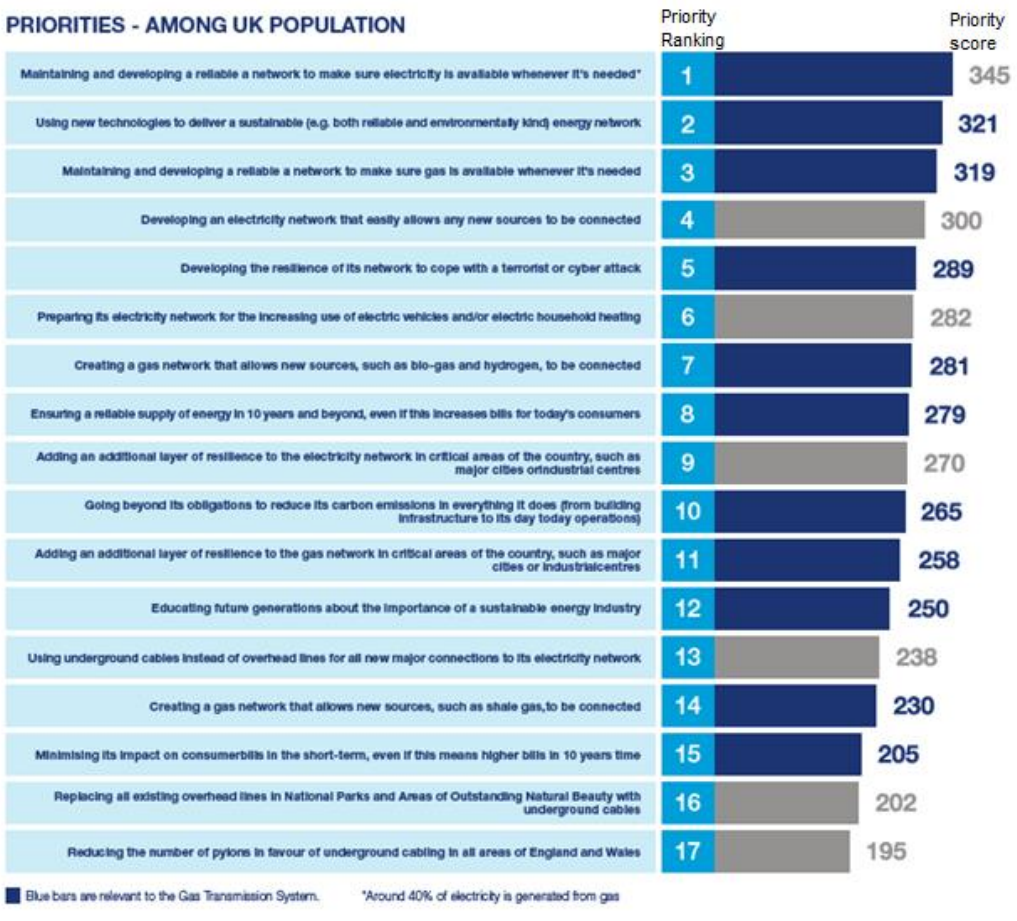
Most consumers believe national grid is an efficient and innovative company.



Understanding consumers priorities:

- Maximum Difference Scaling (Max Diff) is a way of evaluating the importance of a number of alternatives. It is a discrete choice technique where respondents are asked to make simple best / worst choices
- Asking respondents to trade alternatives against each other means we can understand which they prioritise most
- Respondents were shown a total of 17 different investment options. These were presented over several screens, in groups of 4, and respondents were asked to select the most and least important investment option each time

Here are the results:



The more a consumer knows about National Grid, the more important they believe the investment option to be:

PRIORITIES – AMONG TOTAL AND THOSE KNOWLEDGEABLE ABOUT NATIONAL GRID

Select 'An international electricity and gas company that transfers electricity and gas from its source to people's homes and businesses' and claim to know a fair amount or a great deal

	Total	Knowledgeable about National Grid (vs. Total)
Maintaining and developing a reliable a network to make sure electricity is available whenever it's needed	345	+11
Using new technologies to deliver a sustainable (e.g. both reliable and environmentally kind) energy network	321	+10
Maintaining and developing a reliable a network to make sure gas is available whenever it's needed	319	+14
Developing an electricity network that easily allows any new sources to be connected	300	+22
Developing the resilience of its network to cope with a terrorist or cyber attack	289	+24
Preparing its electricity network for the increasing use of electric vehicles and / or electric household heating	282	+17
Creating a gas network that allows new sources, such as bio-gas and hydrogen, to be connected	281	+16
Ensuring a reliable supply of energy in 10 years and beyond, even if this increases bills for today's consumers	279	+27
Adding an additional layer of resilience to the electricity network in critical areas of the country, such as major cities or industrial centres	270	+24
Going beyond its obligations to reduce its carbon emissions in everything it does (from building infrastructure to its day to day operations)	265	+6
Adding an additional layer of resilience to the gas network in critical areas of the country, such as major cities or industrial centres	258	+27
Educating future generations about the importance of a sustainable energy industry	250	+2
Using underground cables instead of overhead lines for all new major connections to its electricity network	238	+5
Creating a gas network that allows new sources, such as shale gas, to be connected	230	+34
Minimising its impact on consumer bills in the short-term, even if this means higher bills in 10 years time	205	+8
Replacing all existing overhead lines in National Parks and Areas of Outstanding Natural Beauty with underground cables	202	+4
Reducing the number of pylons in favour of underground cabling in all areas of England and Wales	195	+2

Consumer listening

These are independently facilitated workshops designed to help us understand what consumers think about key topics as well as a tool to facilitate senior leadership team engagement with consumers and what's important to them. This type of event helps the evolution of the company culture. These events include consumers that represent all socio-economic groups. However, due to their nature, they aren't nationally representative, but act as an additional source of qualitative insight to confirm or challenge outcomes of alternative engagement techniques.

Objective:

To understand consumers views on key topics to inform current and future business plans.

We've held two sessions to date:

25th February 2019 – Birmingham		23rd July 2019 - Edinburgh	
Table 1: ABC1 x 7 3 male, 4 female Age: 18 – 45	Table 2: ABC1 x 7 4 male, 3 female Age 46+	Table 1: ABC1 x 8 4 male, 4 female Age: 18 – 45	Table 2: ABC1 x 8 5 male, 3 female Age 46+
Table 3: C2DE x 6 4 male, 2 female Age: 18 – 45	Table 4: C2DE x 8 4 male, 4 female Age 46+	Table 3: C2DE x 8 5 male, 3 female Age: 18 – 45	Table 4: C2DE x 6 3 male, 3 female Age 46+

Findings:

Overall prioritisation:

	Birmingham (Feb 19)	Edinburgh (July 19)
Reducing our carbon emissions	NA	1
Helping the move towards a low carbon economy	2	2
Ensuring a reliable gas supply	1	3
Managing our air quality emissions	NA	4
Managing cyber security	NA	5

Keeping gas bills down for everyone	3	6
Helping the fuel poor and vulnerable consumers	4	7

Topic	Question	Response
Affordable energy bills	"Do you think keeping gas bills down for everyone is something that National Grid Transmission should be focusing on?"	• There is general confusion amongst consumers about the role that National Grid Gas Transmission has from extraction to delivery, most of the time National Grid's role is confused with suppliers and providers. • Majority of consumers believe that the responsibility of affordability falls on the suppliers or in some cases Ofgem. - *"…suppliers and providers should be able to associate costs"* • Consumers believe that it is important that National Grid should help contribute to lower bills however our influence is limited - *"It's such a small percentage on our bill I'm not quite sure of the effect that National Grid's reducing costs would have on our bill because its only 1.6% anyway. So, if they halved it, it's not really going to make much of a difference or much notice to us"* • National Grid's contribution to affordable energy bills should not come from cost-savings that result in the deterioration of network's reliability. - *"They should be trying to get the best value for money",* • When mentioned, consumers are surprised by the percentage charged (being lower than expected) and some responses being that the price they pay for the service is fair. - *"I think it's fair for what they're offering", "I couldn't believe how, to be honest, how low your percentage was, you know, if somebody had asked me I'd have said that actually it would have been a lot higher, 20%, sort of 20%, but actually it's very low in comparison to what you do really."*
Cyber-security	What are your thoughts about cyber security in relation to National Grid gas transmission? (Consumers)	• High-standards of cyber-security is paramount for National Grid as the gas network is integral to domestic living - *"Essential considering what's going on in the world these days."*, *"It's a priority."* • As a natural monopoly National Grid may be more prone to more sophisticated attacks - *"Anybody who is serious enough to do that has always got intent, I don't think they would do that for a laugh and it will cost money to throw resource at it"* • Actions that could be taken: more investment in IT, a cyber-security team, continual update of the systems and high levels of security at the lower levels of the company, "*The systems should be secure….", "Continuously update it", "Ensure the strength of passwords of users*…", *"...have some sort of cyber security team."*
Air quality	Should we be focusing on air quality and carbon monoxide?	• Local air quality is important to consumers due to the health concerns associated with it • National Grid has a responsibility in improving local air quality because they are part of the transmission process of pollutants to the atmosphere - "*Emissions are part of the transmission process…", "They need to have a duty of care."* • National Grid should use existing solutions such as the conversion of existing compressors to electric or other solutions that offset the emissions such as planting trees - "*…catalytic convertors…", "…planting of trees…", "Swapped out the compressors", "Carbon capture…"*
Global emissions	Should global emissions be an area in which National Grid should focus on?	• National Grid should take a proactive approach when dealing with global emissions, either by coming up with solutions independently or working collaboratively with other networks - *"I would want them to kind of learn from other nations of other providers to see which one is best one and see what they are doing and then kind of learn from that if that's possible."* • Solutions could include following trends, using company profits to both help facilitate other schemes and implementing improvements in efficiency - *"…people are less reliant on gas fuelled things so maybe they should follow trend and maybe prioritise other ways of providing energy...", "Improved efficiency in homes and business' and a percentage of the profits going towards that"* • Reducing emissions is seen as high priority for National Grid due to the imminent issues of climate change

Topic	Question	Response
		• Consumers believe that National Grid is responsible for the emissions that it produces and should implement practices that reduce it - *"So, if they are responsible about producing CO2 along some level then yeah, they have to look at that…"*
Low carbon future	Do you think that National Grid should be facilitating the transition to a low carbon economy? (Consumers)	• Consumers want National Grid to help facilitate the transition towards a more sustainable network by making the network compatible with alternative sources - *"More investment in carbon neutral to protect our usage…"* • Consumers are confused about what actions National Grid can take to move to a low carbon future, with individuals stating that we should transport extracted gas that is reasonably sourced or merge with a supplier to speed up the transition to a low carbon future if suppliers are being complacent. Disparity between age groups • 45+ are concerned with the potential ramifications for consumers of National Grid assisting in a low carbon future, either through increased billing costs by having to use an alternative fuel or a reduction in the reliability of the network, "*It would come down to reliability, that's the thing", "It's interesting because to actually change to electricity, it's got a very significant cost associated with it to heat your home."*
Ratings Justifications		• There doesn't seem to be a unanimous decision across socioeconomic groups at the different events for which priority is the most important for National Grid and the reasons why • Reliability of the network seems to be considered the most important in the majority of groups, it is consistently ranked highly amongst the older categorized groups whilst in the younger groups there tends to be mixed responses, regardless of socioeconomic status • Reliability of the network is argued to be most important both due the fact that gas is a necessity and that National Grid is the only company that provides this service - *"If they transport it, so that's their job to keep it reliable, make sure we get it.", "Reliable, the same, that you need it.", "Well it's their job isn't it, there's nobody else doing it." "Can't function without it.", "It's a necessity.", "No because they're the only ones who can transport our gas, yeah."* • In groups where there is a greater mix of which priority is the most important, consumers tend to state cyber-security instead of reliability, this seems to be because of the eminent threat that cyber-security poses and how it links with other priorities *"cyber security because if that is compromised then we aren't going to have a supply of gas", "Yeah because it's a weapon so it has to be"* • Keeping bills low and helping the vulnerable is consistently ranked low across all socioeconomic classifications and age groups – neither are seen as National Grid's responsibility both due to the limited impact that we can have and because these priorities are seen as the responsibility of either the government or the providers *"Well I don't think they've got too much of an influence on the gas bills.", "Trying to think that this isn't their responsibility really. It's not, doesn't mean it's a low priority just think it's someone else's responsibility."* "*I don't think it's their duty.", "It should a priority. It should be a priority for the government and the suppliers. …"* • Two groups, one from each socioeconomic group, rank keeping bills affordably low because of the potential trade-off it may have with sustainability *"…we shouldn't just get it from the cheapest gas producer but also thinking longer term about the sustainability…", "… with the new structure that is going to be in place such as reducing the carbon, mission's footprint etc. keeping gas bills down would be the hardest task. Somewhere along the line with everything you have to do that going to get hit"*
Reliable service of gas		• Unanimously agreed across groups that the reliability of the network is an important priority both because gas is a necessity and due to National Grid's position as a natural monopoly - *"Because we need to use it. Everybody needs it so it is vital", "Well it is there business. If they can't supply the gas then they have no business surely" "Well given that that's their monopoly I think yeah. it's very important".* • There are a wide range of suggestions that can help improve or maintain the reliability of the network: maintaining existing asset health and improving their performance by implementing the new technologies, facilitating the transition to other energy sources, ensuring the infrastructure is adequately planned to accommodate any increase in demand, ensuring that there are backup systems in place if there are technical issues

Topic	Question	Response
		on a certain proportion of the network, and making sure the system is not reliant on one supplier/country "…say there's a big influx of housing going on in one part of the country, and your infrastructure possibly wouldn't be able to meet that demand, can you then invest to prevent that happening?" "New energy too. There is a big monopoly in gas but it's a fossil.", "Maintain the pipelines", "And upgrade"
Responsible business		Activities suggested: • Recycling • Apprenticeships • Volunteering in economically deprived areas Community • The C2D group believes that National Grid should direct its activities towards those that are most affected by our practices and those that are economically less fortunate - *"…, if you could put x percent of your profits into good community causes around the country that would be … I think people would think, okay, well at least you're giving something back."* • The C2D group suggests that National Grid could give employment opportunities to individuals of all educational levels and those who have recently come out of rehabilitation • The ABC1 consumers believe that it will lead to an increase in bill prices and that it is not National Grid's responsibility - *"…I think the experts should be experts at doing what they do best.", "No just to do anything like that, charity work or whatever, it's just going to put people's bills up isn't it, people don't want that."* Volunteering • Same ideas are iterated as said in response to community Available land • Unanimously agreed that this land should be used for either recreational or educational purposes - *"You'd have geography school trips.", "But work with somebody like, I don't know, The Wildlife Trust, or RSPB or, you know, whoever, actually have a partner."* Environment • Improvement in environment can be achieved through both educating the public and improving our current business practices such as going into schools to talk about fuel efficiency and turning existing brownfield sites to wildlife areas - *"Support in terms of what we said in terms of educating children about fuel and fuel efficiency." , "Well, you could even do like working with universities and looking at studies about renewable energy and efficiency." , "…like talking about educating new builds and houses and academic buildings where they're more sustainable and less impact on the environment*.", *"But work with somebody like, I don't know, The Wildlife Trust, or RSPB or, you know, whoever, actually have a partner."* – This is all from C2D group STEM • Encouragement should be focused towards minorities (e.g. economically less fortunate and women) - *"Well we need to train people up for the future don't we and I think that still women are underrepresented and other minorities, they think it's not for them,…"* • C2D: Encouragement should be directed to all educational levels through apprenticeships, scholarships and job centre advertisement - *"Sponsorship.", "…like young people who won't go to uni, (a) for financial reasons and because it's not necessarily the done thing in their family, so it's just about tapping into those young people who are going to be our future engineers,…", "I don't necessarily agree that university's the answer, I think technical colleges are the answer."* Importance and Justification: • Mixed response on the most important priority within being a responsible business either being improving the environment or encouragement of STEM

Topic	Question	Response
		• Environment is argued because of both our corporate responsibility to help protect the environment and because of the number of personnel we have in the field - *"I think everybody's got to take part in the environment haven't they. Whether it's a company or an individual, we're all responsible to the environment", "With 6000 employees in the UK, so obviously your carbon footprint new because your vehicles are supplying the motorway. They can make some real quick wins in terms of producing their carbon footprint."* • STEM is argued because of the lack of engineers we have in the U.K. - *"I put encourage young people to take STEM subjects and make them engineers like we said, there aren't that many engineers about, we need engineers to carry on doing what they're doing."* • Unanimously agreed that these two priorities are heavily interlinked because encouraging STEM would result in the improvement of the environment in the long run - "*Because if you don't teach the young ones, how are they meant to know when they get older."* Lowest priority: • The C2D group believes that either volunteering or using available land is the least important priority whilst the ABC1 believe that it is only volunteering. • ABC1: Volunteering because of its limited impact - *"You think what is the point of a company wasting all that money on..."* • Available land because most consumers either do not clearly understand what the land will be used for or believe it is conditional on where the land is; the more remote the smaller the positive impact - *"… mum's with prams and stuff like that, they're not going to travel all that way to go … or even lonely people if they want to go and sit on a bench when it's a nice sunny day, you're not going to go all that way…", "I don't know, I just think like why would you want to go to some grass…"*
Helping the vulnerable and fuel poor	Should helping the fuel poor and vulnerable be something National Grid focuses on?	• The responsibility lies with both the government and suppliers - ….", *"Again, going back to National Grid, that's not your … that's not under your control, you can't control that, but it is wrong, but again it's the energy companies."* • Helping the vulnerable is of importance to consumers however they do not believe that it is National Grid's responsibility, it should be achieved through collaboration across the industry or from government regulation - *"Everybody is going to have a part to play in it but I don't know what"* • 50% of the 18 – 45-year olds would like to see cooperation between other members of the industry and National Grid to help the vulnerable - *"It needs to be a combined force really, where everyone gets involved."* • Consumers believe that the impact that we can have on vulnerable consumers is limited to the percentage that we add to bills - *"I don't think there's much they can do, after I've thought about it- they take a small percentage anyway so nothing else much they can do*
Who should pay		<u>Reliable Gas supply</u> • Clear disparity between socioeconomic groups • ABC1 groups tend to be willing to pay more in order to ensure a reliable gas supply because they believe that the hypothetical additional cost is marginal and that the service we provide is essential to consumers "And if it's only a nominal amount.", "It's 50p, if it was £50 I wouldn't", **"**Because I think it is imperative that we maintain the current system and if there is not enough invested back into the current system it is going to fail…." • C2D groups tend to believe that National Grid should pay for any additional costs to maintain the network because it is seen as our responsibility to do so "Because it's a monopoly, they've got to do it.", "I think that's their responsibility." <u>Helping the poor and vulnerable</u> • Consumers from the event in England are less inclined to pay more to help the fuel poor, this tends to be because they believe that it is neither their or National Grid's responsibility to do so, with it being more the responsibility of both the government and suppliers "I think it's the duty of your British Gases, your energy people, to deal with that.", "It's definitely down more to suppliers and government.", "I think it's the government's responsibility…."

Topic	Question	Response
		• A proportion of these consumers are also sceptical of a scheme that subsidises the fuel poor's bills as it may be potentially abused, or they believe that vulnerable consumers should be educated on the subject instead of receiving subsidised bills "...flawed system, a lot of the vulnerable that would claim it are probably better off than I am", "…. If I company wants to work with a charity and have their logo associated with a charity, they should do it and us consumers shouldn't be paying for it" , "Well it's down to education, I know it sounds harsh, people need to keep an eye on their smart meters, keep an eye on what they're using because at the end of the day, what they're using, they've got to pay for. So they need to realise what they're burning money on." • The responses from consumers in Scotland are more mixed, consumers say no because they believe that helping the fuel poor is the responsibility of the government and suppliers • Those who are willing pay to help the fuel poor would be happy to do so if they were informed where and how the additional finances are spent "I voted yes under the condition that you actually would use the extra money for that specifically" <u>Low carbon economy</u> • Most consumers are willing to pay to help National Grid facilitate the transition to a low carbon economy, this tends to be because consumers believe that it is the shared responsibility of both companies and individuals "Well yes – it's everyone responsibility and it's our future, we all have to help.", "I just think that everybody has got to do it and there's probably an agreement we are all responsible for it" • Those who are unsure or said no, did so because they believe that it is part of our corporate responsibility so do not believe they should help finance this transition "I think it's the responsibility of the distributors and the producers – we have a minimum and we don't know how to reduce that but if you tell us how to do that then we will. I think it's the social responsibility." • Others believe that because we are a profit organisation then it is National Grid's responsibility to pay for this transition "I think National Grid but all these big companies as a whole, they should contribute more as they are making a lot of money, part of that process they sell or transport, so its up to them to contribute to that" <u>Managing cyber-security</u> • Mixed responses across consumers on who should finance cyber-security • Those who say that they are willing to pay believe that it is a shared responsibility due to the fact that the transmission network is crucial to national security and gas is a necessity. "This applies to us because we need the power, we need to use it. We have a responsibility, its not just on National Grid…", "Like you said security is the main issue for the country so I am willing to pay an extra 50 pence for that. I know that with any problem security wise then the whole country is gone. It is like paying for defense" • A fraction is unsure whose responsibility it is to pay. "I am just not sure where the responsibility should fall" • The reason that a proportion of the consumers are either unsure or don't believe that they should pay is because they believe that it is National Grid's responsibility, stating that consumers wouldn't have to pay an additional amount to expect the same level of cyber-security from other companies. "You wouldn't pay extra money to other companies for the same reason…" <u>Air quality emissions</u> • C2D consumers are less inclined to want to finance National Grid to reduce pollutants emitted, this is either because they believe that it is National Grid's responsibility or, a similar reason being, that this priority should not be cost dependent and should be done regardless. "I feel that it's something that should be done already. I'd be more inclined to give them 50p more to improve their technology to make it more ego friendly rather than to make sure they're not emitting any more gas. I know it's a similar thing but", "I don't think that companies should be looking for monetary incentive to do that. I think they should already be doing that…." • ABC1 consumers are more inclined to want to pay to help reduce pollutants emitted by National Grid, either because of the potential health risks caused by the pollutants or because that it is viewed as a shared responsibility. "It affects everyone", "Its future generations aren't it", "The quality is going to affect people's health and the NHS bills are going to go up"

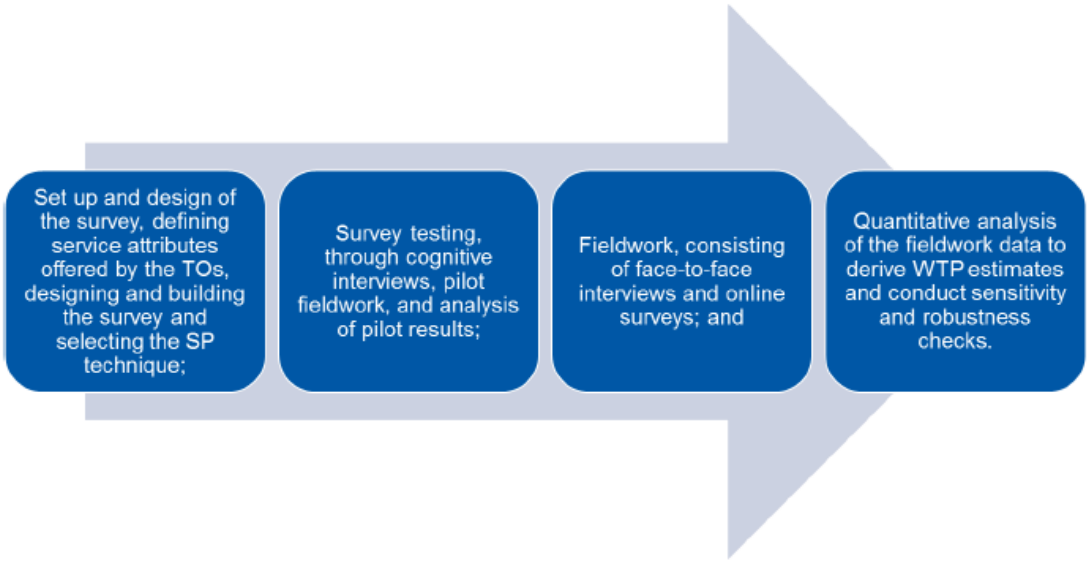
Topic	Question	Response
		Reducing carbon emissions • It is almost unanimously agreed amongst consumers that they are willing to pay to reduce National Grid's carbon footprint. This is because of the threat that global warming poses and they are willing to pay the price associated with being more sustainable. "It has to be part of our after measures right across the board to try and reduce. It is like plastic bags, single use plastic, it is one of these things we are going to have to pay for whether we like it or not"

Willingness to pay

Executive Summary

NERA Economic Consulting (NERA) and Explain Market Research (Explain) were commissioned by a consortium of the four Transmission Operators (TOs) in Great Britain (National Grid Gas Transmission, National Grid Electricity Transmission, SP Transmission and Scottish Hydro Electricity Transmission) to estimate consumers' willingness to pay (WTP) for improvements in the service provided by the TOs, domestic and non-domestic gas and electricity consumers. To achieve this, we have designed, implemented and analysed the results from a series of stated preference (SP) surveys, which derive valuations from consumers' stated choices about trade-offs between changes in services provided by the TOs and changes in their energy bills.

We chose to use a stated preference approach to enable us to consider a broad spectrum of service attributes, which would not have been feasible using other techniques such as revealed preference which requires data on consumers' choices about the levels of service they demand for similar services; such data is often not available. Stated preference also has the advantage of allowing us to value the private value consumers derive from using services, as well as the altruistic or existence value they place on services provided by the TOs that bring environmental or societal benefits.
The full report is available, please contact Jennifer.pemberton@nationalgrid.com
For the rest of this summary, we will cover the Gas Transmission results.
The project consisted of four main stages, summarised below



We conducted two SP surveys, one each for domestic and non-domestic gas end users. The surveys used a mix of face-to-face and online methods, adhering to best practice in the conduct of WTP surveys. We conducted fieldwork only after a thorough process of defining attributes and testing the survey instrument.

The two surveys consisted of five attributes related to the service provided by the gas TO, National Grid Gas:

- Risk of Supply Interruptions;
- Improving the environment around transmission sites;

- Supporting local communities;
- Investing in innovation projects to create future benefits for consumers; and
- Supporting consumers in fuel poverty.

- Finally, the domestic gas surveys also tested consumers' relative preferences for five alternative heating technologies:
- Gas boilers;
- Air source heat pumps;
- Ground source heat pumps;
- District heating systems; and
- Hybrid heat pumps.

Research Method

Here is a summary of our approach to developing the survey:

Robust process of iterative testing to ensure respondent understanding	▪ NERA and Explain developed an initial version of the survey instruments drawing extensively on industry best practice and our prior experience of designing stated preference studies
	▪ We obtained comments on the draft survey instruments from the TOs, and, following discussion of these comments, we adjusted our initial draft to create a draft survey instrument for use in cognitive testing
	▪ Based on the feedback we received from participants in cognitive interviews, we made revisions to the survey instrument before final internal testing;
Testing to ensure respondents make anticipated trade-offs when completing the survey	▪ We obtained feedback from the peer reviewer and reflected these in revisions to our model and
	▪ We then conducted a final test version of the survey instrument through pilot surveys, and again made minor changes to the instrument before proceeding to the main survey

Source: Explain and NERA.

We designed the stated preference surveys to conform with best practice in relation to stated preference research. In relation to the design of the questionnaire itself, we provided respondents with background information and context to improve the validity of their responses (e.g. the reason for conducting the research, the role of the TOs in the energy industry). We also provided detailed descriptions of service attributes through videos and other explanatory information, the content and phrasing of which was informed by focus groups conducted with consumers. Also, before asking consumers to make trade-offs between bill changes and service changes, we also reminded consumers about changes in their bill affecting the money they have available to spend on other things, and that their bills may change due to other factors.

Having designed the two surveys, we also tested them thoroughly. First, the draft survey was reviewed by the TOs and the NERA/Explain teams. We then performed cognitive testing to ensure the survey instrument was understandable and engaging to consumers. We also performed a pilot survey to validate the design of the stated preference questions.

Having conducted the survey, we also conducted a number of checks to ensure the validity of the survey data and the statistical robustness of our results. Overall, we concluded that the survey instrument performed well, providing a base estimate for the TOs' societal valuations at RIIO-T2. The evidence suggested that respondents engaged well with the instrument, and that a large majority reported that they were able to understand the attributes and make choices between packages. Only 3% of the gas respondents stated that they did not understand the services offered, and 2% of the gas respondents were not able to make comparison between services offered. These favourable performance indicators suggest our statistical analysis is unlikely to be affected by respondents' failing to understand the choices.

Our Results

As set out in the table below, we then followed an econometric model estimation process to estimate "logit" models from which we derived consumers' willingness to pay for changes in the service provided by the TOs. We subjected these tests to a number of checks to examine the drivers of consumers' choices (e.g. demographic characteristics).

Method for Econometric Model Estimation and Deriving Valuations from the Choice Experiment and Contingent Valuation Results

General-to-specific model selection procedure

- We started by estimating a basic model, which only controlled for service levels and bill effects.
- We then expanded it, following a "general to specific" modelling process, estimating multiple conditional logit models to test for the effect of respondents' demographic characteristics and other factors:
  - Gender, Socio-Economic Group (SEG), age, income, region, household size, family status
  - Research method (face-to-face vs. online), prior experience of interruptions, understanding of the services
  - Non-linearity in consumers' preferences
- We estimated a final "mixed logit" models using statistically significant factors. Where we control for consumer demographics, we estimate WTP for the population mean.

Standard procedure to avoid overstating WTP

- We also follow two steps to test if WTP from choice experiments is overstated by only covering some attributes of service:
  - We found that WTP does not depend on the statement in the survey about the "bill change for other reasons"
  - We compare consumers' WTP for each attribute in the Choice Experiments (CEs) to their overall WTP in the Contingent Valuation (CV) Exercise, and scale down the CE WTP results.

Source: NERA

Domestic Surveys

Using these econometric models, we find that domestic gas consumers are, on average, willing to pay for improvements in all attributes which were presented to them. We find positive WTP for all gas service attributes, shown in the table below. We also find that our willingness to pay estimates are statistically significant. In deriving these valuation estimates, we have made methodological choices that result in relatively conservative (low) valuation results, to avoid overstating the value consumers place on service improvement.

Recommended domestic gas willingness to pay value (£/consumer/year)

Attributes	WTP (£)
For a 1/10,000 reduction in the probability of a supply interruption.	6.71
Improving environment around transmission sites	
Additional 3 large sites and 10 small sites	3.61
Additional 11 large sites and 30 small sites	5.37
Supporting local communities	
Current level of community schemes compared to no support	4.79
Current level of community schemes and additional funding to charities and other organizations compared to no support	6.85
Investing in innovation projects	
Small scale projects compared to no innovation projects	6.05
Large scale projects compared to no innovation projects	9.40
Supporting consumers in fuel poverty	
Provide information to lower their energy bills compared to no information	1.41
Provide information to lower their energy bills and funding/financing compared to no support	5.06

Source: NERA Analysis

We also find domestic gas consumers would require, on average, alternative heating technologies to be materially cheaper than gas boilers for them to be willing, when replacing their existing boiler, to adopt an alternative technology. For instance, as the table below indicates, an average consumer would need an air source heat pump to be £8,966 cheaper than a gas boiler in order to switch away from a gas boiler.

Recommended Domestic Alternative Heating Technology Willingness to Pay values (£/consumer/year)

Attributes	WTP (£)
Air Source Heat Pump instead of installing a Gas Boiler	-8965.90
Ground Source Heat Pump instead of installing a Gas Boiler	-13426.76
District Heating System instead of installing a Gas Boiler	-9099.76
Hybrid Heat Pump instead of installing a Gas Boiler	-19140.36

Source: NERA Analysis

Non-Domestic Surveys

We find non-domestic gas consumers are willing to pay for higher service across most attributes, although for some attributes (and, in some cases, for the highest service level for an attribute), non-domestic consumer's WTP is not statistically significantly different from 0, and in these cases we take a conservative approach by assuming zero WTP. Since we conduct our non-domestic analysis in terms of percentage changes in consumers' bill (rather than absolute £ changes – as we use in the domestic survey), we monetise willingness to pay by multiplying by the median bill of respondents (see the final column of the table below), which is conservative given the positive skew in the distribution of non-domestic consumers' bills. This approach was necessary due to the wide range of variation in non-domestic consumers' bills in monetary terms. We therefore performed the logit modelling using bill changes specified in percentage terms to reflect the survey design.

Recommended non-domestic gas willingness to pay values in percentage and monetary terms

Attributes	WTP (%)	WTP (£)
For a 1/10,000 reduction in the probability of a supply interruption.	1.53%	**49.08**
Improving environment around transmission sites		
Additional 3 large sites and 10 small sites	0.31%	**9.91**
Additional 11 large sites and 30 small sites	1.13%	**36.35**
Supporting local communities		
Current level of community schemes compared to no support	1.45%	**46.65**
Current level of community schemes and additional funding to charities and other organizations compared to no support	1.70%	**54.73**
Investing in innovation projects		
Small scale projects compared to no innovation projects	1.36%	**43.74**
Large scale projects compared to no innovation projects	2.25%	**72.27**
Supporting consumers in fuel poverty		
Provide information to lower their energy bills compared to no information	0	**0**
Provide information to lower their energy bills and funding/financing compared to no support	0	**0**

Source: NERA Analysis.

Conclusions

For all surveys, we find that consumers express a statistically significant willingness to pay for a range of service changes considered by our survey. Our WTP estimates are robust to a range of different assumptions in our modelling, for example controlling for respondent characteristics (such as demographic characteristics and firm size), as well as alternative econometric assumptions (since we use both the mixed logit and conditional logit modelling techniques).

Also, for the reasons described in this report, we have made recommendations using the stated preference research that make a very conservative assessment of the statistical evidence when estimating consumers' WTP for service improvement, particularly with regards to our assumptions about consumers' WTP for the highest levels of service. Despite this conservative approach, we understand from our discussions from the TOs that the level of willingness to pay identified through this research exceeds the likely costs of provision by the TOs. On the face of it, this provides good evidence of an economic case for the TOs providing the services considered by the survey. However, this finding comes with a number of caveats that the TOs will need to consider during the business planning process:

- First, as further validation of the willingness to pay results, when used in business planning these WTP estimates would also benefit from being triangulated alongside other sources of valuation evidence, as well as other evidence of consumer preferences, such as qualitative research and analysis of consumers' support for business plan proposals. This reflects, for instance, cautionary guidance offered by Ofwat regarding potential overreliance on stated preference methodology.
- Even if the willingness to pay values we obtain are relatively high when compared to the costs of changing service levels, and if these findings are supported by other forms of quantitative or qualitative engagement evidence, it would not be appropriate for the TOs to use this study as evidence that consumers support the provision of service levels that go beyond the ranges considered in this report. Hence, our valuation results should not be applied outside the ranges of service we presented to respondents on the survey instruments.
- The valuations we have estimated do not (in isolation) provide sufficient evidence to justify the TOs carrying out any particular investment or scheme. They would need to feed into more detailed cost-benefit analysis (CBA) to justify particular initiatives or investments. For instance, even if consumers are willing to pay for the TOs to invest to accommodate renewable generation or electric vehicles ahead of a definite need, the valuation we obtain could only be interpreted as an approximate budget that consumers might be willing to contribute to such investments and does not support any particular investment project. Further technical and economic analysis would be needed to demonstrate the value of particular investments, with this willingness to pay evidence providing a cross-check and/or an input into CBA modelling.
- Finally, while our results demonstrate consumers value the service attributes covered in this research against the context of attribute descriptions that explain these services could be provided by the TOs, our analysis does not prove definitively which industry bodies should provide such support. For instance, while we have found evidence that domestic consumers are willing to pay for the TOs to provide additional support to fuel-poor consumers during RIIO-T2, our analysis does not prove conclusively that the TOs are best placed to provide additional support, or that consumers would not be equally willing to pay for other parties to deliver the same service.

For these reasons, willingness to pay studies of this sort should not be relied upon as the sole determinant of the levels of service provided by the TOs through their RIIO-2 business plans. However, it does indicate whether and by how much consumers are willing to see their bill go up to fund a certain change in service, even in light of the fact they have budget constraints, and they face trade-offs with other attributes.

Consumer narrative development

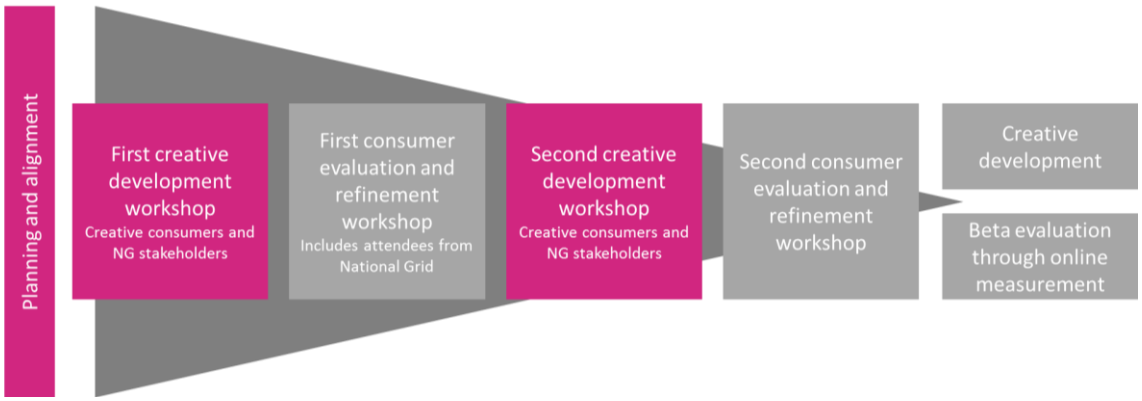
Background:

- With the increasing importance of understanding how NG can add value to the community and the focus on bill impact, there is a growing need to communicate directly with consumers
- Currently, consumers are often confused or unaware of what NG is and does, meaning that it is difficult for NG to have the important conversations it needs to have about what matters to people and what investments it should be making
- Given the impracticality of delivering a presentation with Q&A to every consumer, NG needs a way of making itself immediately relevant to consumers
- NG asked Truth to develop a narrative with consumers for consumers.

Purpose:

- Create relevant, engaging and succinct narratives to be the springboard for more meaningful conversation with consumers
- Narratives in this context could be a video, a diagram, a deck, story or combination of all of these.

Approach



The creative development workshops

Attendees

- Copywriters, screenwriters, graphic designers, marketing professionals and animators.

First workshop (March 2019)

- Briefing and deep immersion in National Grid
- Exploration of communication styles, formats and narratives
- Scoping and framing initial narrative ideas

Second workshop (March 2019)

- Building on consumer feedback to evolve and refine four narratives – 2 x gas and 2 x electricity

The consumer evaluation and refinement workshops

Attendees

- 8 consumers, all with gas and electricity in their home
- All from the broader Warwick area – to counteract any ‘London creative’ effect

- All needed to have capacity for creative thought and understanding in order to make the most of the co-creation workshop – but none were professional creatives
- A mix of professions and life stages

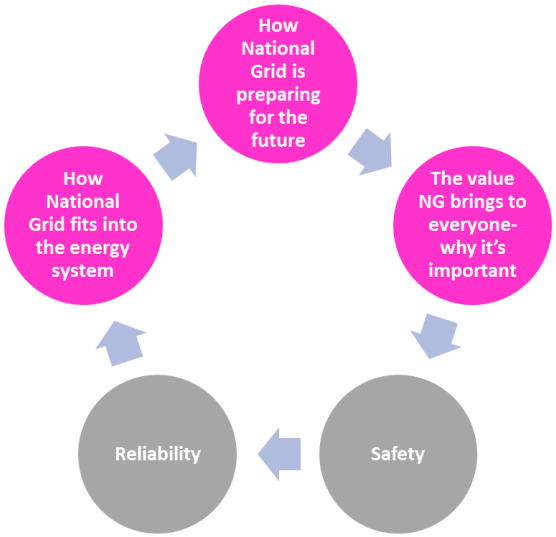
First workshop (March 2019)

- Presentation and Q&A from National Grid
- Exploration of communication styles that are engaging or not
- Evaluation and refinement of early-stage narratives

Second workshop (March 2019)

- Evaluation and optimisation of 4 narratives to help finalise 2-3 narratives to be tested quantitatively

The initial stages identified consistent content needs (both from National Grid and consumer perspectives)



These elements (along with an understanding of the cost to the consumer) formed the building blocks for the refined narratives.

Reliability and safety could be implicit in the NG story. Although, there was some interest in the cyber security side – it's new to them, something they've never thought about

Three routes were developed:

Gas – **Visionary** (yellow):

Future focused, centres around NG's vision of the future based on what it does in the present

Gas - **Everyman** (blue):

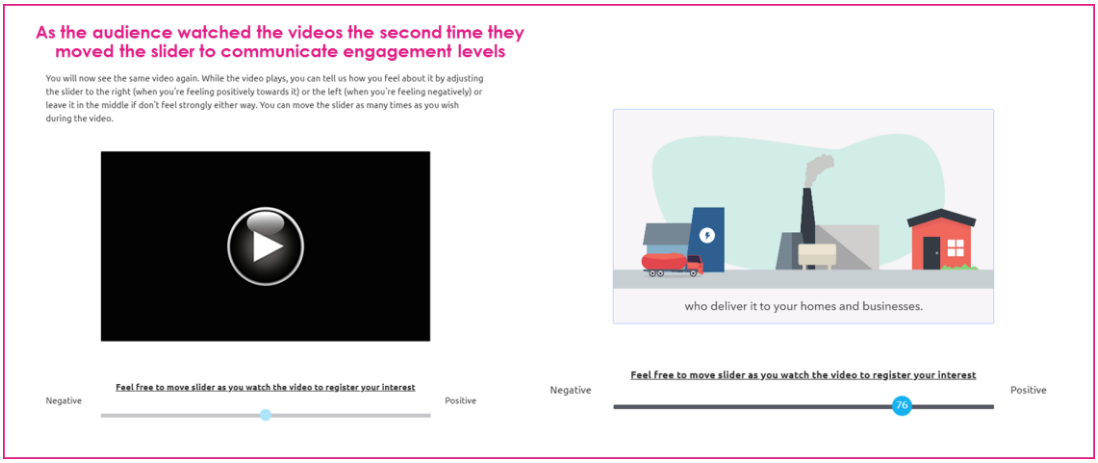
Down to earth and relatable, with targeted humour and employing **conversational and accessible tone**

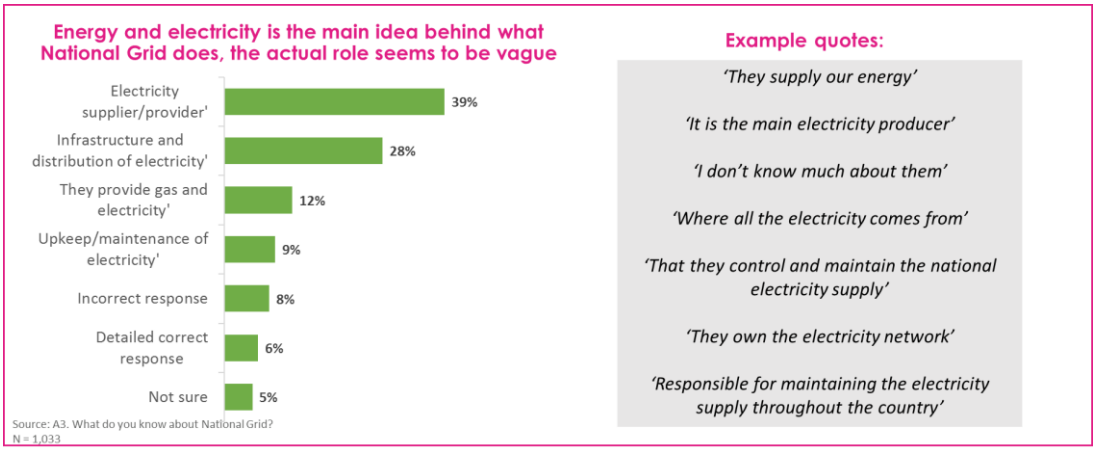
Electricity – **Translator** (green):

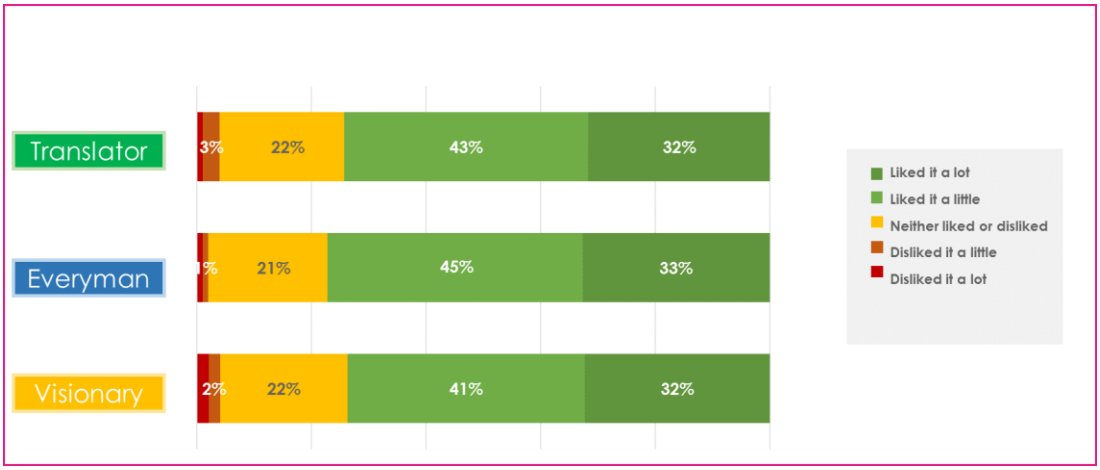
Lays down role of NG in **the most basic terms**, focussing on education and simplicity

Evaluation methodology

- A national representative UK sample was used in this survey to measure each of the three routes
- 1,033 interviews were conducted in total
- Monadic evaluation: respondents saw one route each, balancing the sample evenly across each route
- Respondents were profiled to ensure initial level of understanding of NG was balanced
- Video evaluation:
    - Gut response
    - In depth response
- Fieldwork completed on Tuesday July 8th 2019
- Data collected by Dynata and all under MRS and DPA Evaluation methodology





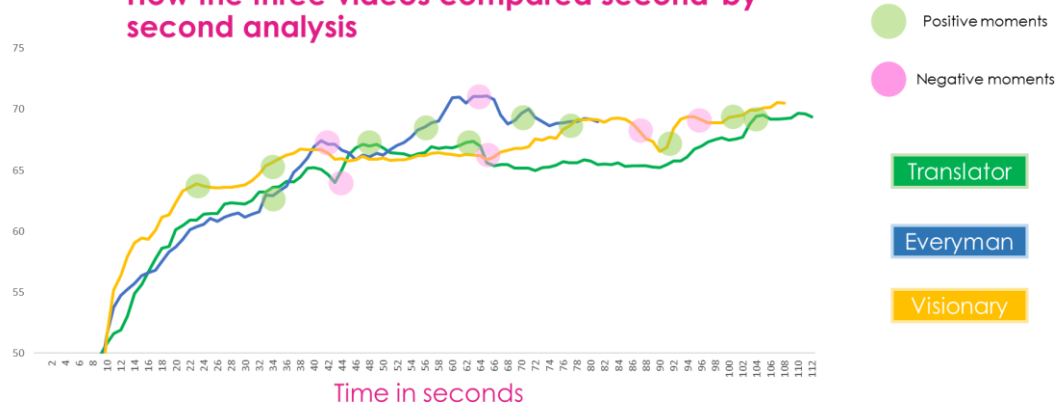


The outstanding response to all the videos is that they are 'Informative' and the audience learns something new from watching

	Translator	Everyman	Visionary
Informative/Told me something new	→ 51%	→ 55%	→ 50%
Boring	13%	7%	16%
Easy to understand	12%	10%	9%
Good explanation	7%	8%	9%
Simple/Concise	6%	7%	6%
Interesting	3%	8%	4%
Liked the music/graphics	4%	5%	5%
Too long	2%	1%	2%
Patronising/Childish	2%	2%	1%

Source: B1. Coded responses: Why did you give that response to the video?
N = 1,033

How the three videos compared second-by-second analysis



Interactive slider tool

Objective:

To provide a supplementary source of acceptability data asked in a more interactive way. Using the tool as the focus of a nationally representative study, consumers can make choices regarding our plans and see the impact on their energy bill. This is a joint National Grid Gas and Electricity project.

The research covered the following topics; reliability, reducing our emissions, environmental improvements, community impacts, resilience, decarbonisation of energy and heat and value for money.

Approach

A bespoke, interactive tool was designed by Proctor + Stevenson to offer an engaging and informative survey experience that allowed respondents to see in real time the impact of their choices on their annual bill.
A combination of online and face-to-face interviewing was undertaken to reach a nationally representative sample of bill payers across England, Wales and Scotland. This mixed sampling technique was chosen to secure a statistically robust sample size whilst ensuring that responses were obtained from a diverse range of respondents, including vulnerable customers and those who may not be found online.

Summary of findings

This research has recommended a bill increase to permit investment in consumer priorities. Throughout, there was significant support for the potential areas of investment previously identified by stakeholders and few respondents prioritised cost cuts over service maintenance or improvement.
On average, respondents were willing to pay £1.44 more on their electricity bill and 10p more on their gas bill to see their desired options implemented. These figures were based upon previously assigned costs and it should be noted that respondents on the electricity survey were presented with more service options that would impact upon their bill than on the gas survey. This, and differences in investment costs, account for much of the disparity in these figures
The findings from this research should triangulate with those from the collaborative willingness to pay and acceptability research projects to inform the 2021-2026 business plan.

Results:

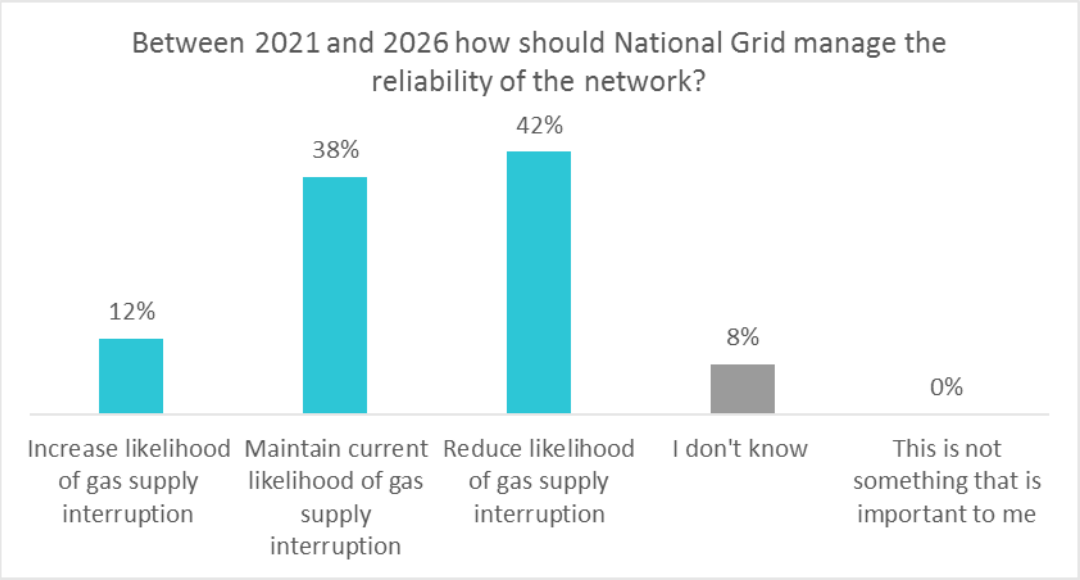
Reliability

Respondents were invited to consider the value they placed upon the reliability of the gas transmission network, where investment should be focussed and what level of security was appropriate.

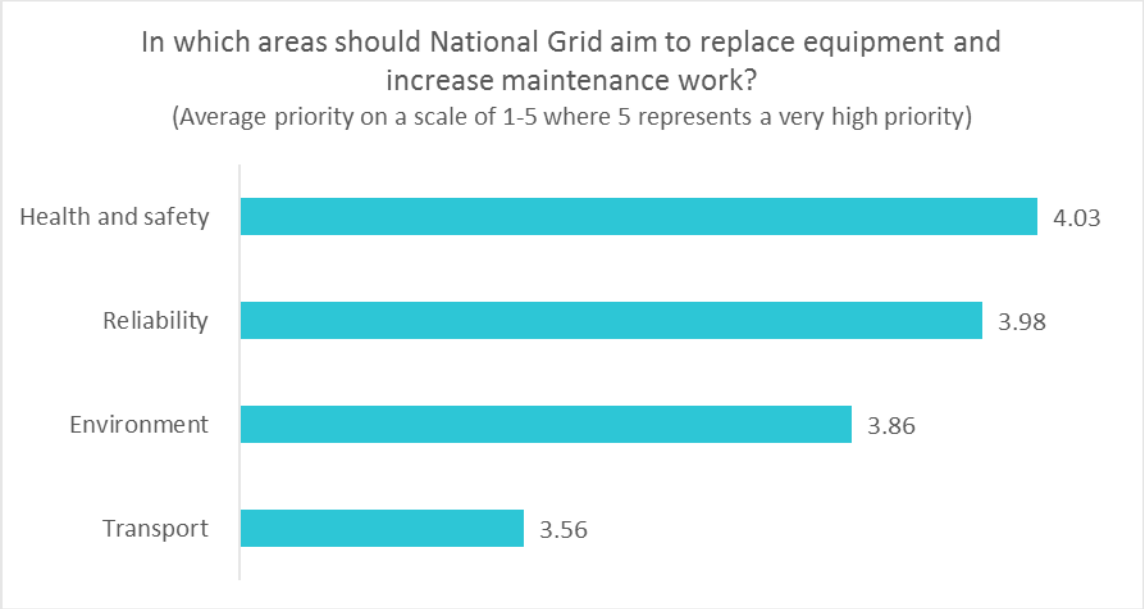
The first question required respondents to choose the level of investment they would like to see in reliability between 2021 and 2026. The choices presented were to:

- increase the likelihood of disruption at a saving of 83p per year
- maintain the current likelihood of disruption
- or reduce the likelihood of disruption at an additional cost of 42p per year.

8 in 10 respondents supported continued or increased investment to ensure reliability, with 38% looking to maintain the current likelihood of gas supply interruption and 42% preferring to increase the cost to the consumer from 7p to 23p per year in exchange for a reduced likelihood of gas supply interruption. 12% would prefer to cut costs and accept an increased risk of gas supply interruption.

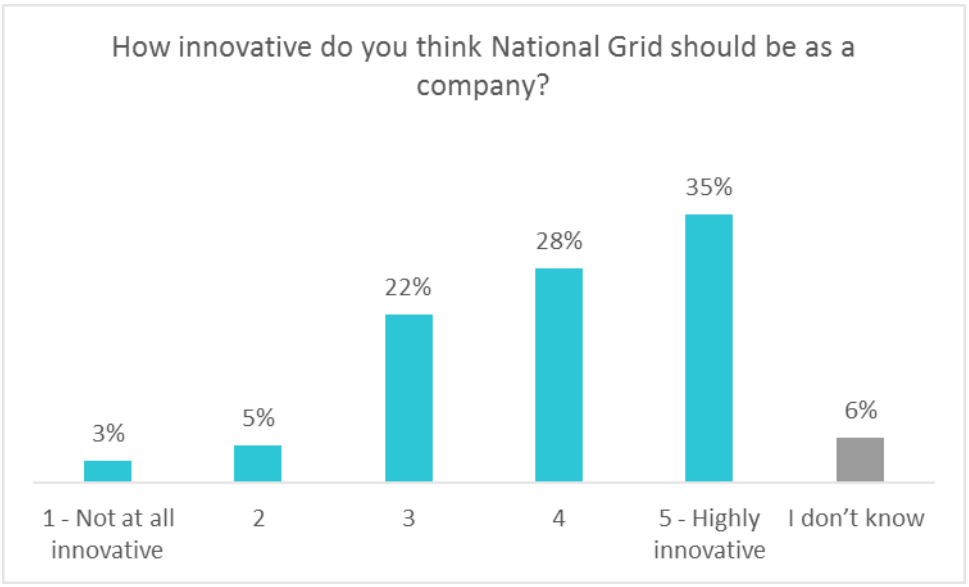


National Grid undertake a rolling programme of investment to maintain its infrastructure and replace equipment. This can be tailored to business priorities. Consequently, respondents were asked to identify such priorities by assigning ratings to each area on a scale of 1 to 5 where 1 was a very low priority and 5 was a very high priority. Their choices on this question has no impact upon their virtual bill. Reliability came a close second to health and safety in this instance.



	Health and safety	Reliability	Environment	Transport
5- a very high priority	48%	43%	41%	22%
4	23%	30%	25%	31%
3	18%	15%	20%	32%
2	8%	7%	6%	12%
1 – a very low priority	4%	5%	7%	3%

In addition to day-to-day upkeep, National Grid must also consider how the gas network should be protected against external threats, such as cyber-attacks, physical attacks on equipment, and natural dangers such as extreme flooding. Respondents were asked to consider what level of protection would be appropriate to combat such threats. No direct impact on bill was shown for this question but respondents were informed that the higher the level of protection the higher the anticipated cost. To aid comparison, examples were given of an industry currently enjoying each level of protection from the defence industry for very high levels to the agricultural industry for low levels.



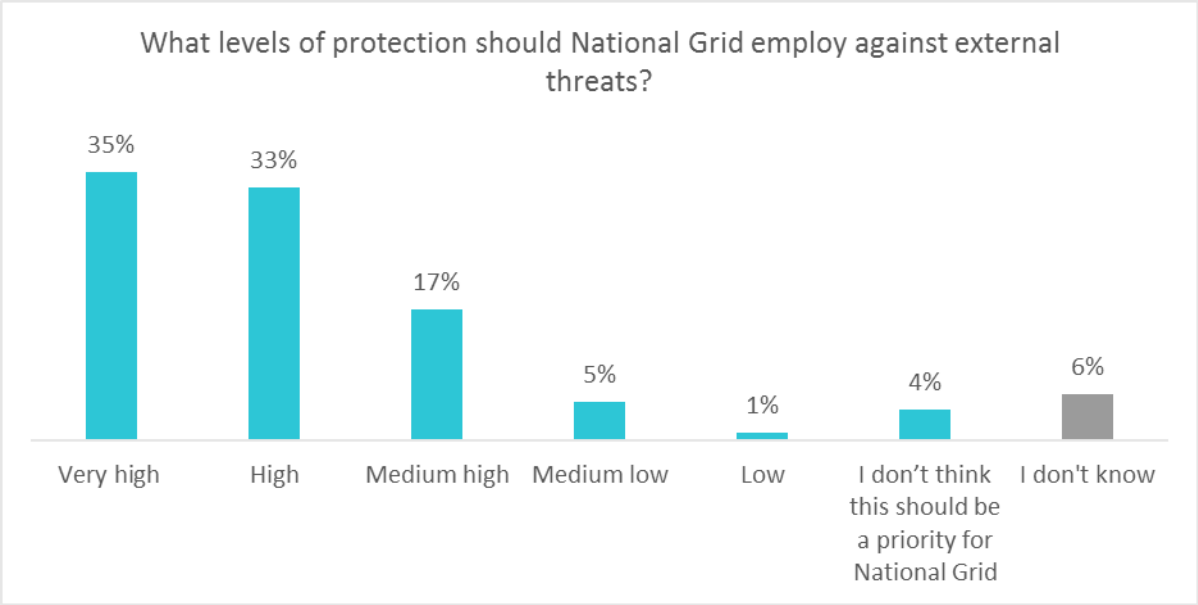
Respondents placed high value on the gas network with **almost 7 in 10 favouring high or very high levels of protection.**

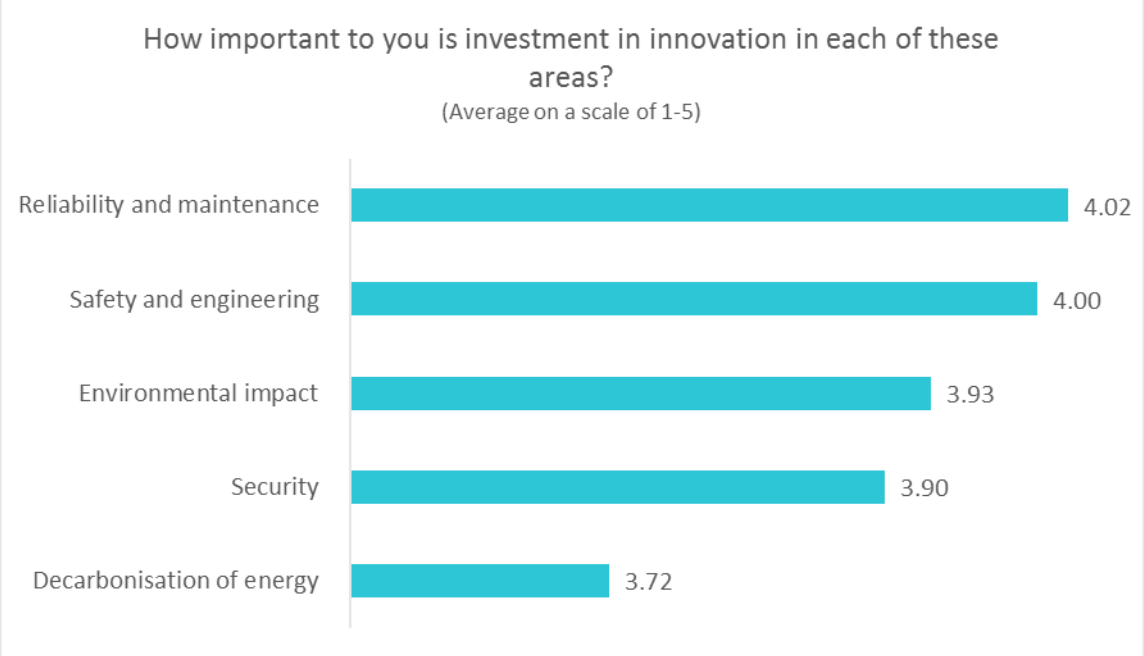
Innovation

Currently National Grid invest in innovation projects where they anticipate operational efficiencies, service improvements, cutting costs to consumers or environmental benefits. However, the very nature of innovation means that all such investments carry an element of financial risk. Respondents were therefore presented with the pros and cons of innovation and asked how innovative they felt that National Grid should be as a company. No direct impacts on consumer bills were specified.

There was **strong support for innovation with 63% in favour** and 35% supporting the highest level of innovation.

Through stakeholder consultation National Grid identified potential areas of innovation in which to invest. Respondents were asked to rate the importance that they would place on each on a scale of 1 to 5 where 1 is not at all important and 5 is extremely important.





	Reliability and maintenance	Safety and engineering	Environmental impact	Security	Decarbonisation of energy

5- extremely important	48%	44%	45%	41%	34%
4	25%	28%	24%	27%	29%
3	14%	18%	18%	19%	22%
2	7%	6%	8%	7%	9%
1 - not at all important	6%	5%	6%	6%	7%

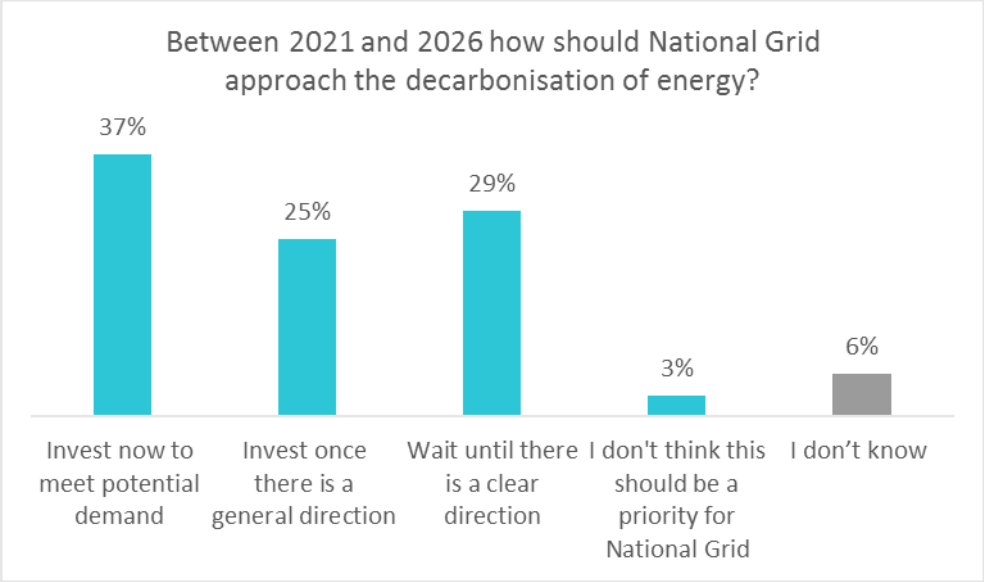
Reinforcing the earlier views of stakeholders, respondents placed importance on all areas. However, they were significantly less likely to say that decarbonisation of energy was extremely important compared to other areas.

Moving to a greener economy

This section addressed the challenges that society faces in moving towards the decarbonisation of energy. Specifically, reducing the global amount of carbon dioxide in the atmosphere by adopting low-carbon sources of energy. The UK Government has set the target of carbon neutrality by 2050.

To achieve this target will require change at both the infrastructural and individual level. Respondents were therefore asked both to consider how National Grid should approach the decarbonisation of energy and about their own decision-making processes when choosing a new heating system. Their choices in this section did not impact upon their virtual bill.

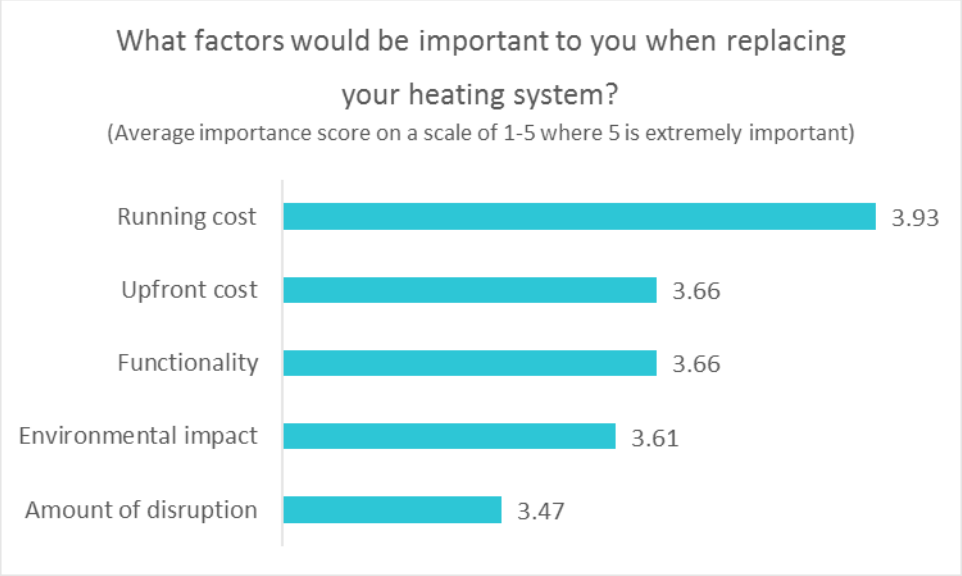
Respondents were divided on the best approach to decarbonisation of energy



37% favoured immediate investment on the understanding that this could avoid disruption and speed up the process but may run the risk of investment in solutions that later developments prove obsolete. 25% preferred to wait until there was a general direction for decarbonisation, such as a likely move to hydrogen or biogas, a medium risk strategy. 29% preferred to hold off investment until there was a clear decision made on future direction, prioritising a low level of financial risk over faster progress towards decarbonisation. In this context investment was defined as the undertaking of rigorous testing and analysis to ensure the right type of equipment is in the right place, and all is safe to carry different types of low-carbon gas (such as biomethane and hydrogen).

Moving on to the individual level, respondents were asked to imagine they needed a new heating system. Who and what would influence their choices and what systems may they consider? A brief video explanation was offered of each unfamiliar heating system to aid understanding.

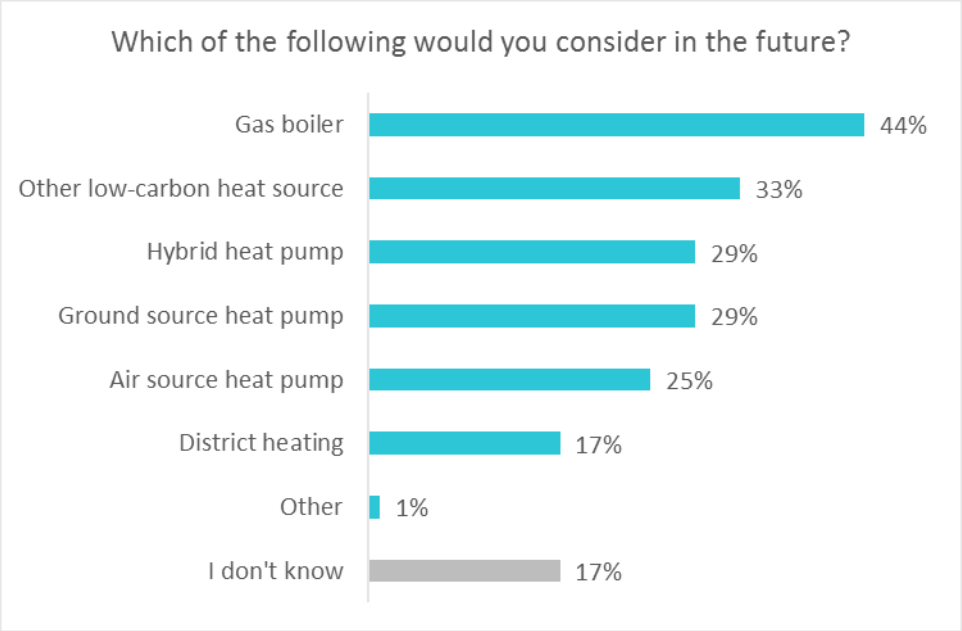
Cost and functionality were the primary concerns for the average respondent.



	Running cost	Upfront cost	Functionality	Environmental impact	Amount of disruption
5- extremely important	49%	36%	31%	31%	24%
4	21%	23%	29%	26%	26%
3	14%	22%	22%	24%	31%
2	8%	12%	9%	11%	12%
1 - not at all important	9%	8%	***8%***	8%	8%

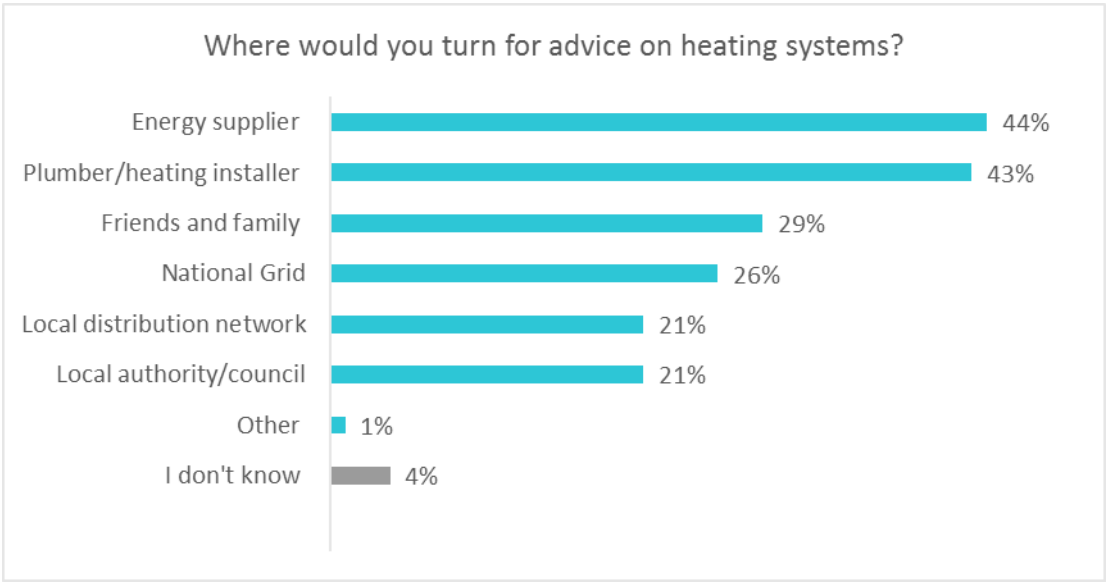
Respondents leaned towards conservatism when considering future heating systems. 44% would consider a gas boiler. 29% would consider a hybrid or ground source heat pump, the next most widely considered of the specified options.

Nationally fewer than 1 in 5 would currently consider district heating, an option that requires community wide rather than individual changes.



Respondents found this question harder to answer than most with 17% opting for 'I don't know', this rose to 21% of women. Moreover, findings suggest that environmental impact is a consideration with a third saying that they would consider a different, unspecified low-carbon heat source, more than opting for any one specified low carbon option. The comparatively high response to these indeterminate options may reflect the challenge of moving from a familiar option, the gas boiler, to as yet unfamiliar alternatives.

Half of respondents would search online for advice on heating systems with energy suppliers and plumbing or heating professionals close behind as popular information sources. Just over a quarter (26%) would consult National Grid, dropping to 19% of over 65s.



The environment

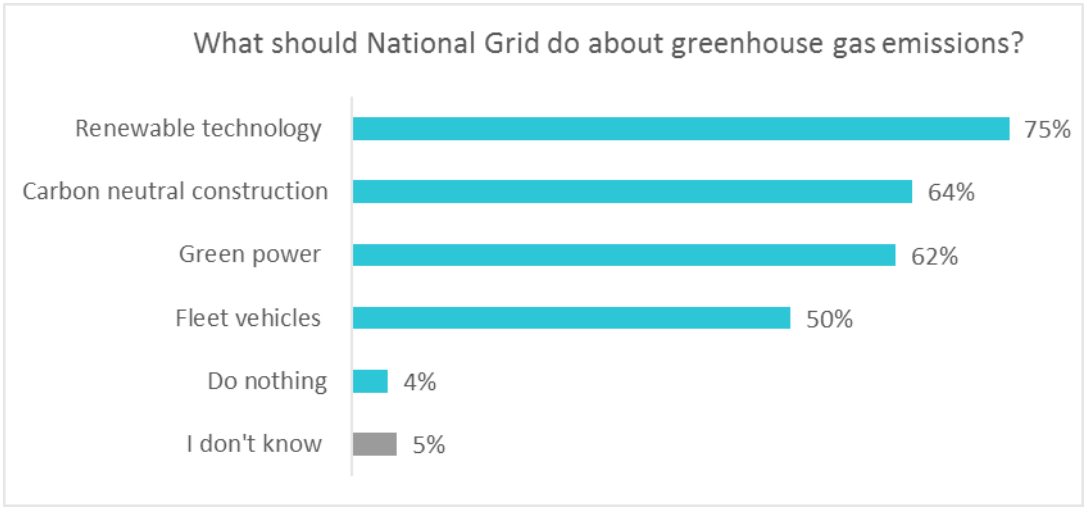
Respondents were asked to consider National Grid's broader impact on the environment from greenhouse gases to land usage.

To encourage informed decision making, respondents were offered a brief explanation of greenhouse gases and how National Grid's work contributes to their release. They were then asked what National Grid should do to reduce its emissions. Where there was an associated cost, this was highlighted on their virtual bill.

Ideas presented were:

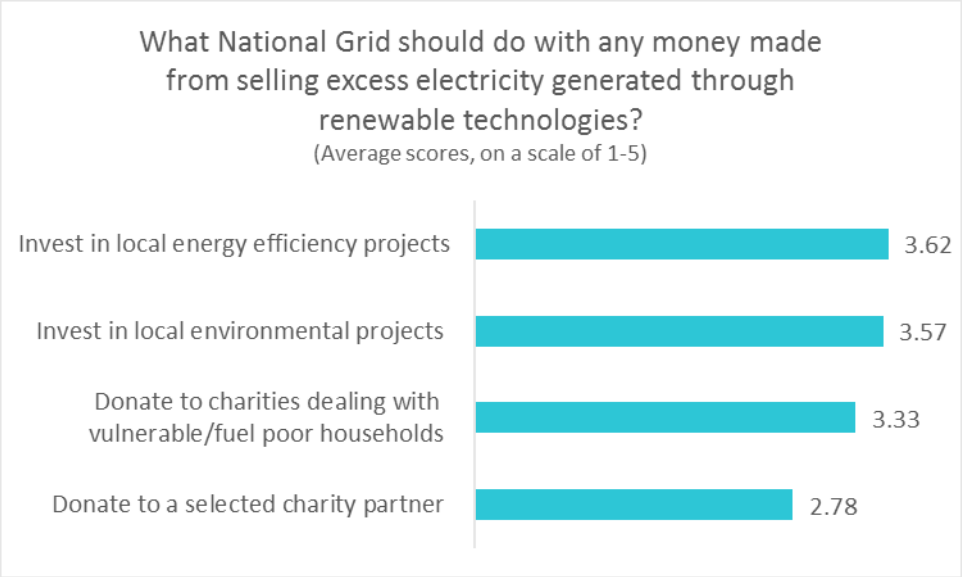
- Renewable technology- for example, install solar panels and heat pumps on National Grid sites (bill impact +1p).
- Minimise emissions and fund projects that help remove carbon dioxide from the atmosphere (planting trees for example), so that the overall impact of construction work is neutral (bill impact +1p).
- Replacing fleet vehicles with more eco-friendly alternatives (bill impact +1p)
- Only buy energy from renewable sources (bill impact +1p).

There was strong support for action with fewer than 1 in 10 believing that National Grid should do nothing or unsure of what should be done. **Three quarters supported the installation of renewable technology,** such as solar panels and heat pumps, on National Grid sites. This was closely followed by carbon neutral construction (64%) and the use of green energy to power operations.



If National Grid were to install renewable technologies on sites, there's a possibility that more electricity may be created than needed and any excess could be sold. The funds raised would not be of sufficient magnitude to be deducted from consumer bills and consequently National Grid would look to invest it for the greater good but what would this look like? Respondents were asked to rate four options on a scale of 1 to 5 with 5 signifying a very high priority. Responses to this question had no impact upon the virtual bill.

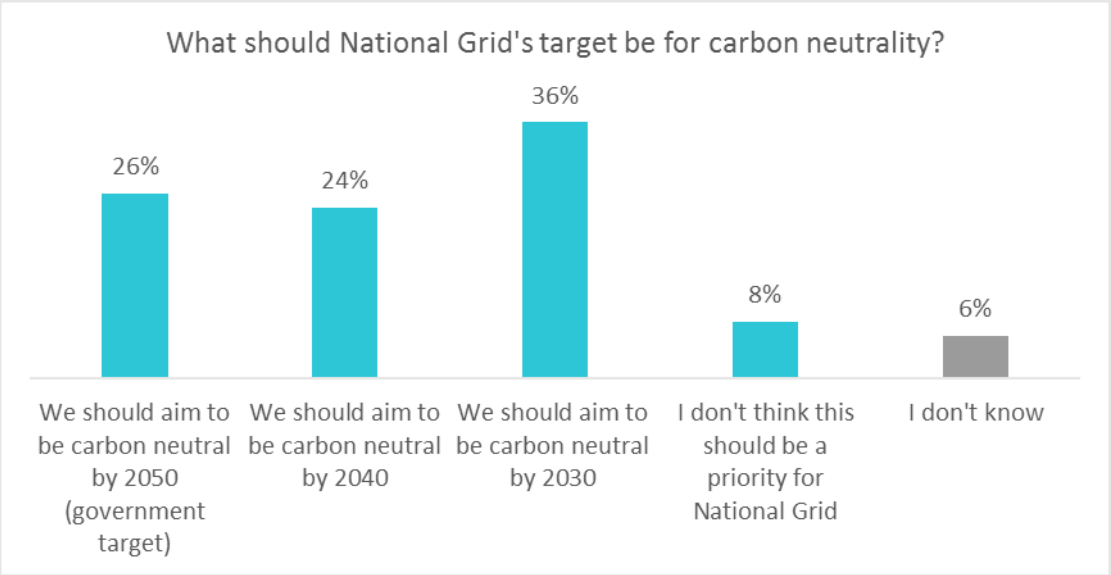
A strong preference was shown for projects with a clearly specified focus. **Local projects focussed on energy efficiency or the environment were the most popular options**, followed by donations to the charities dealing with vulnerable or fuel poor households. Donating to one selected, but unspecified, charity partner was the least popular option.



	Energy efficiency projects	Environmental projects	Charities for fuel poor/vulnerable	Selected charity partner
5- a very high priority	29%	29%	25%	13%
4	29%	28%	21%	17%
3	25%	24%	27%	27%
2	11%	11%	13%	23%
1 – a very low priority	7%	8%	13%	21%

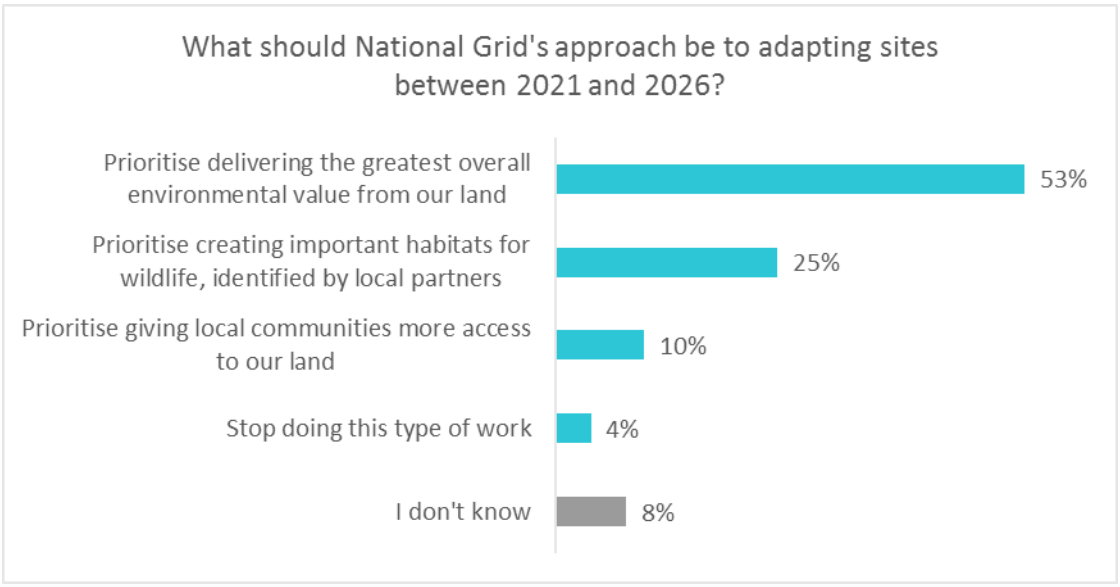
Between 1990 and 2018 National Grid reduced greenhouse gas emissions by 65%. However, with a government target of carbon neutrality by 2050 National Grid must also revise its targets. Respondents were asked what target they would like to see. No costs were specified on this question but respondents were alerted to the fact that the sooner National Grid aims to be carbon neutral the more it is likely to cost.

There was **strong support for action on the carbon footprint with 6 in 10 favouring a more ambitious target than that set by the Government**. 36% would like to see carbon neutrality by 2030 and 24% by 2040. Only 8% did not feel like this should be a priority, although this rose to 13% amongst over 55s.



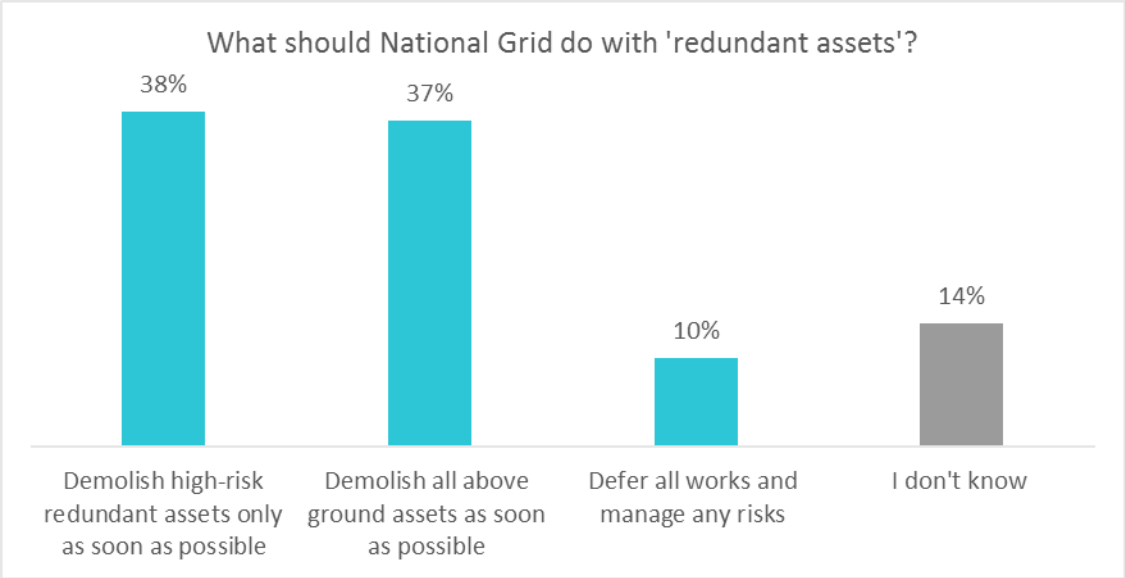
National Grid owns the land surrounding many of its sites in England, Scotland and Wales. This may be developed into wildlife habitats or local community spaces. Respondents were asked what type of improvement they would prioritise with examples given for each project type. No impact was shown on the virtual bill.

Over half would like National Grid to decide on a case-by-case basis and focus obtaining the greatest overall environmental value from each site. A quarter would favour habitat creation and 1 in 10 community access. Only 4% felt that National Grid should not undertake such projects



In addition to its land holdings and operational assets, National Grid must care for small sections of network that are either no longer required or need attention for safety reasons. These are known as redundant assets. These assets don't pose an immediate risk but must be addressed in the long term. This may mean that they are demolished, decommissioned or maintained. Respondents were presented with an explanation of each option, its pros, cons and associated costs. Demolishing high risk assets only would have no impact on the bill, demolishing all above ground assets or deferring such works and managing risk would add 1p to the virtual bill.

Respondents were strongly in favour of demolition but almost equally split between whether demolition should be of all above ground assets or of high-risk assets only. Only 10% were in favour of deferring action. 14% were unsure of the best course of action.



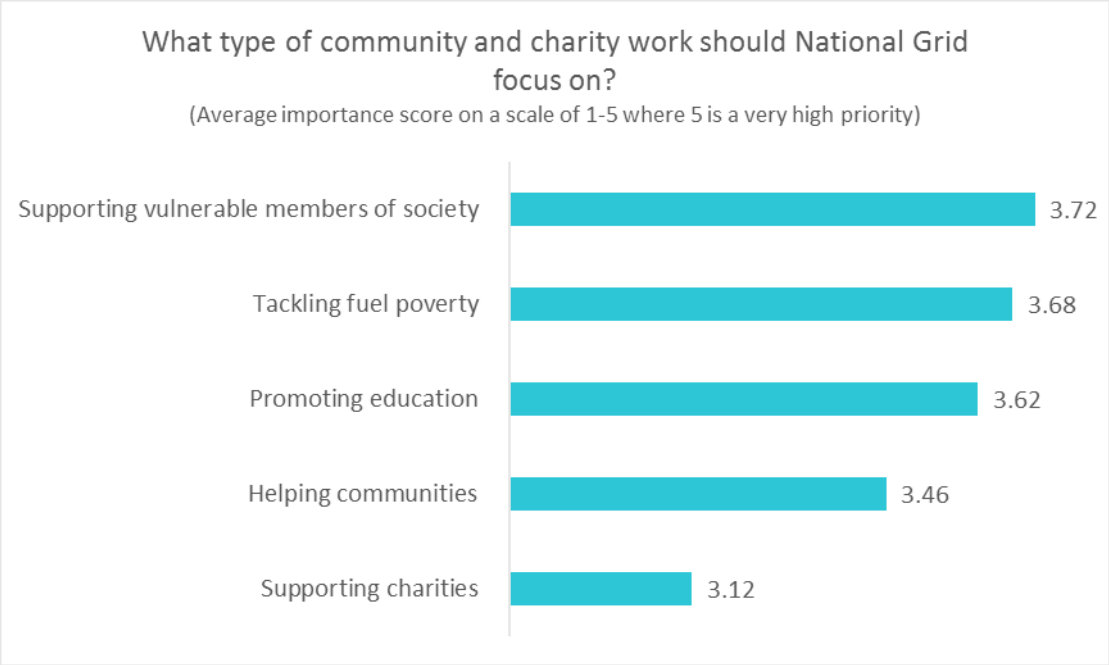
Supporting communities

National Grid currently supports a number of community initiatives, including:

- City Year UK (Supporting education and mentoring within schools for disadvantaged communities.).
- Skills for Good (Providing business and tech skills to not-for-profit organisations.)
- Step Up to Serve (Promoting youth social action.)
- This is Engineering (Promoting science, technology, engineering and mathematics (STEM) subjects. Encouraging children to take up engineering as a career.)
- National Grid's Community Grant Programme (Over £1 million of grants awarded since 2015, funding charity and community-group projects that meet local community needs by providing a range of social, economic and environmental benefits.)

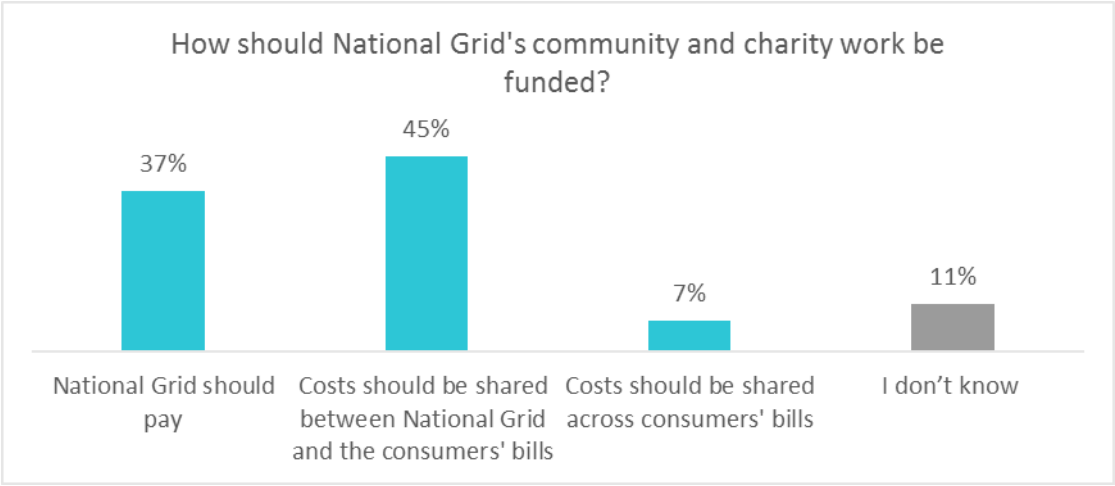
Some of these projects are paid for by National Grid and some by consumers. Respondents were asked to what extent they felt that National Grid should focus on each type of work and how it should be paid for. These questions had no impact on the virtual bill.

First respondents were asked to assign a level of priority from one to five to each of five project types where one signified a very low priority and five a very high priority. There was endorsement for National Grid's ongoing involvement in community and charity work with all project types receiving a positive score. **Support was strongest for work that supported vulnerable members of society,** closely followed by tackling fuel poverty. Promoting STEM education came third. Again, the generic goal of supporting charities lagged behind the more specific targets.



	Supporting vulnerable people	Tackling fuel poverty	Promoting education	Helping communities	Supporting charities
5- a very high priority	36%	38%	32%	24%	21%
4	26%	23%	25%	26%	18%
3	20%	20%	25%	30%	29%
2	11%	10%	11%	13%	16%
1 – a very low priority	7%	10%	7%	8%	16%

37% of respondents felt that the costs of such work should be borne by National Grid alone and a further 45% that they should be shared between National Grid and consumers. There was little appetite for consumers bearing all costs (7%).



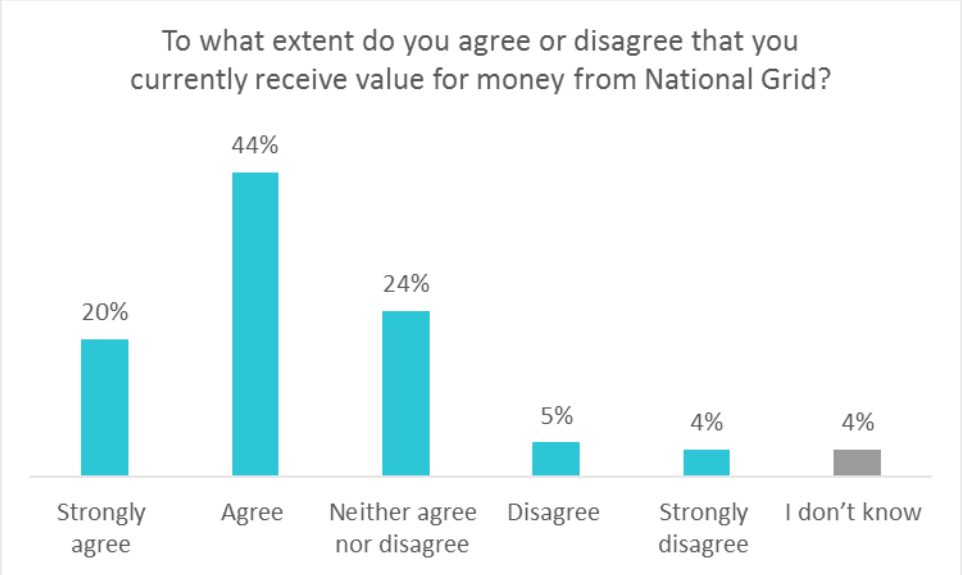
Bill Impact

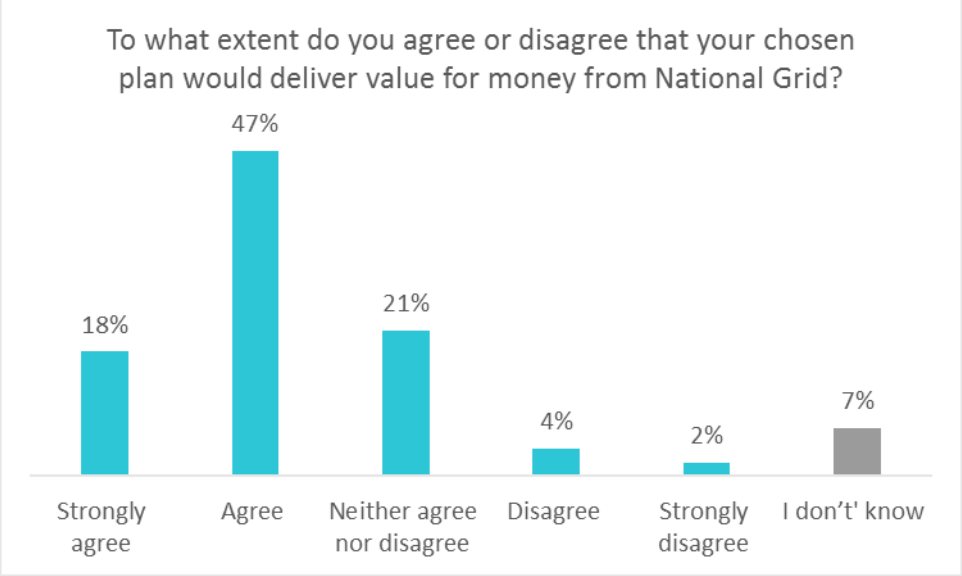
On average, the choices consumers made would see an increase in their annual gas bill of 10p.

Value for money

Having completed all survey sections, respondents had a good overview of National Grid's work. They had created their own business plan based upon the options presented and understood what would be the impact of their choices on their annual bill. They were then asked firstly, to what extent they felt that they currently receive value for money from National Grid and to what extent they felt that they would under their tailor-made plan.

Two thirds of respondents agreed that they currently receive value for money from National Grid, with 20% strongly agreeing. Just under a quarter were unsure and 9% disagreed. When asked to consider their tailor-made plan, respondents showed a little uncertainty with strong agreement dropping slightly to 18% and 'don't know' increasing to 7%. However, overall agreement was at 65% (1% down from under the current plan) and disagreement dropped from 9% to 6%.





Pay now, pay later – deliberative engagement

Background, objectives and research design

This report presents results from qualitative research amongst UK bill paying consumers that was designed to provide National Grid with a deep and evidence based understanding of their expectations of how costs associated with maintaining NGG's assets can be spread over time. The current business plan assumes the cost of assets are spread over their lifetime but this research explores the impact of changing the spread of costs to shorter timescales to better accommodate changes to the gas network itself and a reducing gas consumer base.

The specific goals for this work are as follows:

- Explore consumer sentiment on what is and what is not acceptable in terms of bearing the costs of:
    1. responsible gas asset demolition
    2. gas asset replacement from 2021

The research also needs to provide an understanding of why bill payers hold their views.

Discussion flow and the presentation of relevant information

The groups were designed to allow time to ensure participants had a sufficient understanding of the gas transmission supply chain and the role of National Grid within that supply chain, as well as other relevant issues such as asset management, shifts towards a decarbonised energy network and changes to the gas customer base in the coming decades. The newness of these topics for the largely uninitiated meant that the majority of the groups' discussions was given over to briefings and contextual discussion before the deliberative aspects of the groups were broached.

The discussions were conducted the same way across all four groups as follows:

1. Warm up and introductions
2. Spontaneous associations with National Grid
3. Exposure to National Grid gas transmission explainer video
4. Prompted associations with National Grid and discussions
5. Questions and answers surrounding six consistently ordered points of information
    a. *Gas transmission is made up of equipment e.g. pipes, pumps and valves. This equipment gets old and needs to be replaced.*
    b. *At the end of its life (and where it cannot be reused or repurposed), the piece of equipment that makes up part of the gas transmission network needs to be demolished safely*
    c. *We pay for the upkeep and replacement of this equipment as part of our gas bills, and it is spread across all gas customers*
    d. *The UK's energy network is going through significant change as it prepares itself for a decarbonised future (such as relying more and more on sources like wind, solar and hydrogen gas). National Grid's plans for the future have had to adapt more quickly than ever before*
    e. *Over the next 30 years, the number of households that use gas is probably going to go down. This is due to a shift to decarbonisation where more households and businesses will move to alternatives for heating and cooking.*
    f. *In the future (say 20 years from now), those with lower household incomes or in fuel poverty may still be relying on gas to heat their homes rather than replacing their boilers with alternative technologies.*
6. Deliberative topic 1: Responsible asset demolition
7. Deliberative topic 2: Gas asset replacement from 2021

National Grid: Awareness and understanding

During the initial discussion it was evident that awareness and recall of National Grid was relatively high but knowledge about its purpose, activities and priorities was, at best, minimal.

Typically, participants tend to:

- Conflate all energy companies into one homogenous group
- Associate National grid with electricity, cables and pylons – awareness of National Grid's remit with regard to gas and gas transmission is low to non-existent
- Make connections between energy companies (including National Grid) and a shift to decarbonisation
- Associate all participants in the energy sector with increased utility bills

Following exposure to the National Grid gas transmission explainer video and time spent discussing its content (through Q&A and clarifications), participants were better able to express:

- National Grid's purpose with regard to gas transmission e.g. moving gas across the country
- Where National Grid's responsibilities begin and end
- The financial contribution each household connected to the gas network currently pays i.e. £9 per year
- How National Grid is readying for a decarbonised energy network in the future e.g. biogas and increased numbers of electric vehicles

This understanding was augmented by more in-depth discussions on the topics contained in Item 5 above. This tended to trigger recall of more National Grid related stories/ knowledge, build associations that helped participants understand the context for discussions and ask for more information or clarifications. Throughout these discussion, the moderator replayed key information already imparted and added basic information where it was felt the information would not significantly affect their responses later in the group e.g. that businesses also pay contributions to National Grid based on the amount of gas they use rather than a flat fee.

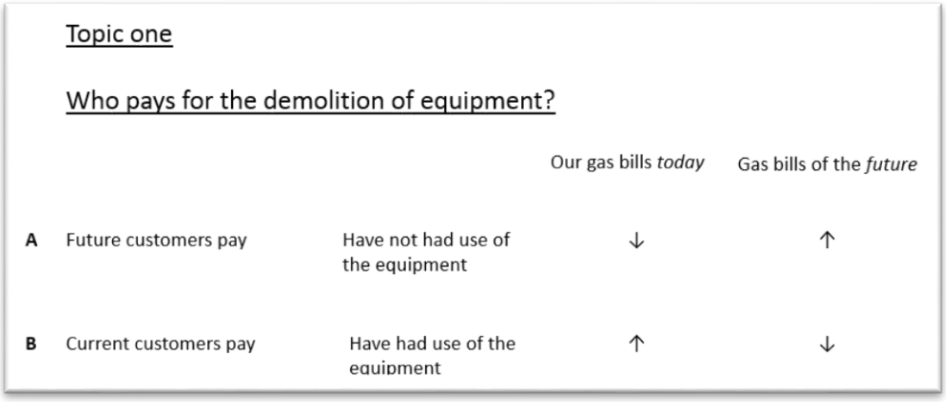
In time, participants confirmed they had understood what had been shared and were ready to explore the scenarios that were to follow. At this point, some participants specifically noted that some of the challenges that face National Grid and its customers would involve making trade-offs e.g.

"It's good to know that changes are being made sooner rather than later. It just depends on how much it affects people's budgeting abilities. Like buying organic food you can do it to save the lifestyle of animals but if it costs too much then you don't do it very much. It'll probably be the same for wind and solar"

Edinburgh, Younger, C2DE

1. Deliberations on asset demolitions

The following scenario was shown and explained to participants. At this point no mention was made of associated increase in costs.



In order to secure unbiased, gut feel responses (often described as system one responses), participants were asked to record their preference for either scenario A or B on a piece of paper before the scenario was discussed as a group. Across all four groups, their initial preferences were as follows:

	Preference for Scenario A Future customers pay	Preference for Scenario B Current customers pay
Group 1	0	8
Group 2	0	8
Group 3	1	6
Group 4	0	8

There is an overwhelming preference for costs associated with the demolition of existing assets to be borne by current customers. The underlying reasons for these preferences were discussed at length and mostly revolve around fairness and affordability:

> ***"We've paid for this subscription of having gas, we should at least finish the process of having to pay for it"***
>
> Edinburgh, Younger, C2DE
>
> ***"I can afford to pay more now, but when I'm old aged pensioner I don't want my gas bill to go up. I would rather pay now and get it done with because it looks like I don't have an escape not to pay"***
>
> Edinburgh, Older, ABC1
>
> ***"It ethically just feels right. Everybody's used that at the moment so you should pay for the demolition of it right?"***
>
> Birmingham, Younger, ABC1
>
> ***"I just thought it was fairer to be honest. With the young ones, you know, it's so hard to get on the ladder and things like that and you've got outgoing bills as well. I've had use of it, I don't think it's going to be exhaustive – I hope not – I think it's just a fairer way to do it"***
>
> Birmingham, Older, C2DE

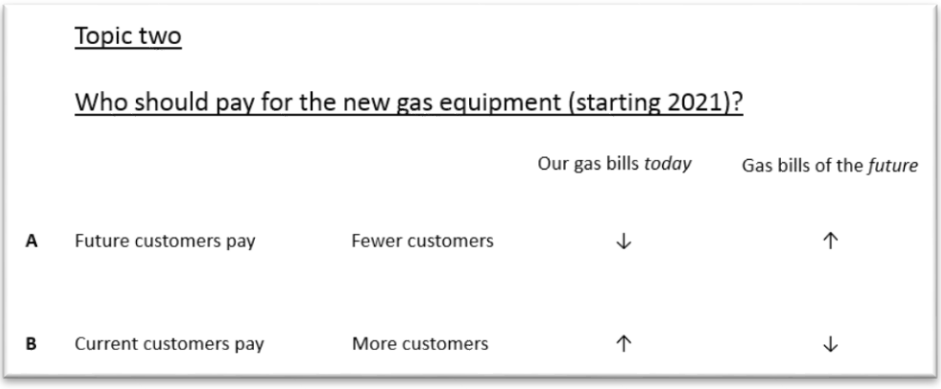
The reason given for delaying payment such that costs are borne by future customers was based on a sense that '*I've paid enough'* and their costs should be borne by someone else.

When asked to suggest how much they would be willing to pay per year to cover the additional cost associated with asset demolition, most gave figures ranging from 50% to 100% increase in their current contribution i.e. £4.50 to £9 more per year.

After full deliberation and after the actual increase in annual bills was revealed (c.10 pence per year), no participant changed their mind, staying with their original preference of paying now.

2. Deliberations on the installation of new gas equipment from 2021

Following a similar format, the second deliberative scenario was shown and explained to participants. As before, no mention was made of the associated increase in costs.



Topic two

Who should pay for the new gas equipment (starting 2021)?

			Our gas bills *today*	Gas bills of the *future*
A	Future customers pay	Fewer customers	↓	↑
B	Current customers pay	More customers	↑	↓

Again, participants were asked to record their preference for either scenario A or B on a piece of paper before the scenario was discussed as a group. Across all four groups, their initial preferences are shown in the following table:

	Preference for Scenario A Future customers pay	Preference for Scenario B Current customers pay
Group 1	0	8
Group 2	2	6
Group 3	1	6
Group 4	1	7

There is an overwhelming preference for costs associated with the installation of new gas assets from 2021 to be borne by current customers. The underlying reasons for these preferences were discussed for some time and as before, mostly revolve around fairness and affordability:

"Fairness. Where now there's more people using it, rather than burdening the future customers to pay more"

Edinburgh, Younger, C2DE

"So we're using it, we might as well pay for it. It's kind of like saying 'Oh, I'm going to buy this car but I'm not going to pay for any servicing or MOT of it, ever. I'll let the person who buys it off me pay for it, like"

Birmingham, Younger, ABC1

"There are more customers than there will be in the future. It's less per head to pay now than if we paid in twenty years' time. It's going to cost us more eventually"

Birmingham, Younger, ABC1

"We're used to our bills going up for whatever reason – I'd rather pay more now and then pay less going forward in the future"

Birmingham, Older, C2DE

"So long as I'm using it, I'll pay for it"

Edinburgh, Older, ABC1

Those preferring to defer payment for future customers to pick up the cost feel that they want to enjoy life today and not be burdened by costs they can otherwise put off.

When asked to suggest how much they would be willing to pay per year to cover the additional cost associated with this new equipment, most gave figures of around 100% increase in their current contribution i.e. £ £9 more per year, the expectation being that installing new equipment is more costly than demolishing old assets.

As previously, after full deliberation and after the actual increase in annual bills was revealed (c£1 per year), no participant changed their mind, staying with their original preference.

Acceptability testing

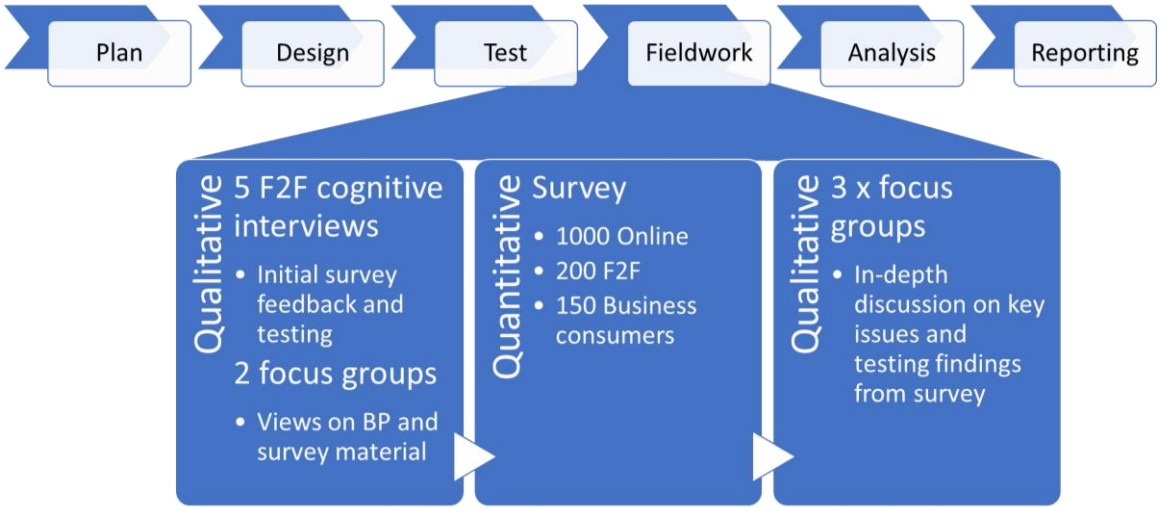
Working with NGET, we've appointed Eftec and ICS to deliver this joint study.

This is a nationally representative research study that presents consumers with our business plan to confirm if it delivers what consumers need from the Gas/Electricity transmission systems at a cost acceptable to them. It will also confirm the overall affordability of the plan.

The study includes domestic, non-domestic and directly connected consumers and features both qualitative and quantitative research techniques.

Building on what we've learned through our willingness to pay study, and using the animation developed through our slider tool, the programme consists of three engagement phases detailed below. scepticism

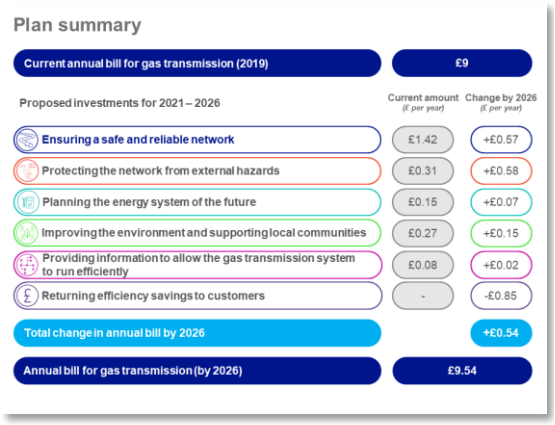
The study is based on the July draft business plan.



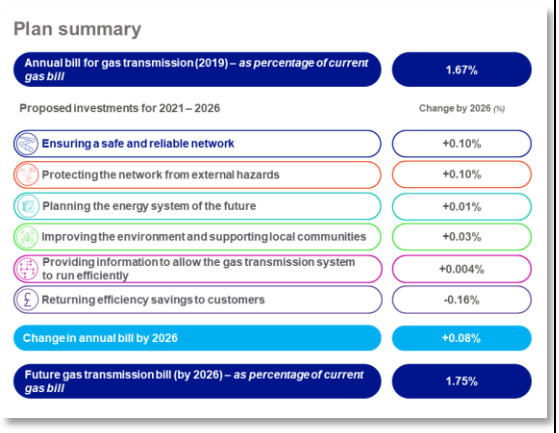
Box ES.1: Business plan descriptions

Survey respondents and participants in the qualitative research were presented with a range of information describing National Grid's proposals for the gas transmission system.

High level summary of key investment areas, associated bill impacts, and overall change in bill by 2026

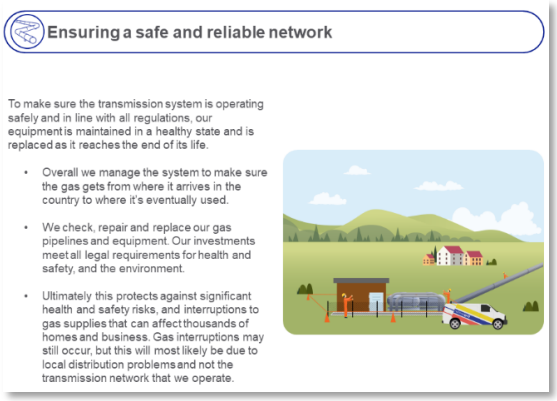


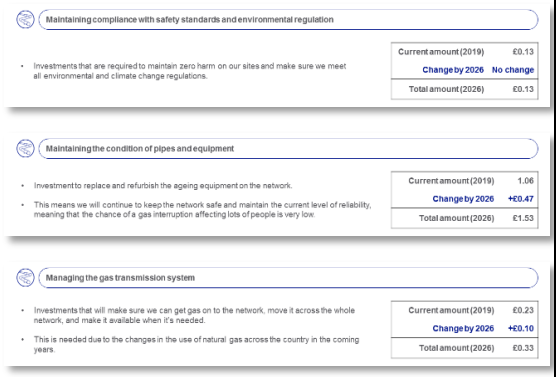
Household consumer version



Business consumer version

Explanation of investment area and specific investments





Overall business plan acceptability

There is a high level of acceptability for the GT business plan:

- Over 80% of business consumers and almost 90% of household consumers stated that the overall plan and bill impact (+£0.54 per year by 2026 for household consumers) was "acceptable".

- For household consumers, the acceptability of the business plan was largely driven by perceived affordability of the transmission bill. For business consumers (+1.75% on current bill by 2026) the need to maintain current high levels of reliability was also an important factor alongside the affordability of National Grid's proposals.

The high levels of acceptability are, though, subject to limited changes in overall energy bills, particularly for household consumers:

- The 'limit' within which the business plan proposals were acceptable was around a 2% change in overall energy bill. For a dual fuel consumer with an average bill (approx. £1,100 per year), this is approx. +£23 on the annual current bill.

- The 'switching-point' from "acceptable" to "unacceptable" for the transmission component of the bill for household

consumers was about +£11 on top of the current amount paid. For business consumers the equivalent 'limit' and 'threshold' were +7% and +2% on top of the respective bill amounts.

The business plan proposal is therefore well within both constraints for household consumers; for business consumers there is less headroom with respect to the switching point threshold (i.e. +1.75% vs. 2% constraint).

Overall, there was limited variation in levels of acceptability between different consumer segments, in terms of socio-economic and demographic characteristics:

- The greatest difference for household consumers was observed for the lower income groups (less than £6k per year). This finding though is subject to a relatively small sample size and even these respondents tended not to outright reject National Grid's proposals, but rather were unsure if the plan was acceptable or not.

- Lower levels of acceptability were also observed for households that were potentially in vulnerable circumstances – based on indicators such as Priority Services Register, receiving support with energy bills (e.g. winter fuel payments), disability in the household, or self-reported measures such as difficulty paying utility bills. However, the differences from the overall sample results are not particularly great, and the overall level of acceptability was still above 80% of consumers.

Acceptability of proposed investments

For the most part, consumers viewed the individual investments in the GT Business Plan as representing value for money:

- Typically, high levels of support (around 60 - 70% consumers) were stated for both the proposed investment and the associated bill impact. Moreover, very few outright rejected the investment proposals (typically less than 5%).

- Investments in safety and reliability were viewed as the top priority by both household and business consumers. After, this though, there was less distinction in the ranking of other investments (external hazards; future energy system; environment and local communities; gas system operator).

Given the overall levels of support for each investment, though, the priority ranking across the range of investment areas is of secondary relevance.

A significant proportion of consumers (around 30%), though – whilst supporting the investment proposals in principle, and indeed the overall plan - consistently challenged the individual bill impacts as "not acceptable". Two main viewpoints were observed to underlie this finding:

- The first was from a relatively small subset of consumers who expressed concerns about the affordability of National Grid's proposals (around 10%). These tended to be lower income households and less likely to be in employment compared to the overall sample. The group also tended to include higher proportions of consumers in the youngest (16-24 years) and oldest (65+) age groups, correspondingly less likely to be in full-time employment, and also a greater proportion paying energy bills via pre-payment meters.

- The second group (around 20%) in contrast featured higher proportions of consumers in higher socio-economic groups and above average (median) household incomes, and also fewer dependents than the overall sample. Rather than being concerned about the affordability of National Grid's proposals, they tended to question the value for money and hold the view that current service levels were good enough. Hence, they questioned the need for the scope and scale of National Grid's proposals, but ultimately most consumers even in this group found the overall plan acceptable because of minimal impact on household budgets.

Views on efficiency savings

Consumers were also very supportive of the efficiency savings that were reported in the summary of the business plan bill impacts. Indeed, this appears to offset the concerns of some consumers that the bill impact of a particular investment might

be too high. It was also evident – especially in the qualitative research – that consumers expected National Grid to meet efficiency challenges, although not to the extent where this would compromise current or future service or reliability. In this regard, there was support for National Grid reinvesting efficiency savings if it meant that more could be done in the Business Plan to address future investment needs. The investment areas that consumers had the strongest preferences for higher levels of investment were 'maintaining compliance with safety standards and environmental regulation', 'innovation projects to trial greener alternatives to natural gas', and 'reducing carbon emissions from operations'.

Conclusions

All in all, the main findings from the research show that there is a high level of support for National Grid's proposals for the gas transmission system. Almost 9 in 10 household and 8 in 10 business consumers expressed their support the business plan.

The research process is judged to be robust and the results appropriate for use in National Grid's continuing planning for RIIO-2. The initial stage of the research featured an iterative test and re-test approach for the development of the explanatory material and investment descriptions that were presented to survey respondents and participants in the qualitative research. The purpose was to ensure that this material gave the right level of information to consumers to provide informed views on the acceptability of National Grid's proposals.

Feedback from consumers was very positive. Most found the survey easy to complete, and sizeable proportions of respondents also stated that survey topic areas were interesting and educational. Overall, the feedback across each stage of the research indicated that there was a good level of engagement from consumers and that they gave valid and considered responses. Moreover, the survey samples were nationally representative in terms of key consumer characteristics (e.g. age, socio-economic group; or business size and sector) and geographic spread across England, Wales, and Scotland. Added to this, participants in the qualitative research stages reflected a mix of socio-economic and demographic backgrounds, ensuring that all aspects of the business plan acceptability testing provided a full and rounded account of consumer views.

The high levels of acceptability are, though, subject to some limits, particularly in terms of changes in overall energy bills. National Grid's current proposals are, though, well within these limits and indeed the 'switching point' between an "acceptable" vs. "unacceptable" bill impact for the transmission component. It is also evident that consumers expect National Grid to be cost-efficient in its investments and associated bill impacts. However, there does not appear to be a strong appetite amongst consumers for significant bill reductions if the trade-off was to compromise either current and/or future safety and reliability in the system. Indeed, consumers typically recognised that increased levels of investment where needed by National Grid to meet future needs and demands on the transmission system, and in order to protect the environment and further reduce carbon emissions from operations.

Asset health engagement case study

Executive summary

Maintaining the health of our assets is critical in avoiding disruption. An aging asset base requires increased work to maintain and improve the levels of service that customers have seen in RIIO-1.

Insight from stakeholders has helped to inform the basis of our asset health proposals in the development of the business plan. This has informed the options and trade-offs between cost, risk, reliability and safety factors.

This report presents our stakeholder engagement approach and how insight has shaped our current position in the development of the asset health proposals for the RIIO-2 business plan. There is a still ongoing discussion with Ofgem on the regulatory framework in this area as well as engagement directly with our stakeholders. Costs provided in this report are at the early stages of development and will be revised as we receive feedback and our approach develops.

How the gas transmission network developed

National Grid Gas own and operate the gas transmission network in the UK. The National Transmission System (NTS) comprises of 7666km of high pressure steel pipelines and over 600 sites strategically located across the UK.

Construction of the National Transmission System (NTS) dates back to the early 1960s with the 320km high-pressure methane pipeline from Canvey Island to Leeds. The first terminal at Bacton was constructed in the latter half of the decade. The network continued to grow throughout the 1970's, and with the construction of a second major terminal at St Fergus, was a pipeline corridor for transporting gas from the offshore UK Continental shelf facilities to the major towns and cities.

A second phase of expansion occurred in the 1990s with the 'dash for gas'; a sharp increase in the number of large industrial and power station connections onto the NTS. The last significant growth of the network was to connect the Liquefied Natural Gas (LNG) terminals at Milford Haven to the NTS resulting in a new >£1BN transmission pipeline and associated infrastructure across South Wales. Additional network reinforcement projects were needed to ensure the new connected gas supplies could be transported to consumers.

How we've developed our asset health investment plans with our stakeholders

Our Asset Health Investment Plans (AHIP) have been prepared by subject matter experts (SME) and cover the investment required (period: 2021-2028) to deliver the capability our stakeholders need whilst maintaining a safe network.

A large part of our investment plan is mandated by legislative requirements. Other drivers of investment include the condition of our assets as well as the availability of parts and skills to maintain them. The statements made in this document have been subject to a process of Cost Benefit Analysis; the outputs of which have been used to model optimal investment scenarios, and to determine a monetised risk value (See appendix 1 for more on monetised risk) that can be removed from the network following investment.

Our Asset Health investment proposals for the RIIO-2 period will deliver outputs consistent with our stakeholder priorities, whilst maintaining an acceptable level of network risk, these are:

a. The ability to take Gas on and off the System, both where and when required;

b. Maintain a safe gas transmission system

c. To leave a positive impact on the environment and communities

Customer/Stakeholder feedback received has been unequivocal that we should not allow for any increase in health and safety risk.

As part of the work on the Network Asset Resilience Metric (NARMS – See appendix 1 for more on this) methodology, we have developed an asset investment optimisation tool or Decision Support Tool (DST) to compare different investment options. The output from the DST is a TOTEX cost for a range of investment planning options and the service levels resulting from this level of expenditure, in terms of safety, reliability, environmental, societal and financial risk.

As demonstrated by our DST, investing in the network to the same level as we are currently (during RIIO-1) does not allow service risk levels to be maintained. As a result, an increasing risk associated with availability/reliability is anticipated.

Why we're engaging

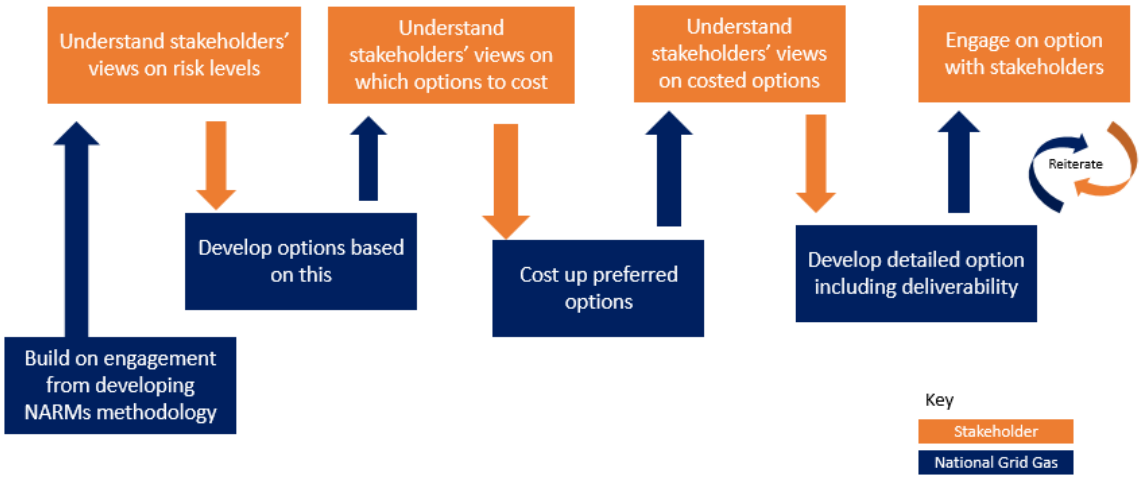
Asset Health investment is the largest area of our business plan. It's vital we truly understand what stakeholders want from the network and deliver an asset health programme to deliver those needs now and in to the future.

Due to the age of the network, we need to make some significant investment decisions. Understanding how the network will be used in the future is vital to designing the right investment programme.

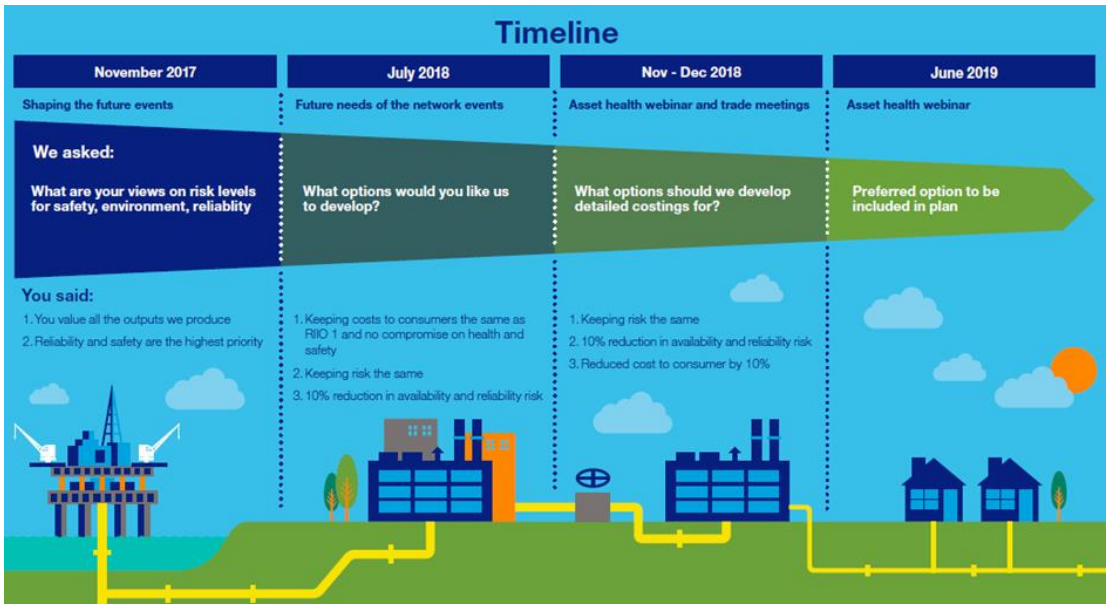
Engagement approach

Whilst we talk to our stakeholders regularly using a variety of channels, we recognised that we needed to do something different to understand stakeholders' views on our asset health investment due to the complexity of the topic and the diversity of views.

We developed a phased engagement approach to ensure stakeholders views could be incorporated throughout.



In practice, this looks like:



External validation

All of our findings were independently reviewed by Frontier economics to answer the following questions:

1. Was our engagement cognitively valid?
    - The data was collected in a reliable and robust way, with options and their implications communicated clearly
2. Which option should we take forward?

- Based on the stakeholders polled on the asset health costed options, there is very little support for (A) keeping cost the same as T1. Stakeholders do not want to see an increase in risk and are willing to pay more to achieve this.
- Overall, there is very slightly more support for (C) increasing reliability by 10% compared to (B) keeping risk the same as T1. However, the frequency of response is similar across these two options, and the one with more responses recorded varies according to which stakeholder group one focuses on. Those stakeholders that actually pay the bills slightly preferred option B.

3. What other things should we consider?

- There is strong support to continue pursuing the future proofing option further.
- Stakeholders overall also want to see the reduced cost to consumers option pursued further, although there were more stakeholders that were unsure about this. Stakeholders overall also want to see the reduced cost to consumers option pursued further, although there were more stakeholders that were unsure about this.
- Stakeholders were also keen to see more focus on options around improving efficiency.

Based on stakeholder feedback we will progress the following:

- Maintain Service Risk levels stable i.e. as per T1. This proposal best represents our stakeholders' preference; that there should be no reduction in the levels of service we provide across all key risk categories (Health & Safety, Availability/Reliability and Environmental performance).
- Improve levels of Availability/Reliability risk by 10%. As per the above but also exploring additional costs associated with improving Availability/Reliability risk in response to customer feedback i.e. the potential to reduce the risk of loss of supply outage by 10%.
- Reduced cost to consumers (holding Health & Safety risk stable) – A higher level of risk expected, i.e. an inability to maintain all service risk levels.

Consumer engagement

As Asset Health investment is a large area of spend, it's important we gain consumer views to shape our direction. We have not previously undertaken consumer engagement on this topic and are learning how best to do this in a way that ensures consumers can engage effectively. We have therefore created a programme that uses a variety of different approaches. This will allow us to triangulate consumers views for a more robust outcome.

Outcome	Method
Understanding consumers views on disruption to their gas supply	Consumer listening
Value consumers place on reliability	Willingness to pay
	Service valuation tool
What does reliability mean to consumers now and in the future and what does that mean for energy/Gas Transmission	Cultural analysis
How consumers prioritise the types of outcomes we can focus on	Service valuation tool

Outputs and findings

Throughout our engagement, we have adjusted our approach in response to stakeholder feedback.

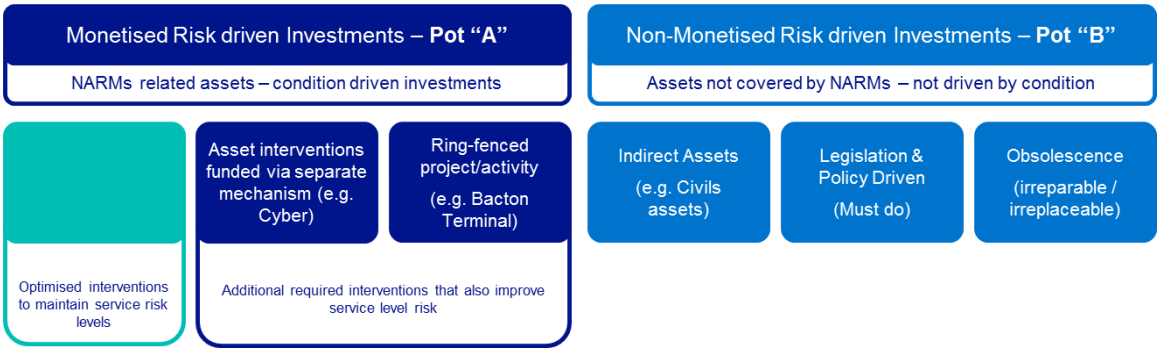
Process Changes

We've engaged with experts (consultants, other networks, citizens advice) along this process and have updated our process based on their feedback.

1) Aligned refurbishment intervention benefits to cost benefit analysis process
2) New Unit List
3) Updated Unit Cost
4) Total network risk reduction by 10% going forward.

Strategic approach to Asset Health across the network

Since undertaking this research, we've been working closely with Ofgem and other networks to further develop our approach to asset health. Recognising the complexity of this topic, the following approach has been proposed:



All areas of work in the A pot in Ofgem's outline for asset health will count towards our monetised risk target.

- Includes a significant amount of work covered by other PCD's & own CBA's
- Significant site rebuilds with asset health drivers (eg Bacton and Kings Lynn)
- NIS directive (control systems, telemetry and gas quality and metering)
- Compressors covered by emissions legislation.

These projects are likely to lead to a significant, but fully justified, improvement in overall risk in isolated network areas.

If we considered all "A" projects together against the same risk target these stand-alone projects are likely to reduce the solely risk prioritised asset health investment hence increasing risk in some significant areas.

Our stakeholder feedback has clearly indicated a lack of tolerance to any reduction in reliability or safety risk.

To mitigate this risk we are following a strategy to maintain risk in the solely risk prioritised investment block (A1).

Shaping the Bacton Terminal for the future case study

Executive summary

A robust process of external stakeholder engagement has been undertaken to determine our proposed programme of work on Bacton. Representatives from a wide range of groups including local authorities, local businesses, industry regulators, terminal operators, offshore companies, the gas distribution network (GDN), interconnectors and gas suppliers have been consulted.

During the future needs of the network stakeholder event held at Bacton in summer 2018 we heard how important Bacton was to the wider industry, and, in particular, the governments priority to maximise the economic recovery of gas supplies from the North Sea. As a result of the critical nature of Bacton to many of the stakeholders we decided to consult more widely on how we should address the significant asset health issues on site.

Background

Bacton is a critical site for the South East and GB plc. It affects millions of consumers and thousands of businesses.

The terminal:

- is used to maintain pressures in the South East including London and/or to move LNG imports North in the event of high LNG
- connects to many North Sea Fields (Shell and Perenco), Belgium (IUK) and Holland (BBL)
- has a throughput of approximately £4billion of gas each year
- at peak, supplies approximately 30% of the UK's gas
- gas will flow through Bacton past 2040 in all Future Energy Scenarios.

We needed to make some investment decisions because:

- the terminal has significant age-related asset health
- there has been a change in supply and demand patterns
- we have seen lower forecasts in Future Energy Scenarios (2018).

To help inform our thinking, we set out to understand and articulate customer and stakeholder needs both now and in the future, impacts of not being able to meet those needs, implications on local communities and views on potential options for the site.

Engagement

We analysed all the feedback we had from the Bacton Future needs of the Gas Transmission network event in July 2018 and fed it in to our plans.

We mapped all the stakeholders who are either interested or impacted by the terminal.

Targeted 1-1 conversations

We recognised that our stakeholders might feel more comfortable discussing their thoughts directly with us rather than at a workshop. This might be because the information they had to share may be confidential or commercially sensitive. Some of them were new to the topic and wanted dedicated time to ask any questions and gather as much information as possible.

We reached out to these stakeholders and offered a 1-1. During these video calls we gave an overview of the topic including background to the terminal and the drivers for the work. We then asked some open questions about their needs and wants of the site now and in the future. It gave both us and stakeholders the opportunity to ask open and honest questions about the future needs of the site.

We also asked each stakeholder if they knew of any other companies or people that would be interested or impacted by the project. This led to an additional four 1-1's

1. Shell, Customer (entry)
2. Perenco, Customer (entry)
3. Neptune, Customer (entry)
4. BBL, Customer (entry)
5. Independent Oil and Gas, Customer (entry)
6. Fluxys, Energy network owner
7. RWE, Customer (Exit): Including power stations
8. Cadent, Gas distribution network
9. New Anglia local enterprise partnership, Other non-energy industry
10. East of England Energy Group (EEEGR), Industry/Trade body
11. Norfolk District Council, Regulator or government (central or local)
12. Oil and Gas Authority, Regulator or government (central or local)

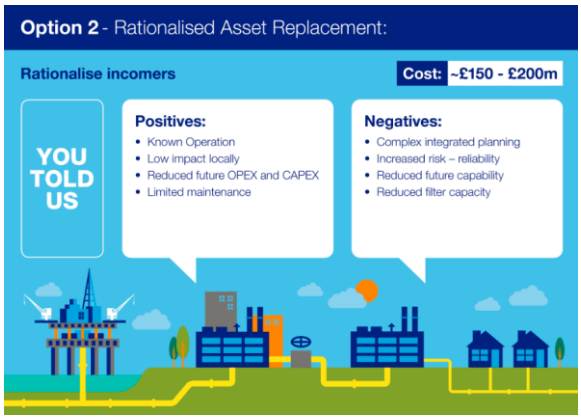
Facilitated workshop

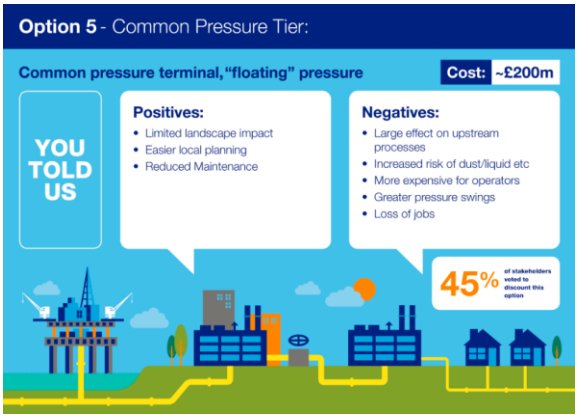
Following these conversations, we held a workshop in Norwich in December 2018. We played back what they had told us was important for them. Key messages we fed back were:

- Customers want their current contractual requirements honoured.
- Pressures, and the predictability of them, is important to customers. For some it was because it is interdependent with their gas compression capability. Some stakeholders preferred lower pressures and others higher pressures.
- Reliability was critical for all. Our Bacton terminal is the biggest export/import area of the UK for connected parties and any unplanned disruption causes major disruption to their businesses and potentially to UK gas supplies. There are also potential implications for disruption to European gas supplies.
- Obtaining and agreeing outages of more than 2 weeks a year aligned to their plant outages will be very difficult. The gas distribution network connection is a single feed to domestic consumers, so no outage is possible.
- Our customers value the flexibility to change flows at short notice.
- Our stakeholders have plans to develop UKCS fields to the 2040's. Interconnector business plans also span this timeframe.
- The terminals at Bacton have recently made significant investments due to the age and condition of their similarly aged assets. This included Shell who published a BBC article stating they had invested £350m in their Bacton terminal.
- Local authorities were keen to understand how the options we developed could impact employment in the area. They also provided insight into land availability should we need to build outside the current terminal footprint.

- UKCS stakeholders were interested in blending services as the composition of some North Sea Gas is falling outside the UK gas specification requirements.

Five options for mitigating the aging asset issues on the site were developed. These were shared with stakeholders and we asked them in small working groups to provide feedback on each of the options. We asked them for positives and negatives of each of the options. The outputs have been summarised below.





As a result of the feedback from stakeholders we decided to discount Option 5: Common Pressure Tier and Option 4: New like for like site terminal. We progressed Option 3: Re-developed Terminal and Option 2: Rationalised Asset Replacement for further study.

Industry forums

We were invited to attend the South North Sea MD forum, to share an update of the programme and discuss our proposals.

We also took the opportunity to present our thinking and proposals to at a local supply chain conference. This allowed the suppliers to understand and ask questions about the upcoming work and how to register with our procurement team to bid for work.

Webinars

During March, we held a webinar with the purpose of:

- Sharing our cost benefit analysis on these options
- Gaining stakeholder views on our proposed option.

We asked Do you support our decision to progress with a new terminal?

- Yes: 67% (6)
- Unsure: 33% (3)

When asked to explain their thinking, stakeholders told us:

- The best option and future proof
- Excellent opportunity to get ready for future flow scenarios
- I need to raise with my colleagues. Are you in touch with BP e.g. Andrew Pearce?
- The proposal looks sound but time for a more detailed assessment would be appreciated.
- New terminal will ensure capacity and efficiency to support longer term plans for customers. not clear to me though if some tweaks to existing would also do the same at lower cost
- Investment is required for the long-term reliability and safe operation of the terminal, therefore something fit for purpose is preferable.

As the project progresses we will develop a targeted engagement programme to ensure stakeholders are kept embedded throughout every phase.