# Annex

# A17.01 Whole Energy System Engagement Log

# December 2019

As a part of the NGGT Business Plan Submission

nationalgrid

# ANNEX A17.01 ENGAGEMENT LOG

Stakeholder Priority: I want you to facilitate the Whole Energy System of the future- innovating to meet the challenges ahead
Topic: Whole Energy System

Author: Jenny Phillips
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## EXECUTIVE SUMMARY

The topic of 'Whole Energy System' requires us to take a collaborative, stakeholder-led approach to the decarbonisation of energy. At this early stage in the transition to the energy system of the future, there is a need to consider all energy types and decarbonisation pathways. Stakeholder engagement is critical to our role in facilitating the transition to the energy systems of the future, not only for the RIIO 2 price control period but in setting the right strategic direction for the next decade and beyond.

The overarching stakeholder priority 'I want you to facilitate the whole energy system of the future-innovating to meet the challenges ahead' has an indicative spend range of £25m per year within the RIIO 2 business plan and comprises of five individual topics of which 'Whole Energy System' is one. The specific costs associated with this topic are low, primarily associated with costs supporting the ongoing engagement and exploration of whole energy system options. The term 'Whole System' was previously associated with a common approach across electricity transmission and electricity distribution and although there is not yet one clear industry accepted definition, we support the much broader concept and meaning of 'Whole Energy System', encompassing gas, electricity, transmission, distribution, transport, heat and other industry sectors. This involves the development of fuel agnostic options, combined across the energy vectors to deliver benefit for current and future consumers.

There are no current ways of working, protocols or procedures defining how we should work with other licenced entities to deliver whole energy system outcomes, and as such the purpose of our engagement is to gather stakeholder insight on the gas transmission role in developing all possible options for the future energy system. Our engagement activities to date have been quite wide ranging and primarily carried out as part of our business as usual RIIO 1 interactions. We have built upon this engagement with additional insight from a smaller number of dedicated RIIO 2 activities.

Our engagement interactions on this topic have resulted in insight which supports the need to work more collaboratively across sectors, develop regulatory framework mechanisms and to influence government policy as part of a cost-effective transition to a low carbon energy landscape. There is however, opposing insight. Some parties suggest that natural gas, as a fossil fuel, should not be a part of the options developed to achieve decarbonisation targets which highlights the overall level of uncertainty in this area.

As our RIIO 2 engagement develops, we are looking to work with stakeholders to develop the right framework uncertainty mechanisms to reduce barriers to a whole energy systems approach. We are also considering more opportunities for consumer engagement, specifically to understand the trade-off between disruption, cost and reliability, and developing more opportunities for sharing and collaboration across sectors i.e. ideas for the development of whole energy systems solutions and activities during RIIO 2. For current and future consumers, this work will ensure we are on the right trajectory for an optimised pathway to decarbonisation for the RIIO 2 period and beyond.

This is version 2 of the engagement log, updated to include new insight generated since January 2019 and to address challenges raised through discussion at the Stakeholder Group meeting, SG5. Any new text is coloured purple.

This is version 3 of the engagement log, updated to include new insight generated since July 2019. Any new text is coloured blue.

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# QUESTIONS FOR THE STAKEHOLDER GROUP

**Pre engagement**

- Sufficient information provided to stakeholders on which to provide input?
- Information presented in an unbiased way?
- Is rationale for engagement approach appropriate?
- Are the options/questions presented clear and unbiased?

**Post engagement**

- Was the engagement undertaken robust and effective?
- Have we demonstrated engaging targeted stakeholders?
- Were the outcomes of the engagement clear?
- Are the conclusions drawn from the engagement robust?
- Do you agree with the conclusions drawn from the engagement?

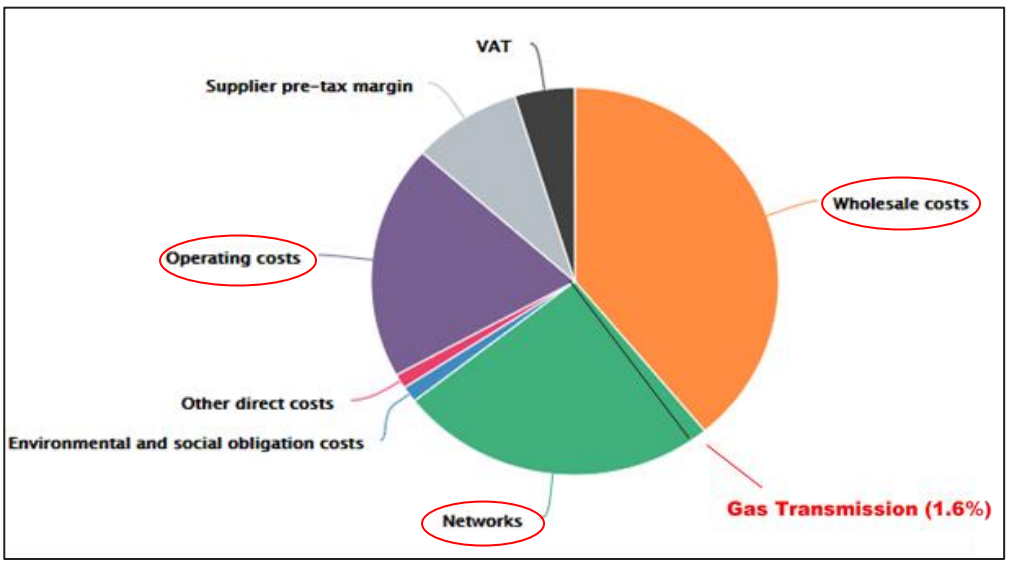
# 1. PRE-ENGAGEMENT

i. ***What is the subject: background and all information (evidence) required to understand what is being engaged on; link to outputs (or incentives)***
ii. ***Where are we today/what do we deliver today, and what do we currently understand from***
iii. ***stakeholders on future development***
iv. ***The industry drivers for this topic***
v. ***The link to the stakeholder priorities and the scale/materiality of the topics***
vi. ***Flag interactions with other topics***
vii. ***Topic prioritisation: materiality vs ease of engagement***
viii. ***Establish boundaries of disclosure for engagement – what is shared, what is not shared, and what is shared after the engagement.***

## 1.1 CONSUMER CONTEXT

Our engagement on this topic has been designed to enable us to understand and articulate the needs of our stakeholders as we move towards a future energy system, which is optimised across all the energy sectors, not just the individual networks in isolation. All three of our consumer priorities play a critical role in the transition to the energy system of the future: where consumers can still use energy as and when they want, experience minimal disruption and energy bills remain affordable. At this early stage in the transition to a decarbonised energy future, there is a need to consider all energy types and decarbonisation pathways to order to achieve the optimum consumer outcomes, not only for the RIIO 2 price control period for the next decade and beyond.

The expenditure within the priority will directly impact gas consumers as the costs associated with developing the gas transmission elements of the whole energy system future will impact on gas transportation charges which subsequently flow through to the end-consumer bill. In addition, the future consumers will be impacted by our current strategy for meeting the decarbonisation, digitisation and decentralisation challenges, ensuring we can meet the needs of all future stakeholders. This topic has the potential to impact upon consumer charges in the other energy network sectors too– both the gas distribution network costs but also electricity consumer costs – as the premise of a whole energy system of the future, optimising across all sectors, will create interactions and trade-offs between those sectors.



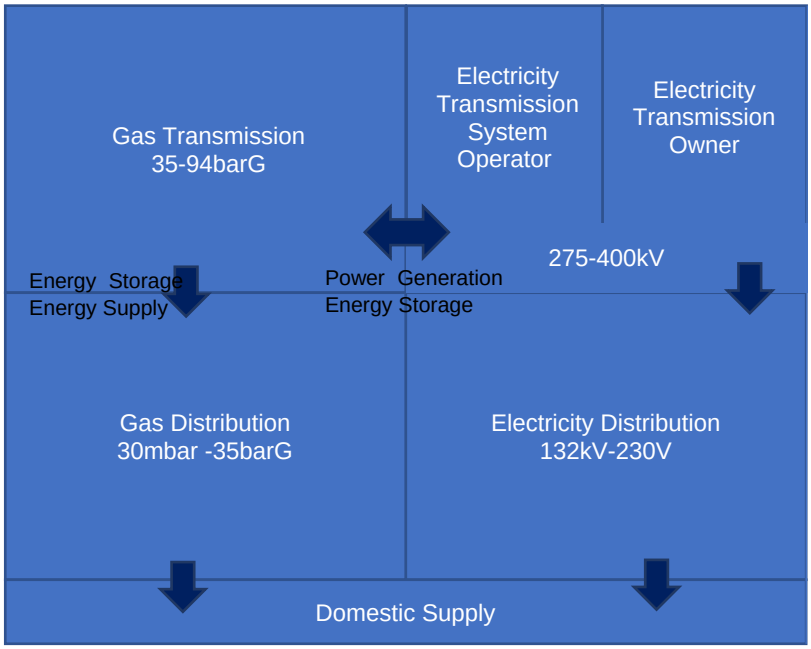

It is expected that our expenditure against the overarching stakeholder priority will be in region of £20m – £30m per annum, however investment specifically within this topic will be fairly low, primarily OPEX spend

associated with several staff full time equivalents (FTEs) supporting the ongoing engagement and development of whole energy system options.

However, as well as delivering key projects within this price control period, this expenditure is vitally important in ensure the right options are developed within the RIIO 2 framework, and embedded for the longer-term development of the gas transmission network within the whole energy systems context.

## 1.2 BACKGROUND AND DRIVERS

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




From a fully vertically integrated system in the 1970s the ownership of the gas transmission network has been through a process of privatisation as well as a number of mergers and demergers to form part of the National Grid company business today. One important change was the introduction of competition into the sector, with gas transportation and storage separated from other parts of the gas energy chain in 1997. A full timeline is presented in Appendix 6.1.

From an asset management perspective, there are a number of similarities across the high and lower pressure tiers of gas transportation, and historically there has been a good degree of learning and knowledge share. However, there are also key differences in the physical attributes of the network and there is a necessary separation of the day to day commercial practices. Gas Transmission continues to operate as one combined transmission owner and system operator entity under the National Grid Gas business licence. This combined entity model optimises the decisions across commercial tools and asset investments available in order to deliver the most efficient outcome for consumers.

The operation of the gas transmission network also impacts upon, and is impacted by the electricity transmission system, primarily through gas fired generation which now makes up ~30% 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. The intermittent nature of renewable generation has led to a greater reliance on gas as a flexible fuel available to pick up, for example under low wind conditions. Under current legislation, there is no exchange of commercially sensitive information between the two licensed entities of National Grid Gas Transmission and National Grid Electricity Transmission to ensure there is no distortion of the markets.

With a highly segmented competitive energy market, the challenges of decarbonisation and the future pathway of energy rely on a change in approach. Decarbonisation in electricity generation has already made a significant change to both gas and electricity sectors. Investment in infrastructure for electric vehicles is paving the way for decarbonisation of transport. As the single biggest source of UK carbon emissions, the decarbonisation of heat is the next big challenge. It has become increasingly evident that the infrastructure required, the potential disruption to consumers and associated costs of electrification mean that a range of other options should not be discounted. This includes the continued use of natural gas in combination with carbon capture and consideration of green gases such as hydrogen. The successful development of these options requires the five sectors to work together in a more holistic and joined up way to ensure the best outcome for consumers. The whole energy system approach therefore is the development of a portfolio of alternative pathways for decarbonisation of energy in all its uses – electricity, heat, transport and industry – and these options should be optimised to deliver best value for stakeholders.

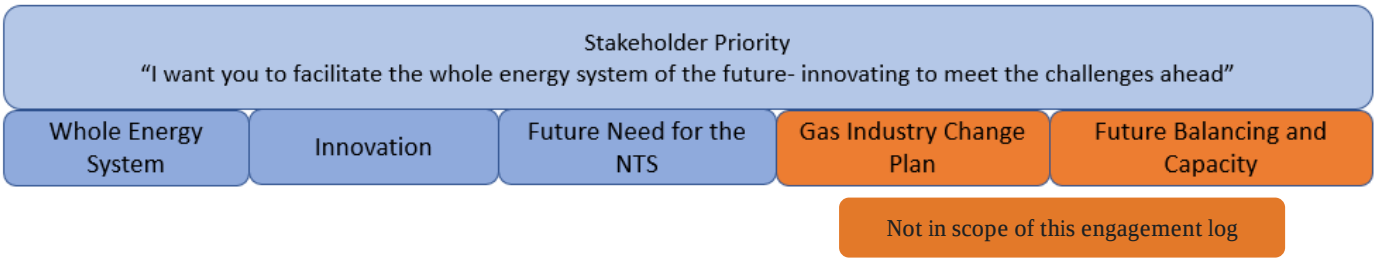
Through our RIIO 1 stakeholder engagement and our Listen phase of the RIIO 2 stakeholder engagement we have clearly heard that stakeholders expect National Grid Gas Transmission to play a key role in the decarbonisation of the energy sector, collaborating with other sectors and innovating to develop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

In their May 2019 Sector Specific Methodology decision Ofgem have confirmed that for RIIO-2 they will take a broad definition of whole system : “In addition to the gas and electricity sectors, the scope of the ‘whole system’ is expanded to apply to all other areas so long as coordination with those areas produces net benefits for the existing and future consumers of the relevant network sector.”

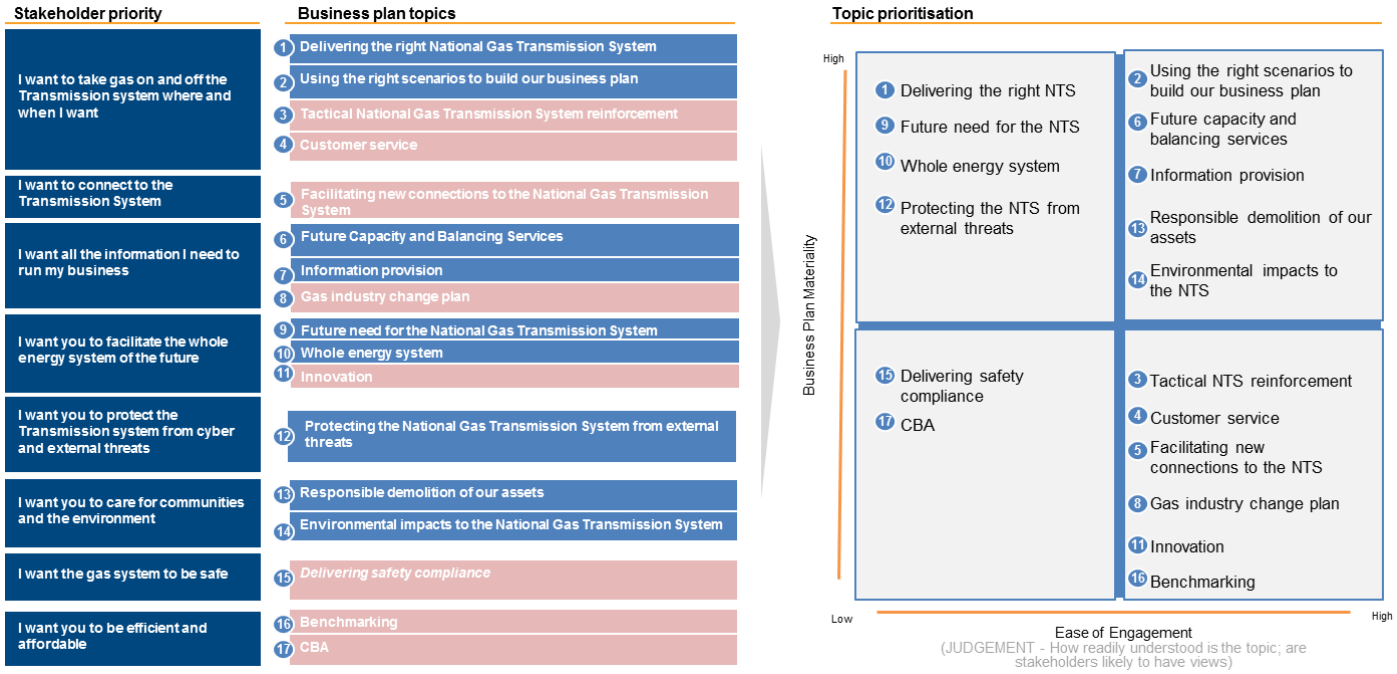
The importance of this work to our RIIO 2 business plan is critical. The gas transmission business currently plays a central role in delivering energy (both gas and electricity) reliably and affordably to stakeholders and the strategies we develop and the investments we make within RIIO2 will enable gas transmission to be fit for a range of future energy scenarios in the most timely and cost effective way for all stakeholders.

## 1.3 LINK TO STAKEHOLDER PRIORITIES AND INTERACTIONS WITH OTHER TOPICS

The stakeholder priority “I want you to facilitate the whole energy system” is formed of a number of topics and the way we optimise our business plan across all these areas is a key consideration as we move forward with our stakeholder engagement.




The importance of this topic to our stakeholders, and the materiality within our business plan, mean that this is a key area of relevance for engagement with our stakeholders. At the Stakeholder Group meeting 2 the topics 'Whole Energy System' and 'Future Need for the NTS' were classified as having a high materiality and therefore deemed relevant for discussion at the Stakeholder Group. The Gas Industry Change plan falls below the materiality line, however it is the means by which we will deliver the activities within this Whole Energy System priority area. Innovation also falls below the materiality line as a standalone topic, however key innovation engagement relevant to the whole energy system is presented in this engagement log. This is demonstrated by the following matrix:




UPDATE May 2019

Although the first version of this paper does include innovation related activities, a separate, specific paper was presented in April at SG 7 covering our RIIO 1 innovation activities and proposals for RIIO 2.

# 2. THE ENGAGEMENT APPROACH

*i. Approach to engagement and why have you chosen this approach, is it: inform, consult,*
*ii. involve, collaborate, empower*
*iii. What are the desired outcomes from this engagement? (incl. where you most need to engage)*
*iv. Stakeholder mapping – who are key stakeholders (anyone who believes they are affected by your decisions), which segment (and why, including impact and interest of topic on stakeholder) Recognising the different threads of the public interest – stakeholders, customers, consumers, citizens, communities (geographical and interest)*

## 2.1 OUR PLANNED APPROACH

Our engagement approach on this topic has two phases:

1. inform and educate our stakeholders on the key issues,
2. move into open conversations to understand our stakeholder needs and discuss appropriate outputs

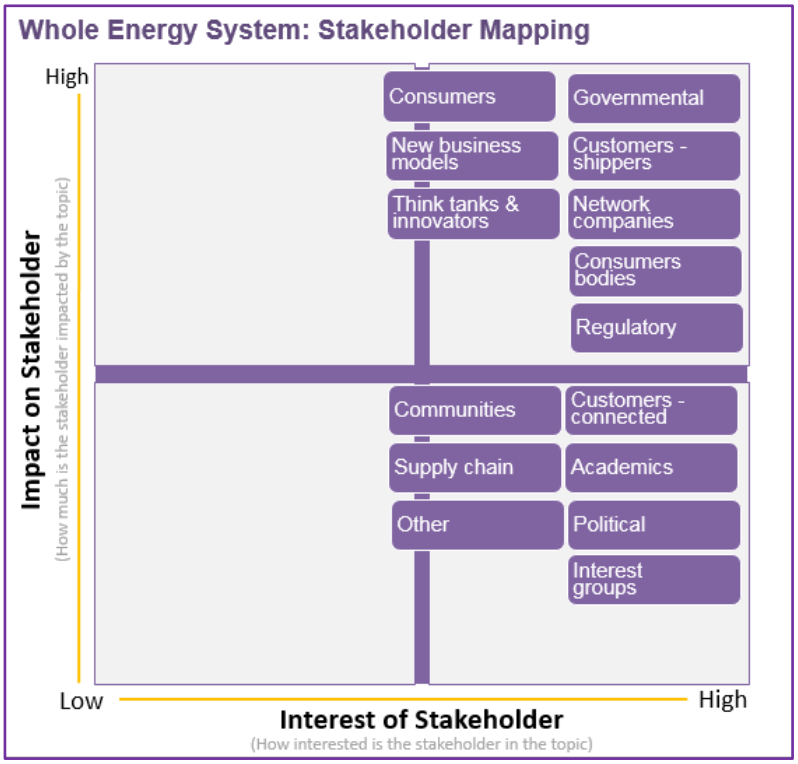
We have currently completed the inform stage and are moving through from open conversations towards defining relevant outputs.

| | |
|---|---|
| **Inform** | Educate stakeholders on the changing energy landscape, the options this might create for the future of the network and the impact on customer and consumer bills. |
| **Open conversations – Stakeholder needs and National Grid Outputs** | The concept of whole energy systems<br>The role of gas transmission in a whole energy system context<br>How much change can the industry handle at any time? |

Our initial steps in developing our work under this stakeholder priority were designed to help us understand the importance stakeholders had placed on the role of gas transmission in a whole energy systems context. The next steps are more focussed on what stakeholders expect as we develop our strategy and options to move forwards in RIIO 2. The desired outcome of this engagement is therefore to understand what our stakeholders expect from National Grid Gas Transmission as we move into a future energy landscape with a whole energy system approach. Building on significant engagement already underway within our business as usual activities, much of which is collaborative with other network companies, we are therefore looking to engage with stakeholders not previously captured, to help underpin and complement the insight already generated or in the process of being generated.

## 2.2 STAKEHOLDER MAPPING

The matrix below shows our assessment of key stakeholder groups impact and interest with the table below providing the detail of specific groups which we have attributed to each category for the purpose of this topic. The key stakeholders for this topic are the top right quadrant of the matrix below. They are characterised as having high impact and interests.




| Stakeholder Segment | Description | Example Organisations |
|---|---|---|
| Regulatory | Energy and safety regulators | Ofgem, HSE |
| Governmental and Political | Civil service and committees | BEIS |
| Customers-shippers | Buy gas from producers | Active shippers |
| Consumer Bodies | Members of the public, commercial & industrial | Citizens' Advice |
| Network Companies | Other regulated energy network companies | Gas Distributions Networks, Electricity Distribution Operators, Electricity Transmission Owner and Electricity Transmission System Operators |
| Consumers | Household consumers and industrial consumers who use gas as feedstock but are not connected to the gas transmission system | Individual domestic consumers and industrial organisations |
| New Business Models | New business exploiting the '3 Ds' – decarbonisation, decentralization and digitalisation | Association for Decentralised Energy |
| Think Tanks and Innovators | Innovators and advisory organisations | Energy Systems Catapult, EIC |

**Regional Focus**

Based on our stakeholder engagement to date, we haven't received any insight to suggest significant regional variation in expectations of the gas transmission network or our strategy in a whole energy system approach. This is a gap in our engagement to date as there is likely to be significant regional application in technology for 'distributed energy' for example. We will seek to engage local authorities where possible and will engage across all the distribution sector companies as part of developing our RIIO 2 business plan as these network companies are likely to have obtained regional insight which we can also use.

# 3. ENGAGEMENT ACTIVITIES

i. ***What insight have been gathered to inform engagement approach?***
ii. ***Engagement activities, methodologies and tools (ongoing engagement, bespoke engagement, willingness to pay, qualitative research, surveys, complaints intelligence, market data) and sources from which decision will be made.***
iii. ***What innovative engagement methods have you considered?***
iv. ***Stakeholders involved – all impacted stakeholders have been engaged (planned vs actual). What did they score themselves on impact, interest or knowledge?***
v. ***Overview of responses (must provide as deep dive if required)***
vi. ***How were the outcomes measured and what evidence do you have? Quantitative and qualitative. How often did points come up and how often responses received?***
vii. ***Does it meet the needs of targeted stakeholders?***
viii. ***Articulation of options plan or process presented (benefits/limitations/ timing)?***
ix. ***How have you considered impact on safety and customer in options?***
x. ***How have you considered innovation in options e.g. innovative approaches to engagement or innovation projects?***

## 3.1 ACTIVITY OVERVIEW

As previously mentioned, our engagement activities to date have been quite wide ranging and primarily carried out as part of our business as usual RIIO 1 interactions. We have built upon this engagement with a smaller number of dedicated RIIO 2 activities. The following section describes all interactions, both business as usual and those specifically RIIO 2.

The interlinked nature of this topic means that good collaboration with other energy sectors is essential in order to draw the most comprehensive insight from all stakeholders to inform our RIIO 2 business plan. This centres around our regular interaction with the gas distribution networks and electricity transmission sectors primarily as well as engagement with the regulators. Each of the eight topics listed below are examples of our business as usual engagement and are described more fully in the next section:

- Direct Consumer Engagement
- Future Energy Scenarios (FES)
- Future of Gas (FOG)
- Gas Future Operability Planning (GFOP)
- ENA Gas Futures Group (GFG)
- National Grid Heat Campaign
- Innovation

In our engagement planning we then looked to supplement these business as usual engagement activities by additional different engagement methods, including regional events with connected customers and engagement with a range of key stakeholders at an industry roundtable event.

| What | Who | Location | Outcome | Engagement Status |
|---|---|---|---|---|
| Workshops at our Terminals | Terminal operators<br>Offshore producers<br>Government (Local Authorities) | Bacton<br>St Fergus | Understand key issues and the value of the future of the gas network by stakeholder segment in a whole energy systems context. | Complete |
| Regional engagement | Network Companies (Gas Distribution Networks)<br>Other connected customers<br>Storage operators<br>Government (Local Authorities) | Workshop within different GDN boundaries | | Complete |

| | | | | |
|---|---|---|---|---|
| Energy Networks Association (ENA) Survey | Interest Groups<br>Network Companies<br>New Business Models<br>Academics | Nationwide | Understanding stakeholder views on the role of the UK gas networks within a whole systems approach. | Complete |
| Industry Roundtable | Interest Groups<br>Network Companies<br>Consumer Bodies<br>Regulator<br>Government | London | Understanding of key issues by stakeholder segment | Complete |
| Consumer engagement – Immersion events, Willingness to pay survey | Domestic and industrial consumers | TBD – Focus group in each geography | Qualitative insight of decarbonisation of heat. | Ongoing |
| 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. | Ongoing |

## 3.2 STAKEHOLDER ENGAGEMENT ACTIVITIES

**Business As Usual Engagement**

**Direct Consumer Engagement Project**

In 2017, we commissioned a report through Populus ('National Grid's reputation and influence') which gave some useful insight into the views of consumer and government which highlight the importance of the changing energy landscape and the changing role of National Grid. The report provides in sight in two main areas. The study included a number of interviews with a range of stakeholders, presented in the table below:

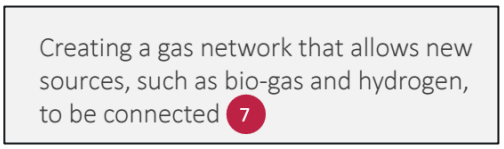
| Category | ALL | Government (inc. officials, opposition, MPs, devolved) | Commentators (inc. think-tanks, academics, consultants) | Infrastructure (inc. engineering, business) | Campaigners (consumer, environment) | Media |
|---|---|---|---|---|---|---|
| Number of interviews | 46* | 13* | 15 | 8 | 3 | 7 |

Some quotes are provided as an example of the insight relevant to this Whole Energy System topic:

"There is **more thinking going on** about how National Grid can be at the heart of a changing energy network." *Commentator*

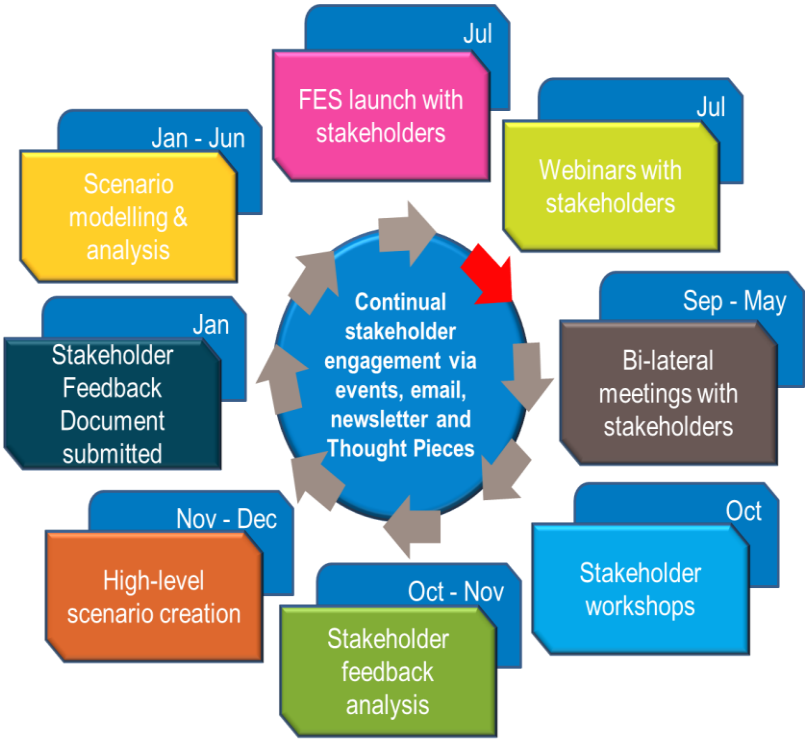
"We would be interested in them playing a stronger role in **driving debate over the future of the UK system**. They tend to talk about relatively short-term issues, whereas they do think about long-term issues." *Commentator*

In the second part of the study, Maximum Difference Scaling (Max Diff) was used as a way of evaluating the importance of a number of alternatives to consumers. 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. When respondents were given seventeen options for investment, greener gas sources such as hydrogen ranked 7 out of 17.




**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 this year involved 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 recently 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 has 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 bodies, innovators and academics, network companies, 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 bodies, innovators and academics, network companies, 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, network companies, regulators, government, customers -shippers |
| **Stakeholder Feedback Workshop** | September 2017 | 18 | Interest groups, innovators and academics, network companies, customers -shippers |
| **Future of Gas: How gas can support a low carbon future** | March 2018 | 89 | Interest groups, consumer bodies, innovators and academics, network companies, 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.

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 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 taken 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. The full list of stakeholders is published in Appendix 7.3. The plan for the next document is a focus on supply challenges in the South East, so this targets a specific stakeholder group and the mode of engagement will be bespoke meetings and one webinar. 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 recently 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 beginning and will run until December 2018, primarily targeting BEIS and Ofgem. The project will then begin a process of wider stakeholder engagement from February to March 2019, with joint workshops with national stakeholders to discuss RIIO 2 related issues. There will be 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 will then be a process of identifying priorities and work streams with the project report issued in October 2019. The project will present a joint vision for decarbonised gas across the gas network companies and a coordinated plan to deliver.

**National Grid Heat Campaign**

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 considering the how to include direct consumer engagement. 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**

We have also collected insight from a range of stakeholders through our existing Network Innovation Allowance (NIA) and Network Innovation Competition (NIC) programmes. We typically spend £4m - £5m per annum on a range of NIA projects. A number of these are presented below which have links to the topic of whole energy systems and three of the four projects are collaborative with other network companies.

| Project Title | Collaborative Partners | Supplier | Total Sanctioned Spend (£) |
|---|---|---|---|
| Spatial district heating analysis and impact on gas and power demand | Cadent Gas Limited<br>National Grid Electricity Transmission | Buro Happold | 136,000 |
| Energy Map | Cadent Gas Limited<br>Northern Gas Networks<br>SGN<br>Wales and West Utilities | Energy Networks Association<br>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.

**RIIO 2 Engagement Activities**

**Energy Networks Association (ENA) Survey**

The ENA recently reported on a national survey, led by independent research consultants Accent on the role of the UK gas networks within a Whole Energy System Approach. Accent, on behalf of the ENA, targeted close to 80 senior-level, national stakeholders from businesses, consumer groups, government and think tanks. Accent carried out a telephone and online survey of the ENA and gas networks' stakeholders. From an initial sample of 229 contacts, 78 stakeholders completed the survey. The majority of interviews (72) were conducted via telephone, with a small number completed online (6). Interviews took place between 6 July and 6 August 2018. A list of the stakeholder organisations surveyed is provided in Appendix 6.2.

Close to 80% of stakeholders surveyed see gas as very important for heating in the future, with the gas networks central to reaching more than 23m homes across Britain providing reliable, secure and flexible sources of energy to homes and businesses. Innovation is a top priority for 86% of stakeholders surveyed and there continues to be widespread support for decarbonising the energy system to provide low-carbon and cost-effective energy, with a clear role for Britain's gas networks in delivering this. Close to 80% of stakeholders surveyed said decarbonisation and the environment are high priority issues for them. By building on the innovative work already taking place, the gas networks can help to develop pathways for gas that are economically and technically feasible in helping to meet the UK's ***Climate Change Act 2008.*** The survey results also signal a continued shift toward the need for a more integrated energy system, with 70% of stakeholders surveyed wanting to discuss how best to use both Britain's gas and electricity networks within the energy system. Taking a 'Whole Energy System Approach' means looking at optimal network investment and operational decisions for the whole energy network, not just the individual parts in isolation.

Expanding on the findings of this survey, a bespoke, face-to-face workshop will be held in early 2019 to explore 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**

In partnership with Network Magazine, National Grid sponsored an Industry Roundtable event on 27th November 2018 titled: "Solving future system challenges now". The objective of the industry roundtable was to arrange a robust and timely discussion centred around solving possible whole energy system sensitivities and was hosted by editor Alec Peachey from Network Magazine.

In planning the event, rather than specific questions, we developed a number of discussion points which are listed below:

- The role of the regulator – are current price controls fit for the future?
- Lack of harmonisation between regulations, policy and pricing
- Empowerment of consumers
- The transition to a flexible energy system, and the new markets required to facilitate it
- The impact and potential of technology

As part of the planning of the event a more extensive list of questions were prepared to aid the discussion. A selection of these is provided below, with the full list in Appendix 7.5.

General Overview:

- What are the challenges to a whole energy system approach?
- Why is a whole energy system approach important to the end consumer?
- Is there anything about working in a whole energy system environment that precludes a project that only looks at one energy vector?
- When implementing a whole energy systems approach, do we think consumers might accept paying more for clean energy?

Making it happen:

- What needs to be done to drive forward a whole energy systems approach?
- Should network operators be driving this change?
- How can the industry get commitment from government and funders of the system?
- Is there the need for some kind of central coordinator to manage a whole energy system approach?
- What's your message to government/the regulator to drive action over a whole energy systems approach?

At the event, there was good representation from a number of priority stakeholder segments with senior representatives from the regulator, government and network company segments.

| Stakeholder Segment | Regulator or Government | Network Company | Academics, Innovators and Think Tanks | Interest Groups | Consumer Bodies | Customer | Supplier |
|---|---|---|---|---|---|---|---|
| **Number of organisations represented** | 3 | 3 | 3 | 2 | 1 | 1 | 1 |
| **Organisations represented** | | | | | | | |

The event was run under 'Chatham House' rules so specific quotes cannot be attributed. However, the key points and views are described below.

Overall, there was a strong focus and recognition that there is a need for whole energy system thinking and that it needs to be driven forward. There was a discussion about what the definition of 'whole system' and it was agreed that when using the term, it should be whole energy system not just electricity as all sectors have a role to play. By this definition, there is a need to ensure that interactions go beyond the Transmission Owner (TO) and System Operator (SO) relationship with a Distribution Network Operator (DNO). There seemed to be consensus on the need to align what's best for consumers with what is best for the whole energy system and flexibility was considered key in the approach needed.

There was discussion about how the energy industry is improving by working together. There is still some way to go however as networks need to talk to each other more and should be planning in a whole energy system way without need for the framework and policy. It was also mentioned that Local Authorities have a place to ensure that there is better coordination, as another example – roads being dug up needs centralising control and that industry and local government need to coordinate better on a regional basis.

There was talk of regional solutions as there is variation across regions in terms of requirements and the energy mix. It was also mentioned that the regional and local strategies would need to align with a national strategy in a two-tiered approach although this would prove challenging.

The discussion turned to looking at optionality as opposed to pure near term outcomes as it is possible that incremental changes and views are more costly than having a long term view. As an example, when the early electricity network was being developed, engineers had the foresight to use 400kV which had the capacity to support the future needs of the system. By taking this approach it was 'guesstimated' that there was a 10 times savings by taking that approach.

In addition, with the current level of uncertainty, optionality must remain on the table to ensure that the system of the future is fit for purpose. At present, there is no clear vision of where the GB Energy industry is going although there was a point made that GB is ahead of Europe in many respects and could strive to be the world leader in whole energy system thinking.

There was further discussion on the difficulty removing barriers to multi utility approaches to work –there was a comment that a more joined up approach can take a lot longer and the example given was HS2 – and so be learnt? The group discussed the need for large demonstration projects now to change assumptions and inform and align a whole energy system framework that works with the decarbonisation targets of 2045 and 2050 through BEIS and Ofgem. Decarbonising heat was also discussed, the point was made that no rash decisions should be made – again large demonstrations of different models needs to happen and there is a role for Government on big decision such as heat policy. The conversation also covered why vulnerable customers aren't funded through a price control. This gave way to a discussion about how government and regulators should be working more closely to align policies. A point was raised that the Electricity System Operator (ESO) would look at whole energy system costs in the future, but there was uncertainty as to how do you measure whole energy system benefits. Especially as there isn't even agreement on the units of measurements.

The industry needs to look at itself and consider designing incentives around consumer benefits – and recognising cross vector work and reward in this area. There is a clear need to take consumers on the journey and tie the future in with what they want. There is a need to find options that are easy for them to engage with, and an example given was the Carbon Intensity Tool. The group then posed a number of questions:

- Should there be incentives from regulator?
- Can there be incentives centred around societal benefits?
- There was a general concern that the industry doesn't really coordinate work; so, should there be greater centralised planning or do we just leave it to the markets?

There was a consensus that options should remain open at this stage. A question around gas research and development (R&D) was raised. There should be long term investment into R&D and innovation that goes beyond price control periods as innovation is key to getting the right solutions but there needs to be a pathway to build new technologies. The final points were made were around how the industry needs better price signals and that data is key, which at the moment is not as consistent as it needs to be.

Finally, in the closing remarks, the sentiment was that a lot of good thinking went into the day and that we must not hesitate to push for a new way of thinking and have greater collaboration and increase our innovation. The event will be written up in Network Magazine and Utility Week.

### Industry Roundtable II

There was a second roundtable event held in April 2019 which was primary focused on electricity network collaboration. There was a range of attendees including BEIS, Ofgem, Citizens Advice, Green Alliance, Cardiff University, Grid Edge Policy, UK Power Networks, SSEN, Energy Systems Catapult and National Grid.

Discussion topics included driving whole system outcomes through incentivisation, barriers for innovation, and identifying the right triggers for investment. As well as this a number of participants referenced the need for coordination across the gas and electricity sectors:

> "How can Ofgem incentives or have a framework that allows for better coordination between gas and electricity?"

> "We need to keep up with change with gas if we want to use the flexibility for the rate of change."

**Regional and Terminal Events**

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 giving context to our business, our performance and the challenges we face. On the topic of the whole energy system, we did not ask specific structured questions at these events. However, given the central role of whole energy system we were able to capture relevant commentary from participants across the various session discussions.

A summary of the four events held in July 2018 with the number of attendees in their respective stakeholder segments is provided in the table below:

| Event | Customer | Regulator or Government | Network Company | Academics and Think Tanks | Supply Chain | Energy Industry Bodies & Institutions | Organisations represented |
|---|---|---|---|---|---|---|---|
| Future needs of the Network – St. Fergus | 4 | 1 | 0 | 1 | 0 | 0 | [redacted] |
| Future needs of the network - London | 6 | 1 | 1 | 2 | 0 | 1 | [redacted] |
| Future needs of the network - Bacton | 5 | 0 | 3 | 1 | 3 | 1 | [redacted] |
| Future needs of the network - Chester | 5 | 1 | 1 | 2 | 10 | 1 | [redacted] |

The replies given to the question "What's important to you under each of our stakeholder priorities that we should be measured against?" were filtered to show all those responses aligned to this priority "I want you to facilitate the whole energy system of the future". Of the total responses to this question (220), 41 are aligned to this priority and 18 are linked specifically to our whole energy systems approach covering hydrogen, transport, carbon capture and storage and broader cross sector collaboration. In addition, when stakeholders were asked the question, "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?", there were a further 14 responses aligned to this priority which also gave insight into whole energy systems.

| Number of Reponses aligned to this stakeholder priority aligned by topic | What's important to you under each of our stakeholder priorities that we should be measured against? | 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? |
|---|---|---|
| Cross sector collaboration | 9 | 4 |
| Hydrogen | 3 | 4 |
| Transport | 4 | 3 |
| Carbon capture and storage | 2 | 1 |
| Innovation | 4 | 2 |
| Other (including workforce skills, disruption and government policy) | 19 | 0 |
| **Total** | **41** | **14** |

*YELLOW – particularly relevant to Whole Energy System topic

The quotes below provide more qualitative insight into the stakeholder views. These have been chosen to reflect the majority of views given by stakeholders on the various topics:

***"Collaboration in whole energy system – going beyond the high level energy networks. More collaboration between future scenarios. High as critical to whole business."*** [redacted], Network Company

***"National Grid could be more seamless between gas and electricity"*** [redacted], Customer

***"A new service that's of medium criticality is short term flexibility for power sector, perhaps considering the whole energy system."*** [redacted], Customer

***"Increase the volume of low carbon gas by including hydrogen"*** [redacted], Academic/ Think Tank

***"There should be new services for gas in transport."*** [redacted]

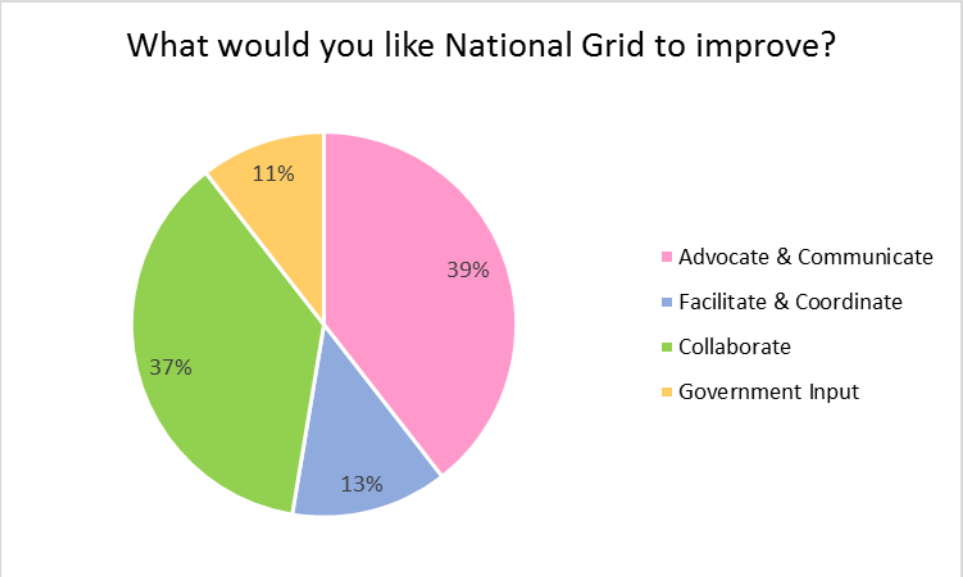
***"National Grid need to be future fit, flexible and innovative***." [redacted], Academic/ Think Tank

A supplementary question, "What outcomes would you like to see under each priority?" also generated useful insight specifically around the need for cross sector collaboration when the networks are particularly stressed or at times of demand/ supply mismatch.

| Stakeholder Organisation | Comment |
|---|---|
| [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 the 1st March. It is incredibly important National Grid are efficient and reliable going forward. |

| | |
|---|---|
| [redacted], **Supply Chain** | The 1st of 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], **Interest Group** | 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 T3. |

The final question which gave relevant insight was "What would you like National Grid to improve?". There were 38 responses linked to this priority. Of these four categories emerge whereby stakeholders indicated National Grid should be doing more to advocate and communicate the need for a whole energy system approach. A second category takes this advocacy further and stakeholders have stated National Grid should be facilitating and coordinating a whole energy systems approach. The third set of comments are linked to the need for collaboration across sectors, primarily, gas and electricity transmission collaboration and the final category concerns the need for government input and policy.




| | | |
|---|---|---|
| Advocate and Communicate | National Grid need people to own specific actions – lack of continuity<br>We need to advocate gas NOW!<br>OFGEM and BEIS need to advocate gas much more than they are<br>Promote the gas industry TOGETHER! | [redacted], Customer -shipper |
| Facilitate and Coordinate | NG and Ofgem to facilitate discussions about whole energy otherwise gas people will keep talking to each other and the same in electric. | [redacted], Network Company |
| Collaborate | interaction between fuels needs to increase | [redacted], Supply Chain |
| Government | Ofgem and the government needs to clearly communicate the increase in costs that are likely to continue to provide heat. | [redacted], Academic |

Some key themes emerging from all these stakeholder interactions and events can be summarised as the need for greater collaboration and communication, in particular cross gas – electricity sector interactions, setting the right regulatory framework with mechanisms to remove barriers to a whole energy systems approach and the need to influence Government policy.

### External Commentary

The Whole Energy System topic also generated a lot of insight through a wide range of interest groups through external commentary in the media. A selection of quotes are presented below which explore the whole energy systems approach:

| Stakeholder Organisation | Key Message | Example Quote |
|---|---|---|
| BEIS (December 2018), A future framework for heat in building | The UK will not be able to continue to rely on natural gas to 2050, but it is not yet clear which low carbon option should replace it | "There are a range of heating technologies with the potential to support our 2032 and 2050 decarbonisation commitments. Whilst we don't yet know which approaches will work best at scale and minimise costs to UK taxpayers, consumers and businesses, 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." |
| CCC (November 2018), Hydrogen in a low-carbon economy | The gas transmission network is likely to be required in all decarbonisation scenarios, even where heat is fully electrified.<br><br>Where a switch to hydrogen is made, a new parallel hydrogen transmission system is likely to be required. | "In scenarios where heat is fully electrified, there may be a case for decommissioning the gas distribution networks. The gas transmission system could continue to remain useful in order to provide natural gas to power stations or industrial users (e.g. for use in combination with carbon capture and storage)."<br><br>"The UK's existing gas distribution networks are expected to be suitable for transporting hydrogen at all 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" |
| National Infrastructure Commission (July 2018), National Infrastructure Assessment | It is not yet clear which low-carbon option should replace gas for heating<br><br>New gas-fired power stations may be required in the 2020s. | "The UK cannot achieve its emissions targets while relying on natural gas, a fossil fuel, for heating. Delivering a low cost, low carbon heating system is the major outstanding challenge"<br><br>"It may also be cost-effective to deploy a limited amount of new gas power stations, provided they can be accommodated within the carbon budgets, and recognising that load factors are likely to be on a reducing path." |
| UKERC (February 2018), The Future role of gas | In a scenario where CCS is available as a technology, natural gas can play a major role in a hydrogen economy. However, even in an electrification scenario and without CCS, gas is still required in industry and the power sector. | "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" |
| KPMG for the ENA (2016), 2050 Energy Scenarios The UK Gas Networks role in a 2050 whole energy system | Gas transmission is required across all scenarios for industry and power, even in electrification scenarios where the gas distribution network is decommissioned. | "Continuing to use the gas network offers significant savings versus alternative heating sources." |

### Future of Gas Stakeholder workshop

This research follows a survey of the gas networks' stakeholders in 2018 which showed that a considerable proportion of stakeholders wanted to engage with the networks collectively on the issue of decarbonisation of heat in a discursive forum. The workshop aimed to understand stakeholders' views of how the gas networks should individually and collectively support the decarbonisation of heat through their RIIO-2 business planning. The work was run as a research project by independent agency Accent, in collaboration with the other GDNs. 54 stakeholder representatives were recruited to participate, with attendance from 37 on the day. A full list of workshop attendees is in appendix 7.11. The workshop included a mix of plenary sessions - discussion, presentation of information relating to gas network activity and the RIIO-2 regulatory process - and breakout sessions in smaller groups. Discussions were facilitated by table facilitators and we considered the following overarching questions:

1. What should a whole energy system approach look like?
2. What should gas network RIIO-2 business plans focus on in the context of decarbonising the gas system?
3. How should customers, including customers in vulnerable situations, be taken into account?
4. How can the gas networks work collaboratively to achieve decarbonisation targets?
5. How can decarbonisation best be funded?
6. What are potential barriers?

The key output from the session is presented below:

1. Most stakeholders preferred taking a broad definition of 'whole systems' and expected the gas networks to find a shared definition (even if it evolves over time). This was seen to:
    - Allow for greater collaboration across sectors, providing a framework for joined-up business planning on shared issues
    - Minimise the risk of unintended consequences
    - Achieve balance and optimise the energy mix

2. Stakeholders wanted future-proofed assets and decision-making with the longer-term end goal in mind but they emphasised the need for urgency in putting the stepping stones in place to reach decarbonisation targets e.g. prioritising trialling of options to provide the necessary evidence

    "***There has to be some anticipatory investment. If you don't, simply what happens is you just lock out some technologies and lock in others. It's that simple.*** ~ (Group 1)

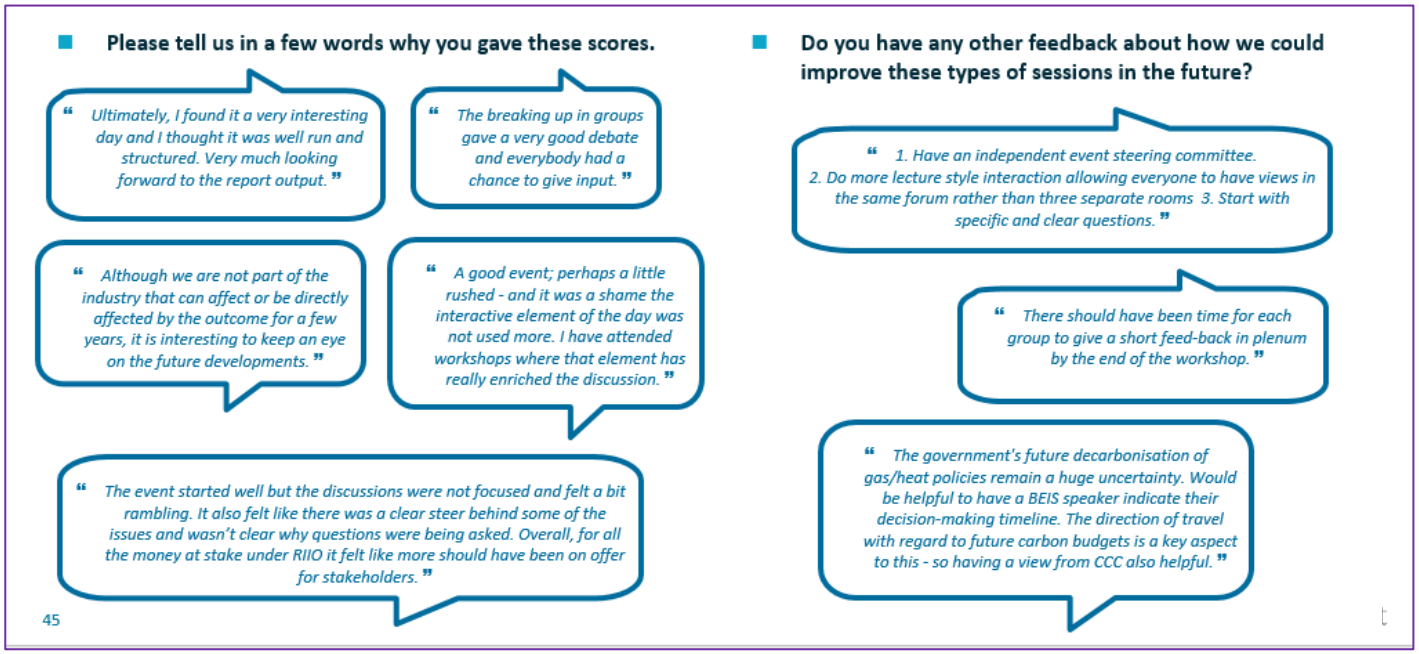
3. They called for a national conversation about the future of heat, with the gas networks seen as being central to:
    - Raising the topic up the public agenda
    - Helping consumers understand the forthcoming decisions, the need for change and possible options
    - Helping consumers understand the value of the current gas system, but also how future options may compare
4. Stakeholders viewed the gas networks as important channels of support to customers in vulnerable situations. This was expected to become even more important in the context of an increasingly decarbonised, and therefore potentially complex, energy system.
5. Stakeholders wanted to see more collaboration between networks (gas but also gas-electricity), particularly in relation to innovation. Stakeholders showed appetite for knowing more about existing

joint activity. Some, however, felt that this kind of joint-working requires an incentive mechanism to overcome barriers of competition.

> "***I'd probably argue against trying to come up with a single national view because the challenges are different in different regions; the ambitions of the Scottish Government are very different from Westminster" (Group 1)***

6. Stakeholders expressed concern that time constraints of the RIIO price control period, combined with cost pressures, may have the perverse effect of hindering network innovation. It was also felt by some that new models for incentivising innovation may be required
7. A possible policy cliff edge and lack of clear direction in heat policy were seen as the most significant barriers to effective planning and delivery. Some stakeholders also point to a likely skills and knowledge gap as an additional concern requiring action.

To help address the challenges around feedback from events, we have also included direct quotes from this event below:




More detail on the workshop and the full report can be found on the ENA website[i].

**Major Energy Users Survey**

further engagement interaction was conducted via an online survey of Major Energy Users. The survey contained two questions relevant to Whole Energy Systems chapter. The first question, "How do you define whole energy system?" generated a range of responses but key words highlighting the linkages with electricity generation, renewables and storage. A word cloud below encompasses the responses from twenty one major energy users.


The second question was more specific – "what interactions do you see between gas and electricity?" The key focus of responses was on the interaction between the two fuels and the importance of this collaboration. There were also references to the changing make up of natural gas in support of the decarbonisation agenda and the price implications.

> "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 fuelled by gas, there is a huge interaction. The choice between gas & electric heating for the future will be interesting."

> "This is a big one, especially in the UK. Gas makes up ~40-50% of UK electricity generation."

> "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 use of CHP fuelled by biogas."

> "Price implications are important. Particularly with reduced storage options."

> "Pricing. Oil price impacts price of Gas which in turn impacts price of Electricity."

We tested our proposals on a webinar with ~30 stakeholders on 2 September 2019. Attendees representing stakeholder segments included the gas distribution networks, customers (shippers), industry trade bodies and regulators. Below is a summary of results:

- Do you agree with our view of what we are leading, collaborating/facilitating on?
  - Yes, 65%, Somewhat - 24%, No, 1%
- Do our proposals meet your needs?
  - Yes - 50%; Somewhat - 50%
- Do you agree with our Net Zero broader perspective?
  - Yes, 67%, Somewhat, 26%, No answer, 7%
- Who should bear the costs of future investment?
  - Current, 17%, Future, 71%, No Answer, 13%

There was some further investor insight from a survey in July 2019 whereby respondents through that National Grid has an important role to play in decarbonisation and it is well positioned to support these initiatives and renewables in general. Some also saw this area as an opportunity for investment. Largely confirms the evidence that fed into the July business plan, i.e. that stakeholders find it important that National Grid take a facilitating/ coordinating role in driving the decarbonisation agenda forward

A further development since July 2019 is the consumer insight which is summarised in the following two tables (domestic consumers, industrial consumers and consumer body). The first table below summarises the insight on the role of National Grid in decarbonisation across a number of different engagement methods:

| | **One-to-one stakeholder interviews: National Grid's role in leading, facilitating and collaborating** | **Focus groups: attitudes to National Grid's role in decarbonisation** | **Acceptability survey: attitudes to National Grid's role in decarbonisation** |
|---|---|---|---|
| **Stakeholder insight and information** | One-to-one stakeholder interactions suggested that stakeholders agreed that NGGT needs to take a leading, coordinating role in whole energy systems (from [redacted] and [redacted]), but some thought it was not doing enough, for example, it wasn't on the H21 panel (from [redacted]). A specific CCS project was also mentioned that NG might engage with (Project Acorn) (from the [redacted] Other participants mentioned various topics which they would like NG looking into, such the future of the network in 20-40 years, hydrogen, and LNG. | Out of four topics (reliable supply of gas, helping the move towards the low carbon economy, keeping gas bills down, helping the fuel poor and vulnerable), focus group participants rated the move towards low carbon economy the second most important responsibility of NG on average (behind reliable supply). The large majority of people also said that they would be willing to accept a small increase to their bills to support the move towards a low carbon economy. Others thought that decarbonisation should be NGGT's responsibility already, and consumers should not have to pay extra. | Participants were asked to rank 6 investment areas (relating to safety, WES, external hazards, environment, innovation and efficiency) by order of priority. Respondents were split on how important "Planning the energy system of the future" is; they were almost equally likely to place it at the top as the bottom. It received an average score of 3.7. |
| **Stakeholder source** | One-to-one stakeholder interviews, input received from a representative of each of: Industry/trade body ([redacted]), Consumer interest group ([redacted]) and Regulator/government ([redacted]) | Domestic consumers | Domestic consumers |
| **Trade-offs between priorities (affordability, reliability, environment)** | None explicitly mentioned. | The majority of consumers said they would be willing to accept a small increase in bills. | Trading off all areas |
| **Source document** | Overall BP engagement, 1-to-1 interviews | National Grid Gas Transmission consumer immersion workshops (February and July) | Acceptability survey |

| | | | |
|---|---|---|---|
| **Robustness** | The findings are likely to be valid and relevant, but not representative. | When discussing the topic, many participants seemed not well informed about NG's potential role in a move towards a low carbon economy. Many participants thought that its role was simply to reduce its own emissions. | Due to the complexity of the topic, consumers had very limited information and they might lack the required expertise. This undermines the reliability of the results. |
| **Relation to existing stakeholder evidence in business plan** | Overall, stakeholders are supportive of National Grid's proposals, though some said that there is not enough detail / too much uncertainty to be sure. Some stakeholders think National Grid could be doing more. Stakeholders are also keen to see National Grid involved in various research topics. | Largely confirms the evidence that fed into the July business plan, i.e. that stakeholders find it important that National Grid take a facilitating/ coordinating role in driving the decarbonisation agenda forward | Largely confirms the evidence that fed into the July business plan, i.e. that stakeholders find it important that National Grid take a facilitating/ coordinating role in driving the decarbonisation agenda forward |
| **Changes to the business plan conclusions and proposed actions** | National Grid might consider responding to some of the concrete initiatives mentioned by stakeholders to its proposals. It might also consider providing more information on the research topics that it is involved in.. | None required. | None required. |

This second table provides a summary of consumer insight on the proposals on approach to the energy transition and net zero.

| | **Approach to energy transition: Interviews with bespoke tool** | **Approach to energy transition: Willingness to pay (WTP) report** | **Net zero targets – domestic consumers** |
|---|---|---|---|
| **Stakeholder insight and information** | Domestic consumers are split on the issue of how NGGT should approach decarbonisation – whether to invest now or to wait until more concrete proposals are on the table. In the same survey, stakeholders also said that running cost is the most important factor when considering changing the heating system in their home, Functionality, upfront cost, environment impact were ranked roughly equally important and the amount of disruptions was the least important. | WTP analysis found that alternative heating systems need to be significantly cheaper than gas boilers for them to be willing to change from the latter | Respondents to the survey were asked what target NGGT should set for carbon neutrality. 6 in 10 respondents favoured a more ambitious target than that set by the government, with 36% saying we should aim to be carbon neutral by 2030, 24% by 2040 and 26% by 2050 (government target).<br><br>While most respondents are in support of NGGT setting carbon neutrality targets, 14% respondents said this shouldn't be a priority for NGGT or that they were unsure. There were some demographic and regional differences. For instance, 13% of over 55s felt that this is not a priority and respondents from the North East of England were significantly more likely than the average to support a 2030 target (56%). |
| **Stakeholder source** | Domestic consumers | Domestic consumers | Domestic consumers |
| **Trade-offs between priorities (affordability, reliability, environment)** | Consumers are trading off all three priorities in their choice of heating systems. | Consumers are prioritising cost over the emissions from their heating systems. | No trade-offs discussed |
| **Source document** | Acceptability Phase 2 - survey | WTP | Interviews with bespoke tool |
| **Robustness** | The findings are relevant and representative for domestic customers. However, there are some issues with validity as consumers may find it difficult to comment on very small bill increases. In the survey, participants were presented with a multiple choice question with one response option for "invest now" but two options for "invest later" which might skew the result towards the former answer. | The findings are generally relevant and representative. However, the specific monetary values should be treated with caution, given the issues associated with validity in Section 3. | The findings are relevant and representative. There are some issues with validity - respondents' ability to answer meaningfully may be limited by the experiences that they have had, and making choices based on very small sums of money. |

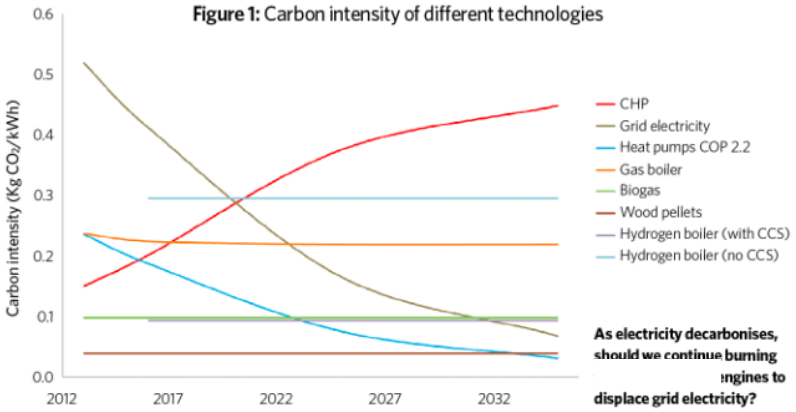
| | | | |
|---|---|---|---|
| **Relation to existing stakeholder evidence in business plan** | The stakeholder engagement provides information on some specific aspects of National Grid's decarbonisation plan. | The stakeholder engagement provides information on some specific aspects of National Grid's decarbonisation plan. | It is a new area but is relevant to a wide range of questions on climate change since it requests a steer on NGGT's overall level of ambition on net zero. |
| **Changes to the business plan conclusions and proposed actions** | No changes recommended | No changes recommended | The majority of stakeholders favour a more ambitious target on net zero. NGGT could consider a discussion on NGGT's targets for carbon neutrality to be presented in the Business Plan. |

## 3.3 CRITICAL VOICES

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 in 2017 references a quote from the CIBSE Journal "after the future decarbonisation of electricity – CHP will become the worst option in terms of CO2 reduction". In August, the CIBSE Homes for the 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.

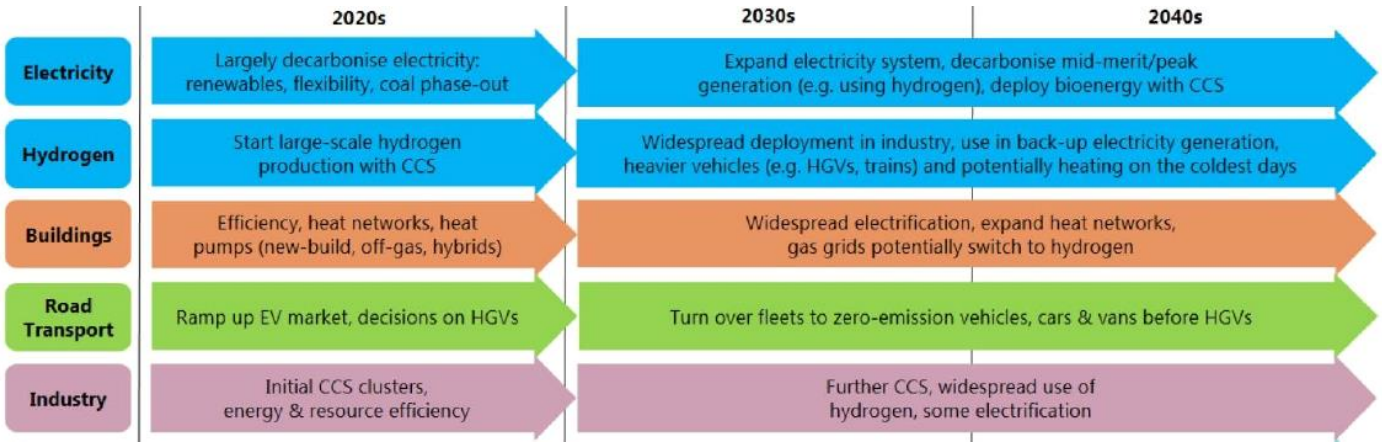
In 2015, in response to the government commitment to replace the UK's coal-fired power stations with gas, the Green MP Caroline Lucas was quoted as saying:

> 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.

## 3.4 WHAT WAS THE FEEDBACK ON THE ENGAGEMENT APPROACH?

I. *Was the engagement channel effective?*
II. *What feedback was received from stakeholders on the engagement approach?*
III. *What lessons have been learnt and has this been shared?*
IV. *Has best practice been shared?*

The engagement channels we have used for this priority are somewhat different to other topics. Our RIIO 2 interactions build off the RIIO 1 engagement, in particular the FOG project and to date has been effective in delivering interactions with the stakeholder segments identified as important during the planning phase. The industry roundtable is an example of where we have utilised more innovative, different engagement formats as the collaborative nature of this topic across all network companies is important.

## 3.5 WHAT WERE THE INITIAL NATIONAL GRID CONCLUSIONS

I. *Was there clear agreement on the outcomes from stakeholders? This outcome will directly inform our conclusions*
II. *If there was disagreement on the outcome across which stakeholder groups?*
III. *Have we drawn conclusions by placing greatest weighting on the views of those stakeholder most impacted?*
IV. *Was the outcome inconclusive?*
V. *Is our conclusion endorsed by other sources; bespoke engagement, BAU or external third parties for example is there existing third party research?*
VI. *Will further engagement activities be required to reach a conclusive outcome?*
VII. *Outcomes against decision making framework:*
    a. *Regulatory requirements - Do the outcomes meet all National Grid regulatory requirements? (check with regulation, all options presented should meet this requirement)*
    b. *Ofgem's RIIO2 outcomes and Strategy - giving consumers a stronger voice; responding to changes in how networks are used; driving innovation and efficiency; simplification?*
    c. *Government agenda - Do the outcomes align with latest Government direction (e.g. industrial strategy)*
    d. *Meeting the needs of targeted stakeholders*
    e. *End consumer bill impact*
    f. *Transparency of trade-offs – has a trade-off been made? If so what considerations allowed you to reach a conclusion?*
    g. *Benchmarking and CBA analysis*

The engagement we have completed to date has been extremely useful in reinforcing the importance of this topic to our stakeholders and the importance of setting the right strategy for all current and future stakeholders.

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. Stakeholders have made it clear that it is important to take account of the impacts of these sectors and their impacts. Ofgem's definition now aligns more closely to this following their update on their definition in their May 19 sector framework decision document.

Our RIIO 1 business as usual engagement has been supplemented with a number of RIIO 2 interactions although there are some engagement gaps which need to be addressed. There are two areas around which to target our next steps. The first is further industry collaboration, working closely with the other networks to

influence policy and to develop framework uncertainty mechanisms to ensure options are kept open and to remove any barriers to cross sector engagement. Secondly, we are looking to develop further consumer insight to inform how consumers perceive the trade-off between their three priorities – cost, disruption and reliability and therefore what successful consumer outcomes are defined as under the whole energy systems topic. This has been one of the gaps in our engagement interactions to date.

There are a number of stakeholder segments where we would like to gather more detailed insight and so the table below describes the next phase of engagement activities:

| Event | Date | Desired outcome |
|---|---|---|
| **National Energy Hubs – Developing local energy best practice** | ~~TBC~~<br>Did not go ahead | Support South West Energy hub develop best practice. Work with the group to identify how Gas Transmission can deliver the energy needs of local communities in the interim and then how we can support the transition to a more localised energy system in the medium to long term. |
| **National Energy Hubs – Data Mapping** | ~~TBC~~<br>Did not go ahead | Support Greater South East Energy Hub to develop a national approach and platform for regional energy mapping – checking with J Pemberton for update |
| **Cambridgeshire and Peterborough Combined Authority** | ~~TBC~~<br>Did not go ahead | Working with the Local Enterprise Partnership to create an engagement programme to understand and create an energy solution for the South East.<br>This is an area that will require significant focus in T2 due to high energy demand and the aging assets in the region. |
| **IGEM Council- Future of Gas Networks** | 13th December 2019<br>COMPLETE | Customers<br>Gas Distribution Networks<br>Interest Groups (including heat and transport sectors) |
| **ENA "Whole Energy Approach" workshop** | COMPLETE | Explore 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 |
| **Consumer Engagement** | Ongoing | Our programme of consumer engagement encompasses a range of activities targeting domestic, commercial and industrial consumers. This is more fully described in the gas transmission consumer programme for RIIO 2. |

## 3.6 TRIANGULATION OF STAKEHOLDER ENGAGEMENT OUTPUTS

In September 2019, Frontier Economics undertook a study to draw out the robust messages from stakeholder research based on a systematic triangulation of evidence. Stakeholder views have been collected from a wide range of sources. Each source can provide insights, but also has limitations. By triangulating multiple strands of evidence, the aim is to derive robust conclusions on stakeholders' views from a holistic assessment of the entirety of the evidence. Their results are presented in the form of answers to five questions:

What new evidence is there on stakeholder views?

The majority of domestic consumers accept the proposals and would be happy to accept a small bill increase in return. However, a significant proportion (around a quarter) accept the proposals, but not the bill increases. This is consistent with UKERC research , which finds that consumers would be willing to pay more for 'increasing low carbon energy'. Stakeholders (major energy users and a consumer body) agreed that NGGT needs to take a leading, coordinating role in whole energy systems. Stakeholders are keen to know NGGT's plans on net zero targets and would like to see a discussion of this in the business plan. Stakeholders are requesting further clarity from NGGT on its net zero plans – the trajectory envisioned and

the cost to implement changes and do more in this area, other stakeholders expressed the view that it is important to keep options open, rather than choosing a specific option (e.g. hydrogen). They have asked NGGT to provide a clearer explanation of how their plan fits (or not) with the delivery of net zero, following recent legislation. Some stakeholders are also keen to see National Grid involved in various specific research topics, including hydrogen, CCS, the future of the network in 20-40 years, and the future role of LNG.

Domestic consumers also support "Innovation projects to trial greener alternatives to natural gas" and are willing to pay more for this. National Grid investors agree that NGGT has an important role to play in decarbonisation and it is well positioned to support initiatives in this area.

Is there a consensus among stakeholders?

A significant proportion of stakeholders state that these proposals only 'somewhat' meet their needs. Some stakeholders said that there is not enough detail / too much uncertainty to be sure, and some stakeholders think National Grid could be doing more. A significant proportion (around a quarter) of domestic consumers accept these proposals but are not willing to pay more.

How does this compare to the findings described in the July Business Plan?

The new stakeholder engagement largely confirms the evidence that fed into the July business plan, i.e. that stakeholders and consumers find it important that NGGT take a facilitating/coordinating role in driving the decarbonisation agenda forward. New evidence is now available that shows that consumers and stakeholders are generally supportive of the proposals in this area.

Based on this new evidence what changes to the Business Plan conclusions and proposed actions are justified?

It is not clear that major changes to the proposals are required. There is broad stakeholder support for the actions NGGT has proposed. However, stakeholders are keen to know NGGT's plans on net zero targets and would like to see a discussion of this in the business plan. This could include a presentation of the feasibility of current proposals under a net zero scenario, NGGT's transition plans to achieve carbon neutrality and the cost of such a transition including the impact on consumers. If NGGT were to consider that aspects of its plans may impede future progress towards net zero, then the latest round of stakeholder feedback suggests that changes should be made.

How have trade-offs been made in reaching these conclusions?

A relatively significant proportion of domestic consumers were not happy with the bill increases associated with NGGT's proposals on net zero. However, there is strong support generally for action in this area from a wide range of stakeholders.

# 4. STAKEHOLDER GROUP CHALLENGE & REVIEW

## 4.1 WHAT POINTS OF CLARIFICATION AND INTEREST WERE RAISED?

National Grid circulated version 1 of this engagement log in advance of the Stakeholder Group meeting on the 19th December 2018. Pre-meeting calls were held to collect feedback on the log and any points of clarification, as set out below.

| Topic specific feedback and points of clarification | | |
|---|---|---|
| **Pre-meeting calls** | **Feedback** | **National Grid Response** |
| [redacted] | Engagement seems to consist of a lot of networks talking to networks (i.e. stakeholders who share the same commercial frameworks)<br>Whole energy system seems to morph into future of gas<br>NG definition of whole energy system is different from the Ofgem cross sector one. What are the implications of this? | We responded Ofgem's consultation to say we support Ofgem's ambition around whole system solutions and accept that the narrow definition proposed is a reasonable and proportionate way to start making progress during RIIO 2. |
| [redacted] | 1. FES and FOG have been very effective and NG should get good leverage from those. Not necessarily needing improvements on these. Issues have been 'well aired' in the run up to the business plan, but what does this mean for outcomes and expenditure?<br><br>2. Pg 31 Heat campaign – considering the range of solutions but we can't back all options as it would start to become very cost inefficient.<br><br>3. Single scenario – useful in one way but actually this should not just be about numbers/ percentages in a spreadsheet. More about what people believe, 'what I would have in my house is...'.<br><br>4. Hydrogen- GT should work with GDNs in order to establish whether blended hydrogen or dedicated hydrogen networks are going to be the main option and focus the investment accordingly.<br><br>5. How does this fit with ET proposals on this subject? | 1. The primary outcome is the Gas Markets Plan element of this chapter.<br><br>2+4. Agreed, but at this stage we are supporting investigative and innovation work across the range of solutions in advance of committing to one pathway. In a similar way to the GDNs continuing to evaluate hydrogen blending and pure hydrogen networks we expect there to be a convergence as policy decisions are made throughout the 2020s.<br><br>3. The results from the Single Scenario are now available on Huddle. These work has delivered a common set of assumptions to enable the networks to work within an 'envelope' rather than a specific supply and demand pattern.<br><br>5. Electricity Transmission Owner proposals are broadly supportive, however their main focus is across the electricity sector barriers transmission, distribution and system operator. |
| [redacted] | 1. How are the stakeholders selected for engagement (what are your methods to get people to attend etc)?<br><br>2. How much effort has been put into inviting smaller companies and shippers to the events. | We want to be as inclusive and open as possible. Since 2016, we have been following the AA1000 Stakeholder Engagement Standard, which sets out principles and detailed steps for how all types of organisations should go about engaging with their stakeholders. It's an internationally recognised, best practice approach, and we have combined its principles with what we learnt from others to develop our approach for RIIO-2. In each stage we have plan, prepare, implement, review and improve. To reflect stakeholders' needs in our business plan, we need to make sure a broad range of views are represented. Including smaller organisations.<br><br>We have evolved our engagement to make it as effective as possible, based on three factors:<br>• How stakeholders tell us they want to be engaged.<br>• What we're talking to them about.<br>• The type of insight we're seeking<br><br>Over the last two years we have carried out our most extensive listening exercise ever to create this stakeholder-led business plan. In that time, we've engaged more than 100 times, covering over 500 individuals. We have also listened to domestic and major energy consumers surveying more than 3,000 household bill payers and 1,000 major energy users.<br><br>Smaller organisations have been a challenging segment for successful engagement. We have utilised a range of engagement options across a number of topics, including reach out by direct email and telephone, introductions by other third parties, attending existing events/ for a. The most successful has been our online data community established as part of our engagement on information provision. More information is provided under challenge #100. |

| | | |
|---|---|---|
| [redacted] | 1. How will uncertainty mechanisms be used in RIIO 2? Political uncertainty etc. How do we ensure optionality (linked back to uncertainty mechanisms)?<br><br>2. Supply chain on the stakeholder map – are they really low interest?<br><br>3. Regional focus – should consider offgrid communities who require back up to renewables<br><br>4. FES spotlights – how do these get identified and assessed? By whom?<br><br>5. Single scenario – how will this work?<br><br>6. GFOP – how long has this been running for? Are these more 'expert' stakeholders?<br><br>7. ENA GFG – is there another third party consultant working on the pathways project?<br><br>8. Innovation – could we have a full list of the portfolio and RIIO 1 pipeline. Innovation – include Utility Week Live. Innovation – more detail on the call for ideas | 1. We will be discussing the range of outputs and incentives with the Stakeholder Group in advance of the July business plan. For Whole Energy Systems we are proposing an incentive to facilitate collaboration but no uncertainty mechanisms (e.g. reopeners).<br><br>2. Stakeholder mapping has been updated<br><br>3. This would have to be a distribution level investment<br><br>4. Spotlights are generated alongside the FES analysis. And the process described at SG2. In areas, we want to expand our analysis, to examine uncertainties or consider more extreme cases as extensions to our core analysis. Further explanation of some technologies or concepts used are called spotlights.<br><br>5. The single scenario report is now available on Huddlle under SG&. The work provides a common set of assumptions and feasible 'envelope' as the basis for the network company business plans. Our analysis work uses the steady progression scenario from FES 2018. And the main investment drivers for NGGT in RIIO 2 e.g. connections and capacity fall within there.<br><br>6. Since 2016. GFP has an aim of setting the direction for solutions that benefit all market participants.<br><br>7. Yes, Navigant<br><br>8. These points have now been addressed within the innovation paper presented at SG7. |
| [redacted] | Positives: Clear identification of stakeholders, clear objectives of engagement, variety of methods used, good use of information from innovation projects<br><br>Challenges: Although hydrogen is addressed, little engagement with those doing new business models such as heat networks (e.g. through the workshops on the future of gas), even at this stage the questions could have been less general and more focused on the particular issues (e.g. barriers to elec-gas SO collaboration), it is interesting to note that none of the critical views came from NG's own workshops – perhaps demonstrating that they are not wholly representative? | We have been seeking to improve our engagement with stakeholders representing the new business models segment in particular through the Future of Gas stakeholder workshop |
| [redacted] | Unclear how the topics fit within the overall priority and what expenditure is associated with each – how is future of gas different to the Gas Industry Change Plan for example? Further breakdown of expenditure would be useful.<br>Be clear on ambition for hydrogen – 2% by 2026?<br>Set clear outputs/ targets for RIIO 2 and into RIIO 3 | The July business plan submission will give this breakdown of expenditure |
| [redacted] | 1. Further explanation of expenditure (priority vs topic)<br><br>2. Why have different approaches been taken for the different engagement events?<br><br>3. Does the term cross sector refer to those within the energy sector or outside the sector too?<br><br>4. When will we see options on this topic?<br><br>5. Critical voices section is good<br>Unpick the views a bit more e.g. FOG stakeholders, who said what. Is there "group think" or could the outsider views be the right ones.<br><br>6. What is the assessment/ feedback at the end of the events? Good quality of engagement and unbiased? Suggest a survey of all stakeholders as part of this process.<br><br>7. When is the ENA workshop in early 2019? | 1. As comment above<br><br>2. The different approaches reflect the evolving nature of our engagement. The timeline spans the start of RIIO 1 through to the final phases of this specific RIIO 2 engagement process. We have continued to learn and get direct feedback which has influenced the structure for the range of events.<br><br>3. This term refers to those within the sector.<br><br>4. Options are fully described within the July business plan draft.<br><br>5. It has not been possible to give more detail on the FOG engagement as the timeline for that work dates back to 2016 although this is something we have looked to incorporate in our latter events for RIIO 2.<br><br>6. as an example we have included feedback from the recent Future of Gas Stakeholder Workshop on page XX. We are considering the suggestion of a feedback survey at the end of the process.<br><br>7. 6th February 2019 |
| [redacted] | Critical voices section is good. However, concerned about the conclusions from this (i.e. the reference to reinforcing the level of uncertainty) are not good | 1. Primarily discussed through call with Jenny Phillips after the SG 5 meeting discussing the need to meet peak demand (1 in 20) . |

| | | |
|---|---|---|
| | enough. The fall in gas demand indicated by the FES scenarios raises significant questions and needs to be more clearly addressed (gas demand fall by 1/3 etc)<br><br>We need to address regional differences – some alignment with the GDNs | |

## 4.2 WHAT WAS THE OUTCOME OF THE STAKEHOLDER GROUP CHALLENGE AND REVIEW?

*I. Capture all questions and challenges raised by Stakeholder Group*
*II. Capture agreement/disagreement*
*III. Executive summary for RIIO Challenge Group*

At SG5, National Grid presented a short overview of the topic, explaining the scope and definition of whole energy system, noting there was a difference between the definition in the engagement log and that in Ofgem's recent sector specific consultation, as well as the stakeholder engagement undertaken so far.

The Stakeholder Group asked questions around whether presentation of key facts and figures (such as the cost of one unit of gas compared to electricity) would influence consumer views and noted the importance of the correct framing of questions when undertaking consumer engagement. The Stakeholder Group participated in an interactive session using a 'work-mat' to discuss the challenge themes for the topic of Whole Energy System. The members were split into four smaller groups representing mixed constituencies and feedback was provided on the limitations, positive aspects and whether views between individuals were broadly in consensus. There were a number of key points including:

- Collaboration and transparency across network companies in the definition and cost of whole energy system solutions;
- Seeking diversity of views rather just those who are 'self-selecting'.
- Clarity on the impact of regional variation to gas transmission including local heat and hydrogen networks

Ten formal challenges and three actions were recorded:

| **Topic specific challenges from Stakeholder Group discussion. Meeting SG-05 11/01/2019** | | |
|---|---|---|
| **ID** | **Challenge** | **National Grid Response** |
| 92 and 94 | Clearer narrative on how GDN uncertainty will impact transmission work and maintenance<br><br>and<br><br>More explanation of the impact on transmission of local networks developing | We will continue to work more collaboratively than ever with the GDNs in order to facilitate any changes post RIIO 2 as they develop their infrastructure for hydrogen or alternative forms of heat etc. In addition, our network capability metrics will play a key part in our assessment of transmission requirements, considering a range of supply and demand scenarios. This will include the FES high hydrogen scenarios as well as the range of demand and supply variables defined in the 'common view'. We can therefore define our associated network capability options to meet demand as the uncertainty around the GDNs evolves.<br><br>Subject to Ofgem's Sector Specific consultation, we are still considering opportunities for incentives in these areas which would ensure the optimum solution for consumers, whether at transmission or distribution level investment can be undertaken with the appropriate mechanisms to transfer funding between different licensees. |

| | | |
|---|---|---|
| | | Current insight from our stakeholder engagement with the GDNs indicates the volume of gas associated with embedded generation will not make a material impact to the forecast flows through the NTS offtakes during the RIIO 2 period, i.e. we are not making provision to alter or decommission offtakes. Our work on network capability will also improve the way we meet customer needs, we are developing a more holistic articulation of the measures and metrics that define 'Network Capability'. The new Network Capability framework will allow us to talk more meaningfully to stakeholders about the effects of the available options and to say clearly, for example, that we would not be able to meet certain supply demand patterns on X% of days, not be able to accommodate certain flow profiles on Y% of days or accept changes to flows on Z% of days |
| 93 | What is the NG leadership role in setting the whole energy system narrative | We believe our role in the energy transition should be to facilitate the changes that happen in the gas industry. Policy on heat is not due until the mid-2020's, and policy development on CCUS is currently ongoing. It is therefore, important to have mechanisms in place to act on this policy should it be required during RIIO-2. Overall, for RIIO-2 we are committed to ensure the right framework is put in place to enable cross-sector working and collaboration. This will enable the development of information from projects such as decarbonisation of heat innovation project, which will help policy makers make an informed decision on future energy transition issues. Described below are the main activities we will undertake in order to demonstrate this leadership position.<br>• We have a key role to play in moving to a low carbon energy system and the Gas Markets Plan is key to this. As part of this work, we are proactively considering how the gas NTS frameworks may need to evolve to facilitate change over the 2020's.<br>• We are also Chair of the ENA whole system working group that looks at the challenges ahead and how networks should enable the energy transition.<br>• A number of documents including the 'Towards 2030' publication and Future Energy Scenarios are joint activities carried out by the gas and electricity system operator. Towards 2030 sets out areas of priority focus, which will deliver the energy future and the changes in our own role. |
| 95<br>and<br>106 | Be more collaborative across industry to ensure we are all asking the questions effectively<br>and<br>How to articulate WES on an ongoing basis not just during business plan development | Collaboration is the key premise of the 'whole energy systems' chapter in our RIIO 2 business plan.<br>Gas Transmission will play a key role in enabling the transformation to a sustainable energy system and ensure the delivery of reliable, affordable energy for all consumers. We are committed to drive industry debate to understand the most efficient options for future whole gas system networks, markets & frameworks; and to explore responsibilities across boundaries and timeframes to deliver consumer benefit. We will champion efficient and effective governance, as we believe that it underpins the rapid change required to meet UK 2050 targets. We are proposing a regulatory framework that enables and incentivises networks to work together and make changes easily when policy decisions are made.<br>Similar to the answer above we will carry out this commitment through the Gas Markets Plan and our work at the ENA Open Networks Workstream 4 on Whole Energy. National Grid are sharing this working group which covers collaborative working on five 'products' - customer connections, Investment planning, Seasonal forecasting, Day ahead forecasting / operations, Data sharing process and governance<br>Our stakeholder engagement strategy ongoing for RIIO 2 will also specify that we will seek appropriate collaboration with stakeholders to ensure joined up answers and maximise effectiveness of engaging with our stakeholder community. |
| 96 | Clarify what is meant by regional - different to Cadent's findings but is transmission talking more high level (is that ok) | For Gas Transmission, the term 'regional' refers to a geographical location linked to a particular local distribution zone (LDZ). There are 12 LDZs which cover Great Britain–<br>Scotland, North, North West, North East, East Midlands, West Midlands, Wales, Eastern, North Thames, South East, South, South West.<br>Within each LDZ there are between 4 and 13 offtake points which connect the transmission to the distribution systems. These offtakes are above ground sites encompassing the pipework, valves, metering required before the pressure reduction point. |

| | | |
|---|---|---|
| | | Our operations teams cover the whole of the UK and work over an even larger area, grouped into three teams - West, East and Scotland. The NTS control room into just two, north and south.<br><br>This means each LDZ covers a very large geographical area – both physically and from a societal urban/ rural perspective. However, the infrastructure which connects the transmission and distribution systems is relatively small in number but high in energy flow.<br><br>This approach means regional variations the GDNs discuss are often not applicable to gas transmission – and even significant variation within any LDZ might not sufficiently impact flow through one offtake to make material difference to the investment required in that asset.<br><br>Our face to face stakeholder engagement has been conducted to reflect the wide geographical spread of our stakeholders in terms of both regional issues on the network and regional variation in stakeholder insight. With the early events being held in Scotland, London and Cheshire, we have subsequently followed up with events at Bacton and St Fergus. We have also run our willingness to pay focus groups across a range of geographical locations. |
| 97<br><br>and<br><br>103 | Define whole system collaboratively<br><br>and<br><br>Need to justify investments against the narrow definition and then develop incentives or articulate uncertainty around the wider definition | Following Ofgem's sector specific consultation earlier this year, we responded to say we support Ofgem's ambition around whole system solutions and accept that the narrow definition proposed is a reasonable and proportionate way to start making progress during RIIO 2. We also seek to account for the impacts of the heat and transport sectors. Getting whole energy system approaches working well can bring significant value to existing and future consumers.<br><br>Following Ofgem's recent May sector decision document, they have agreed with ours and others definition of including other sectors such as heat and transport. They have therefore expanded their definition on whole system.<br><br>For our business plan proposals an important element of delivering our commitments is the training and retention of skilled staff in these areas. In particular, it is important we invest in the skills of our people so that we can respond effectively regulatory change including development of new technologies and how these might impact our network. |
| 98 | Review 'framing of questions' for WTP research - define outcomes and should consumer work be done more collaboratively | [This challenge seems to be applicable to the full business plan, rather than this specific chapter.]<br><br>The gas WTP survey contained questions on 5 attributes, followed by a further question on customers' preferences for different heating technologies i.e. switch from boilers to alternative heating technologies. The attributes tested are as follows:<br><br>- Risk of Supply<br>- Interruptions<br>- Improving the environment around transmission sites<br>- Supporting local communities<br>- Investing in innovation projects to create future benefits for consumers<br>- Supporting consumers in fuel poverty<br>- Customers' preferences for different heating technologies<br><br>We are proposing to give a full update on the WTP results at the July meeting of the stakeholder group. |
| 99 | Clarity on golden thread of engagement (be clear how this is applied, review existing work, articulate themes different parties would like to see, trade off views) | The golden thread for the Whole Energy Systems chapter presented is attached separately. |
| 100 | Small customers and stakeholder organisations - review what might help them to engage, access and inclusivity | We have utilised a range of engagement methods to assist with developing insight from on small customer and stakeholder organisations. This includes webinars rather than face to face of workshop events, National Grid offering to attend other meetings/ forum and making use of existing relationships e.g. through Xoserve. The efforts have not been completely successful to date.<br><br>Our engagement through Xoserve is described in more detail in the Future Balancing and Capacity Engagement Log where the small customer voice is particularly important. Initially we were seeking to using Xoserve and their contacts in smaller shipper organisations. This was of limited success due to GDPR restrictions but also an ability to reach out to stakeholder who want to engage. We attended a number of Xoserve meetings to provide some introductory face to face contact but could not establish the necessary follow up. |

| | | |
|---|---|---|
| | | This challenge is also linked to the engagement undertaken for Information Provision. With that topic we have used our RIIO 1 collaboration site and established a data enhancements community. The site has 250 stakeholders registered; 7 of which we've never engaged with before. The tool is tailored to be accessible to smaller organisations, for example we present data in a much more modern and accessible way, the screens are self-configurable which is ideal for smaller companies with smaller resource pools. The success of this platform for Information Provision is an approach we want to build on in other areas for our enduring engagement with smaller organisations. |
| 101 | Is engagement proportionate to cost to customers- seek to reach diversity of views | Throughout our RIIO-2 engagement process, we have been seeking to make sure the latest version of our plans clearly reflects what stakeholders have told us. The AA1000 standard that we follow includes steps to make sure we have accurately captured what we have heard, check this with stakeholders, and then act on it in the right way. |
| 102 | Show transparency of costs where WES investments have an interface into other sectors and so may cause other sector costs to go up/ down | As part of our business as usual activities within RIIO 1 we routinely discuss investment requirements with the gas distribution networks relating to issues of reinforcement at offtakes etc. We also have monthly discussions with the GDNs regarding innovation projects on whole energy system topics (e.g. hydrogen), whereby we establish opportunities to collaborate and ensure projects are complementary. There were not however defined strategies for collaboration in other areas of investment.<br><br>Whilst we are not currently proposing a large range of Whole Energy System investments in the business plan our aim for RIIO 2 is to develop the right strategies and frameworks to ensure collaboration on whole energy system solutions across all network companies, specifically through our work with the ENA. The proposed incentive would also provide the necessary framework to manage work and funding where new solutions are required which go beyond the baseline requirements.<br><br>Two case studies illustrating the consequences of different solutions across energy sectors are provided below. One is from RIIO 1 and one for RIIO 2:<br><br>GDN offtakes x [redacted]<br><br>There have been several issues along the feeder [redacted] pipeline spur which feeds gas to GDN offtakes [redacted] During 2013 there were several operations carried out to inspect corrosion issues at various sites along the feeder. For safe work to be completed the pressure was reduced to 85% of normal operating pressure with the GDN (Cadent) accommodating flow swaps to other offtakes along the same spur. Had the pipeline required isolation, or demand been higher, or if Cadent had been undertaking maintenance on their own network, then those flow swaps may not have been possible. An additional risk for this section of feeder [redacted] has been identified where the overflow for the Heapey Dam passes underneath feeder [redacted]. Heavy rainfall in December 2015 resulted in water overtopping the dam. There is a risk that during a similar future event, the top of the dam could wash out with the potential damage to or loss of feeder [redacted] with the subsequent loss of supply to Blackrod offtake supplying the Manchester area.<br><br>We have worked with Cadent to asses a range of options as we are not being able to isolate the pipeline without risk of disruption to domestic consumers. In considering the best whole system solution to increasing resilience for the potentially impacted customers, solutions on the Cadent Network to resolve the issue were approximately double those available on the NTS. Cadent are supportive of our proposed transmission solution to this issue.<br><br>Electric drive compressor example<br><br>As part of the compressor investment assessment for Peterborough compressor station, we engaged with the electricity distribution network operator (UK Power Networks) to evaluate the cost of a high voltage supply to the site to facilitate the installation of an electric drive compression solution. The cost estimate of a 132kV supply at Peterborough was between £8 – 10 million and entailed crossing the East Coast Main Line and the A1. This excluded the cost of a new Supergrid transformer which would be required to facilitate this connection. Final costs were expected to significantly increase (>£15m). The initial cost estimate of a gas turbine compression package was around £8 million, which meant that the cost of the power supply alone was about the same as a total GT compression package. |

| | | |
|---|---|---|
| 104 | Innovation - lessons learnt from NIA governance in RIIO 1 | This information is provided in the SG7 pre-read in the innovation paper covering our RIIO 1 innovation activities and RIIO 2 proposals. It is proposed challenges raised against that paper will supersede no. 104 and 105. |
| 105 | Innovation - NIA redefined and renamed (could be linked to the ambition in the business plan). NG is suggest process, test with stakeholders and present to stakeholder group. Be clear on barriers to coordination and collaboration. Funding of third party access- is this within our capability, consider governance | This information is provided in the SG7 pre-read in the innovation paper covering our RIIO 1 innovation activities and RIIO 2 proposals. It is proposed challenges raised against that paper will supersede no. 104 and 105. |

**Actions from Stakeholder Group discussion**

| ID | Date | Meeting | Action | National Grid Action |
|---|---|---|---|---|
| SG05-G01 | 11/11/19 | SG05 | To provide examples of whole energy system challenges, engagement and solutions that are specific to gas transmission. | Link this to challenge 102 |
| SG05-G02 | 11/11/19 | SG05 | To include more detail on RIIO 1 journey for Whole Energy Systems. | Our RIIO 1 activities on Whole Energy Systems have been relatively limited up until the start of the RIIO 2 business planning process. As described in section 3.2, it has been primarily through the Future Energy Scenarios work and the Future of Gas programme. In our build up for RIIO-2, we have increased our participation and facilitation in the discussions around what whole energy system is, what the future of the energy system may be and the challenges around meeting these potential changes. This includes round-table events to engage industry and promote how we can work together to enable whole energy system outcomes for consumers.<br><br>We have recently recognised that one of the key areas we can support is the decarbonisation of heat. which includes studying the key inputs required to influence policy decisions in support whole energy system approach.<br><br>We have ongoing participation in various ENA working groups with other networks to collaborate on industry projects and deliverables, from innovation projects to collaborative work on the future gas pathways. These include the gas strategy group, gas futures group, gas innovation and governance group, gas networks collaboration forum, gas regulation group, stakeholder engagement group. |
| SG05-G03 | 11/11/19 | SG05 | To review stakeholder mapping (particularly those in low impact/ low interest category). | Stakeholder mapping updated on page 8 |

# 5. CONCLUSIONS

## 5.1 WHAT IMPACT HAS THIS FEEDBACK HAD ON THE BUSINESS PLAN?

We have made three business plan commitments on this topic:

- We will lead on developing the options for Gas Transmission in relation to the decarbonisation of heat, looking specifically at options around hydrogen
- We will collaborate across all sectors and vectors to develop the whole energy system options and solutions required to achieve net zero
- We will collaborate with GDNs, BEIS and others on an agreed hydrogen workplan

The direct influence of feedback from the stakeholder group is presented in the table below:

| How feedback from the stakeholder group impacted National Grid and the RIIO-T2 business plan? |
|---|

| Stakeholder Group feedback | Impact on RIIO-T2 Business Plan (Outputs) |
|---|---|
| Focus on the definition of 'Whole Energy System' | Initially we were supportive of the Ofgem 'narrow' definition with the additional considerations for heat and transport. Ofgem have proposed the broader definition in the recent RIIO 2 Sector Specific Methodology decision. |
| Tangible and specific in our proposed commitments | Providing clearer, specific narrative in the business plan on our proposals and our wider role within the industry. |
| **Stakeholder Group feedback** | **Impact on National Grid Business / Processes** |
| Determine if engagement proportionate to cost to customers- seek to reach diversity of views | Undertaking more targeted engagement and being clear on when to stop. |

### 5.2 BUSINESS PLAN OUTPUTS ALIGNED TO STAKEHOLDER ENGAGEMENT OUTCOMES.

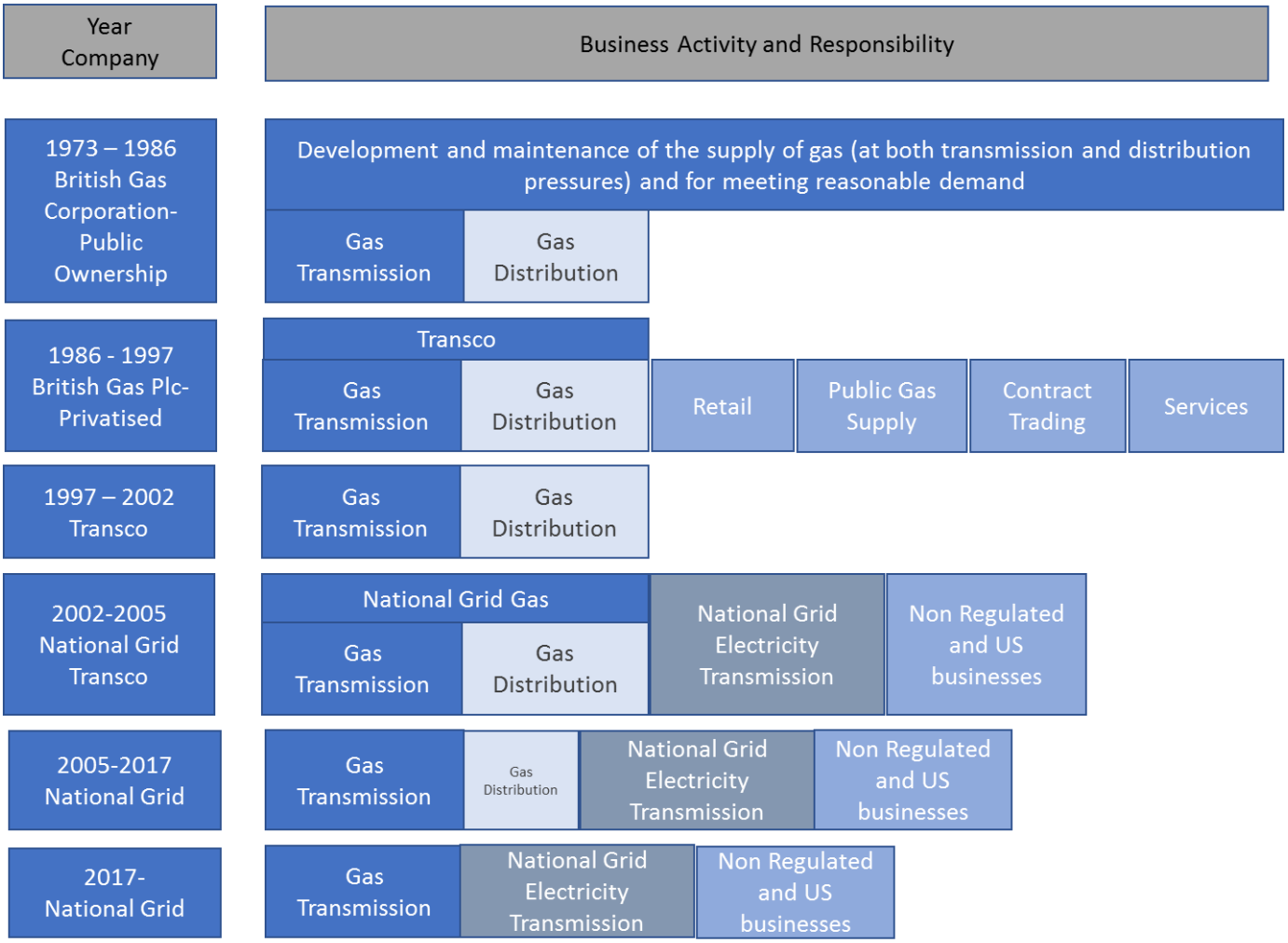
The golden thread diagram is embedded in a standalone file. This illustrates how the business plan outputs align to the stakeholder engagement outcomes.

## 6. DOCUMENT CHANGE CONTROL

| Version Number | Date Updated | Updated by | Comments |
|---|---|---|---|
| 1 | November 2018 | Tamsin Kashap | SG5 |
| 2 | June 2019 | Tamsin Kashap | SG8 |

# 7. APPENDICES

## Appendix 7.1: Gas Transmission Timeline



## Appendix 7.2: ENA Survey

A list of those stakeholders interviewed who were happy to have the name of their organisation shared as part of the study is provided below:

| | |
|---|---|
| 1 | AIGT |
| 2 | Alconex |
| 3 | All Party Parliamentary Carbon Monoxide Group |
| 4 | Association for decentralised energy |
| 5 | Association for the conservation of energy |
| 6 | Association for local energy officers |
| 7 | Association of meter operators |
| 8 | Bethell Utility Services Ltd |
| 9 | CIBSE Journal |
| 10 | Citizens advice |
| 11 | CNG Services |
| 12 | CO Awareness |
| 13 | CO Gas Safety |
| 14 | Committee on Climate Change |
| 15 | Council of Gas detection and environmental monitoring |
| 16 | Delta EE |
| 17 | DNV GL |
| 18 | Element Energy |
| 19 | Ellen Macarthur Foundation |
| 20 | Energy Action Scotland |
| 21 | Energy and Utilities Alliance |
| 22 | Energy Efficiency Association |
| 23 | Energy Innovation Centre |
| 24 | Energy Intensive Users Group |
| 25 | Energy Savings Trust |
| 26 | Energy UK |
| 27 | G2 Energy Ltd |
| 28 | Gas Safe Register |
| 29 | GS Energy Connections Ltd |

| | |
|---|---|
| 30 | Health and Safety Laboratory |
| 31 | HETAS |
| 32 | High Voltage Systems and Services |
| 33 | Hydrogen and Fuel Cell Association |
| 34 | IGEM |
| 35 | IMechE |
| 36 | ITM Power |
| 37 | JPB Utilities Ltd |
| 38 | Major Energy Users Council |
| 39 | National Energy Action |
| 40 | National Energy Foundation |
| 41 | National Farmers Union |
| 42 | Navigant |
| 43 | NIC |
| 44 | Pipeline Industries Guild |
| 45 | Providence Policy |
| 46 | Renewable Energy Association |
| 47 | Road Haulage Association |
| 48 | Royal Society for the Prevention of Accidents |
| 49 | Sheffield University |
| 50 | Siemens |
| 51 | SP Energy Networks |
| 52 | Sustainable Energy Connections |
| 53 | Sustainable Gas Institute |
| 54 | The National Housing Federation |
| 55 | Total Utility Connections Ltd |
| 56 | UK Certification |
| 57 | UK Power Solutions |
| 58 | Western Power Distribution |

## Appendix 7.3: GFOP Stakeholder Organisations

A list of stakeholder organisations who participated in the February and June 2018 GFOP events.

| | | | |
|---|---|---|---|
| 1 | Agency Partners | 31 | Malloryland |
| 2 | Air Products | 32 | Manx Utilities |
| 3 | Arcadis | 33 | Market Force |
| 4 | BEIS | 34 | New Power |
| 5 | British Steel | 35 | Northern Gas Network |
| 6 | Caroline Pitt Consultancy | 36 | Noveus Energy |
| 7 | Centrica | 37 | Npower |
| 8 | Chevron | 38 | Ofgem |
| 9 | Citizen Advice | 39 | Orrick |
| 10 | Crown Commercial Services | 40 | Power Site UK |
| 11 | Drax | 41 | Poyry Management Consulting |
| 12 | Ecotricity | 42 | Prescient Advisory |
| 13 | EDF Energy | 43 | Ravens Bourne |
| 14 | Energy UK | 44 | Ricardo |
| 15 | Engage Consulting | 45 | RWE |
| 16 | Engie | 46 | Shell |
| 17 | ENI | 47 | Solvay |
| 18 | Eon | 48 | SSE |
| 19 | ESB | 49 | Statoil |
| 20 | ESPO | 50 | Storengy |
| 21 | ESP Utilities Group | 51 | Tameside Metropolitan Borough |
| 22 | ExxonMobil | 52 | Total |
| 23 | EY | 53 | UK Power Reserve |
| 24 | Glencore | 54 | Uniper |
| 25 | Global Energy Advisory | 55 | Utility Wise |
| 26 | Hull City Council | 56 | Vector Bus |
| 27 | Iberdrola | 57 | Verizon |
| 28 | Intergen | 58 | VPI Immingham |
| 29 | Jahrna | 59 | Wales and West Utilities |
| 30 | London Energy Consulting | 60 | Wood Mackenzie |

## Appendix 7.4: Industry Roundtable Pre-Read

**Tuesday 27th November ~ Covent Garden Hotel, London**

**The definition of whole system for purposes of the discussion is:**
***A strategic integrated approach to planning and delivering a range of utility services for consumers in GB.***

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 is 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.

| | |
|---|---|
| Electricity peak demand could change significantly from today due to a number of factors such as -<br>• electric vehicles<br>• changing weather patterns that will give rise to greater reliance on cooling systems<br>• Increase in distributed renewable generation could lead to periods of very low demand on the transmission system<br>• Volatility of energy flows (caused by more interconnection with Europe and intermittent nature of GBs generation mix) | Gas delivers a long-term role as a flexible, reliable and cost-effective energy source favoured by many consumers.<br>• Gas provides value to consumers and the whole energy system. It supplies more than twice as much energy annually as electricity today<br>• Change in weather increases the reliance on heating systems<br>• Gas infrastructure is ageing and traditional sources of gas are declining.<br>• Gas can play a role in the 2050 carbon reduction target through new technologies and the potential use of hydrogen and other unconventional sources of gas. |

## Appendix 7.5: Industry Roundtable Further Questions

**In making this happen, do we have to think of the following questions?**
The multi-vector approach:

- Should the gas and electricity operators be working more closely together on this?
- How important is it to test different technologies and see how they interact?
- How quickly should we be moving away from trials and adopting whole energy systems as real-world deployments that benefit consumers?
- What infrastructure is needed to help achieve a whole energy systems approach?
- What can we learn from other infrastructure sectors when it comes to adopting a whole energy systems approach?
- Price signals - The Energy Systems Catapult has highlighted the huge disparities in carbon pricing across utilities and the wider economy. How can carbon pricing be harmonised to ensure decarbonisation happens as efficiently as possible?

**Regulatory**

- Gas and electricity distribution present the biggest opportunities when it comes to adopting a whole energy systems approach. With both being heavily regulated, how much of a barrier is this?
- Should there be a cross sector incentive offered by Ofgem to encourage a whole energy systems approach?
- Would it be beneficial to have a multi utility regulator or price controls, for example, to enable the water sector to help provide flexibility to the energy system?
- How can we focus more on innovation with limited resources?
- What's your message to government/the regulator to drive action over a whole energy systems approach?

**Technologies**

- Should each vector be connected with comprehensive data and analytics?
- In what ways can the Internet of Things and artificial intelligence (AI) help us understand future trends to help balance costs of assets?
- Interoperability - How do we ensure the interoperability of technologies? Can common standards be left to the relevant industries or does this need to be coordinated?


Stakeholders at the Industry Roundtable event

## APPENDIX 7.6: Stakeholder Engagement Impacts (to be completed)

**Stakeholder engagement impacts**

In order that we are able to demonstrate how our business plan has been shaped by our stakeholder engagement, we need to capture the impact of stakeholder led changes to our plan. For each change made which has an identifiable financial impact on the plan please submit your final workings to calculate the impact of the change together with the front sheet below.

| | |
|---|---|
| **Stakeholder engagement reference** | |
| **Description of change** | |

| **Totex financial impacts** | **FY21** | **FY22** | **FY23** | **FY24** | **FY25** | **FY26** | **FY27** | **FY28** | **FY29** | **Comments** |
|---|---|---|---|---|---|---|---|---|---|---|
| Opex | | | | | | | | | | |
| Direct | | | | | | | | | | |
| Indirect | | | | | | | | | | |
| Capex | | | | | | | | | | |
| Load | | | | | | | | | | |
| Non load | | | | | | | | | | |
| Non operational | | | | | | | | | | |
| Other | | | | | | | | | | |
| **Link to supporting calculations** | | | | | | | | | | |

## APPENDIX 7.7: Definitions of Stakeholder Segments

| Stakeholder Segment | Definition |
|---|---|
| Political | Elected officials and advisors including Westminster, Scotland and Wales |
| Governmental | Civil service and committees including BEIS |
| Regulatory | Energy, safety and environmental regulators |
| Domestic and industrial consumers | Household consumers<br>Major energy users who use gas as feedstock e.g. Ceramics and chemical industries |
| Consumer bodies | Representatives that protect the interest of consumers |
| Local communities | People who are impacted in areas where we operate or have major projects |
| Customers - Entry | Customers connected to the NTS that put gas on to the network. Including terminals, producers and storage operators |
| Customers – Exit | Customers connected to the NTS that take gas off the network. Including power stations and major industrial users |
| Customer – Shippers | Customers that buy and sell gas |
| Network companies | Other regulated network companies including distribution networks |
| Think tanks, innovators, academics | Energy specialists, innovators and advisors |
| Interest groups | Groups representing specialist interests including environment |
| Supply chain | Developers and suppliers of network assets |
| Industry trade bodies | Groups that represent specific groups of customers or stakeholders including IGEM, UKOPA, Oil & Gas UK |
| Other | Stakeholders that are not defined in other segments |

## Appendix 7.8: Engagement Approach Spectrum

We are currently moving from the involve phase into collaborate as we develop costed options to share with our stakeholders and begin to formulate outputs for discussion.

**Approach to engagement – spectrum**

| | INFORM | CONSULT | INVOLVE | COLLABORATE | EMPOWER |
|---|---|---|---|---|---|
| **STAKEHOLDER ENGAGEMENT GOAL** | To provide stakeholders with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions | To obtain stakeholder feedback on analysis, alternatives and/or decisions | To obtain public feedback on analysis, alternatives and/or decisions | To partner with stakeholders in each aspect of the decision including development of alternatives and the identification of the preferred solution | To place final decision making in the hands of the stakeholder |
| **PROMISE TO THE STAKEHOLDER** | We will:<br>▪ keep you informed | We will:<br>▪ Keep you informed<br>▪ Listen to and acknowledge concerns and aspirations<br>▪ Provide feedback on how you have influenced our decision<br>▪ Seek feedback on drafts and proposals | We will:<br>▪ Work with you to ensure that your concerns and aspirations are directly reflected in alternatives developed<br>▪ Provide feedback on how you have influenced our decisions | We will:<br>▪ Work together with you to formulate solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible | We will:<br>▪ Implement what you decide |

Adapted from the International Association of Public Participation – Public Participation Spectrum, 2007

## Appendix 7.9: Engagement principles checklist

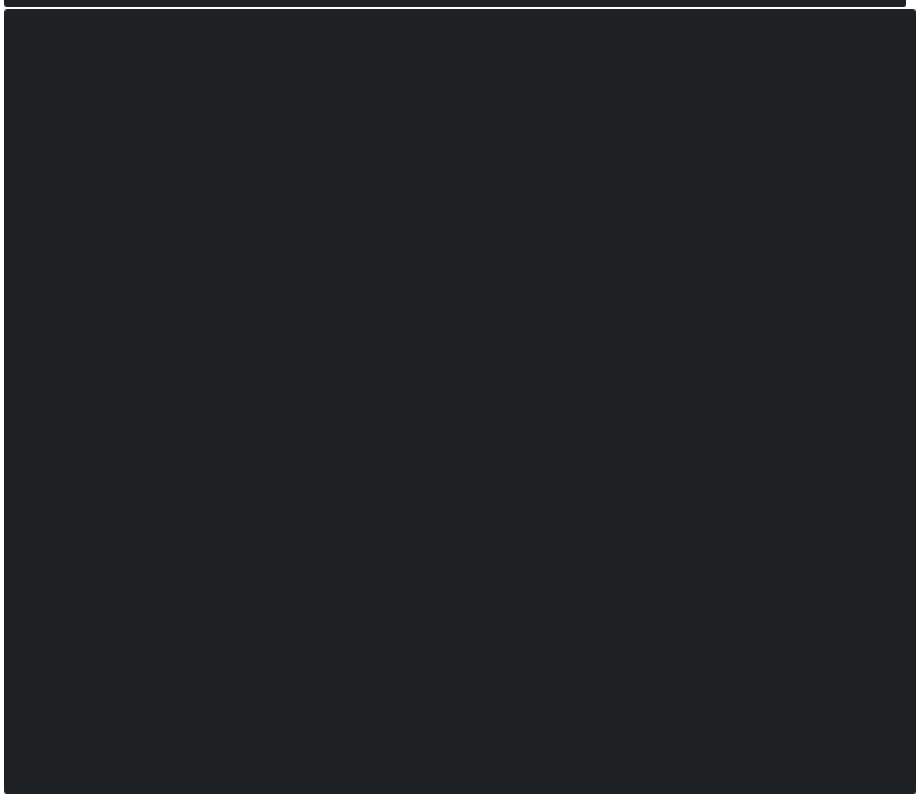
| | |
|---|---|
| **1** | Define and map your stakeholders - anyone who believes they are affected by your decisions. Recognising the different threads of the public interest – stakeholders, customers, consumers, citizens, communities (geographical and interest) |
| **2** | Be clear what you want to achieve with "engagement" – have clear policy objectives and measures of impact; (incl. where you most need to engage) |
| **3** | Understand the "spectrum of participation" and difference between each part of that spectrum: inform, consult, involve, collaborate, empower |
| **4** | Engage early in the process, review and improve throughout |
| **5** | Leadership – effective stakeholder engagement must be led from the top of the organisation |
| **6** | Commitment – to listen to stakeholders' views and act on or respond to them |
| **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 |
| **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) |
| **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 |
| **10** | Be aware that those who often participate i.e. the "usual suspects" are not always representative |
| **11** | Be accessible to all (e.g. in consideration of the tasks, timelines, contact person, tech., locations, challenges of communication, etc.) |
| **12** | Use targeted approaches to tailor engagement to suit the knowledge and awareness of different groups |
| **13** | An ongoing process that is embedded across the business – not just a stand-alone business planning/price control review exercise. |
| **14** | Evidence based – use a full range of available sources of info to identify priorities, views and challenges (e.g. operational insight, bespoke research, |

| | |
|---|---|
| **15** | Gather evidence through a range of methodologies and tools including willingness to pay, qualitative research, surveys, complaints intelligence, market data |
| **16** | Be responsive – seek to adopt a flexible process to engagement, responding to the information revealed as the process progresses |
| **17** | Demonstrate impact of engagement – ensure that the engagement design process plans for and allows evaluation of success |
| **18** | Innovation – trying new and innovative ways of engaging |

## Appendix 7.10: Decision making framework checklist

| PLAN AND PREPARE | IMPLEMENT & REVIEW | ACT |
|---|---|---|
| Clear scope and outcomes defined☒ | Triangulate diverse views ☐ | Use conclusions to build business plan ☐ |
| Information sources identified ☒ | Share outcomes and conclusions ☐ | |
| Unbiased material produced ☒ | Evidence to justify conclusions ☐ | |
| Tailored to our diverse stakeholders; targeting those most impacted ☒ | Undertake further engagement where required ☒ | |
| Options consistent with our checklist ☒ | Articulate where trade offs or no action taken and why ☐ | |
| Ensure inclusivity of views ☒ | | |

## APPENDIX 7.11: Attendees at the Future of Gas Stakeholder Workshop



[i] http://www.energynetworks.org/gas/futures/gas-networks-joint-stakeholder-engagement.html