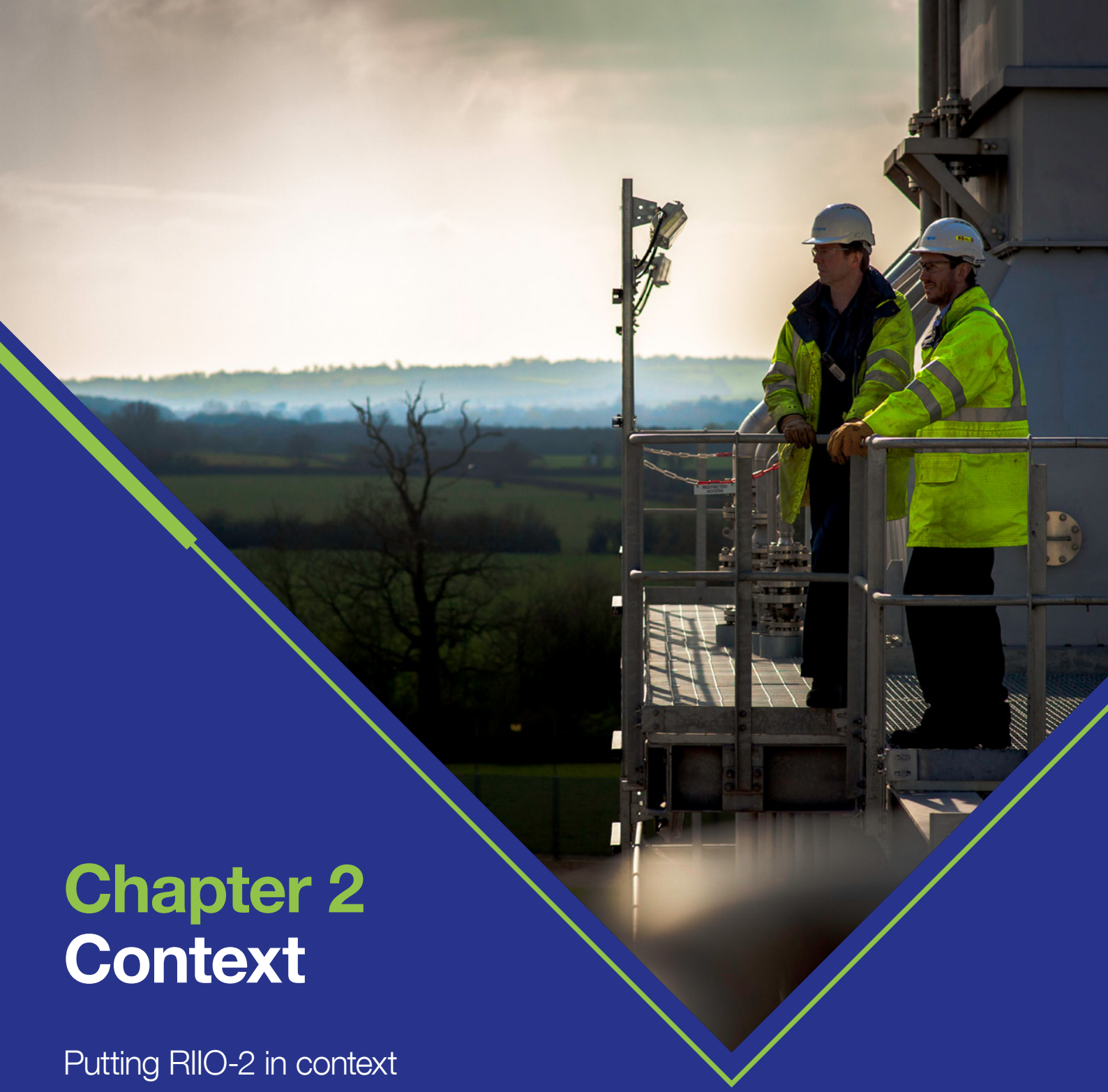


Chapter 2
Context

Putting RIIO-2 in context

Gas Transmission

nationalgrid

2. Context

Putting RIIO-2 in context

Our customers' requirements are changing. We are seeing different patterns of gas supply and demand on the network meaning that we face new challenges in operating the system.

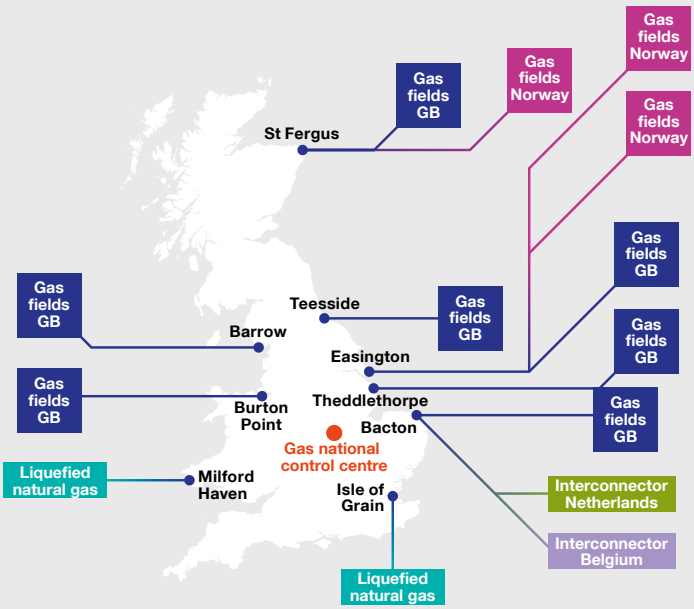
This comes at a time when our ageing assets also need greater care and replacement to maintain a safe, reliable and flexible transmission system.

Here we explain the external views on the future role of gas and the gas transmission system to meet the challenges of tomorrow.

What we do today

We own and operate the high-pressure gas transmission system in Great Britain. It comprises 7,660 km of pipelines, 24 compressor stations and 504 above ground installations. Our system is connected to eight regional Gas Distribution Networks. We deliver industry leading safety performance with a 99.996% network reliability achieved in 2017/18.

Figure 2.1 Sources of gas into Great Britain



The importance of gas to Great Britain

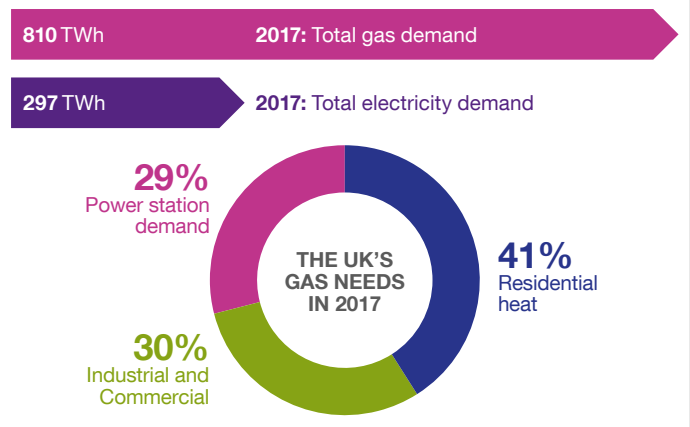
Gas is used to heat the nation's homes, power our industry and generate the electricity we all use every day:

- Eight out of 10 GB homes use gas for heating.
- A domestic unit of gas energy costs about a quarter of the price of a unit of electrical energy. This shows the important role of gas in meeting the needs of vulnerable consumers and addressing fuel poverty.
- Each year, the 40-year-old gas networks deliver three times the amount of energy as electricity networks. In 2017, we delivered 810 TWh of gas demand to our customers.
- Gas is also critical for industry. It is used for industrial heat and as an important fuel source for manufacturing.
- Gas helps to maintain secure electricity supplies. It is a responsive, flexible fuel source for electricity generation and balances the variable output from renewable energy like solar and wind.

810 TWh

In 2017 we delivered 810 TWh of gas demand to our customers.

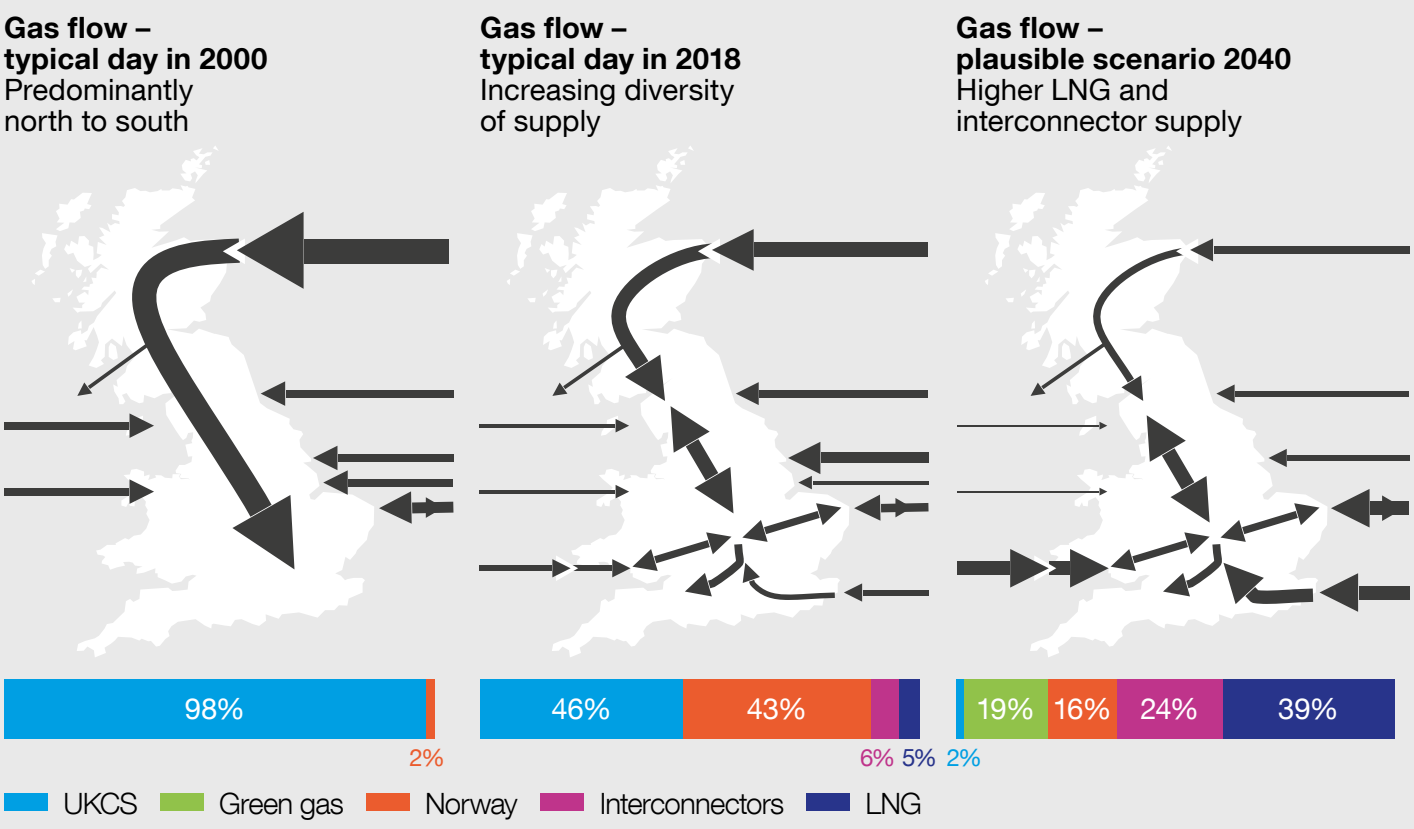
Figure 2.2 Comparison of electricity and gas demand and the breakdown of gas usage



So, what's changing? The network was originally designed for a predominantly north to south flow of gas. This gas came from the UK Continental Shelf (UKCS).

Today, gas is a global commodity. This means a more diverse supply pattern, which can change from day to day. Sources include Norwegian gas fields, pipeline interconnection to continental Europe and imports of liquefied natural gas (LNG) from different continents. Looking ahead to RIIO-2, we will need to manage an even greater range of supply patterns to keep supplies secure and make sure GB consumers can access the cheapest sources of gas.

Figure 2.3: Changing sources of gas supply



"We will need to manage an even greater range of supply patterns to keep supplies secure."

Operating the network is more challenging than ever. We don't control where our customers choose to bring gas onto our system. Even for our customers, it is becoming increasingly difficult for them to anticipate how their future requirements may change.

This evolution means that we are working our assets harder to keep pace with changes in gas flow and demand. For example, we use compressors to move gas around the network. We also ensure that supply and demand are balanced, and we maintain safe operating pressures.

Our customers tell us they value the ability to flow gas using within day profiles. We try to balance what our customers need with our own safety, operational, maintenance and commercial obligations.

We provide flexibility to flow gas at the most efficient profile for our customers. This allows them to keep operating costs down and benefit consumers.

What our stakeholders tell us

During our engagement we have gathered a range of views on the future of gas and the transmission network. We've engaged with stakeholders directly and drawn on external publications.

The future of energy remains uncertain, with a range of different views. We believe, and there is a broad agreement that, gas transmission will have an important role to play for many decades to come. Here we summarise the key findings from published independent reports.

Figure 2.5: The role of the GT Network in meeting carbon targets

Stakeholder	Key message for gas transmission	Example quote
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.	"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."
UK Energy Research Centre (February 2018), *The Future Role of Gas*[1]	In a scenario where carbon capture and storage (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.	"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)." "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 £0.5 bn/year."
National Infrastructure Commission (July 2018), *National Infrastructure Assessment*[2]	It is not yet clear which low carbon option should replace gas for heating. 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". "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."
Committee on Climate Change (November 2018), *Hydrogen in a low carbon economy*[3]	The GT Network is likely to be required in all decarbonisation scenarios, even where heat is fully electrified. Where a switch to hydrogen is made, a new parallel hydrogen transmission system is likely to be required.	"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."
BEIS (December 2018), *A future framework for heat in buildings*[4]	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.	"Continuing to use the gas network offers significant savings versus alternative heating sources."

[1] http://www.ukerc.ac.uk/publications/the-future-role-of-gas.html
[2] https://www.nic.org.uk/wp-content/uploads/CCS001_CCS0618917350-001_NIC-NIA_Accessible.pdf
[3] https://www.theccc.org.uk/wp-content/uploads/2018/11/Hydrogen-in-a-low-carbon-economy.pdf
[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/762546/Future_Framework_for_Heat_in_Buildings_Govt_Response__2_.pdf

The role of gas in a decarbonised future

External publications, our Future of Gas Programmes and the Future Energy Scenarios (FES) all paint a similar picture. Gas has a role to play in meeting environmental targets. It can also support the transition to low carbon power, heat, industry and transport.

Power: Gas provides a reliable and flexible way to support intermittent renewables.

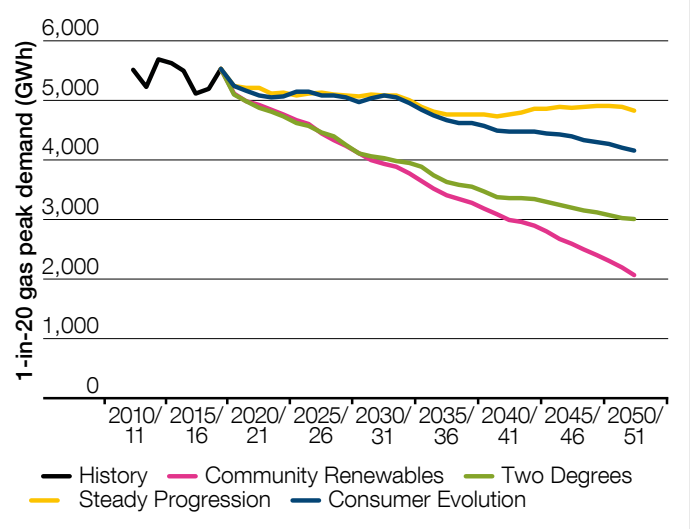
Heat: Gas can help decarbonise heat at lowest cost and disruption to consumers.

Transport: Commercial vehicles could use biogases, natural gas or hydrogen.

Industry: The NTS provides options for hydrogen and Carbon Capture Usage and Storage.

Our Future Energy Scenarios show a range of credible pathways for the future of energy out to 2050:

Figure 2.6: Future Energy Scenarios for annual and peak gas demand to 2050



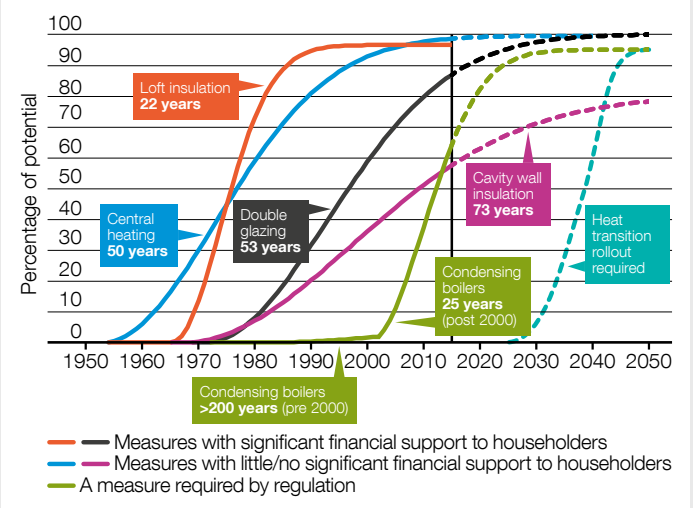
All the *FES* 2018 pathways show an enduring role for gas until at least 2045.

Peak demand across all scenarios remains significant. Peak demand in 2045 is about 50% to 90% of today's peak.

The size of the decarbonisation challenge to come is massive. Heat policy, for example, is not likely to be determined until the mid-2020s.

The heat challenge:
To move homes from gas to electric heating by 2050 would require the conversion of 20,000 homes a week, costing around £11,000 per household (to deploy electric-powered heat pumps). The roll-out would need to be faster than other comparable technology changes in recent decades.

Figure 2.7: Heat transition challenge compared to previous national large-scale roll-outs



With this uncertain future, it is important to keep our options open so that GB consumers achieve the best outcome.

We can keep our options open on the GT Network at a relatively low cost. The rest of our document explains more about what will be needed to achieve this.

"With this uncertain future, it is important to keep our options open so that GB consumers achieve the best outcome."

Summary: The role of gas

- Gas will continue to play an important role.
- Under all scenarios, gas will be used until at least 2045.
- Preserving capability in the gas grid keeps options open and reduces long-term risk at minimal cost.
- We are working with stakeholders to determine the type of network they need.

Initial planning assumptions

What does all this mean as we develop our business plan? Based on what we have heard from stakeholders so far, we have distilled what we think this means for our business planning through the identification of initial business planning assumptions:

- **GT Network – future**: Most of our stakeholders tell us that there is a long-term future for gas and the GT Network to at least 2045. We share that view. However, there is uncertainty about how customers will use the system in the future. We will explore with stakeholders and consumers their views on the costs and alternative options.
- **GT Network – value to society**: The GT Network provides wider benefits to society. For example, it supports decarbonisation by flexing with gas-fired power stations to balance intermittent renewables. We consider the wider impact on society in our plans and we are supporting research in this area.
- **Keeping options open**: The network is playing an important role in facilitating decarbonisation. We should maintain a GT Network, for minimal cost, which keeps our options open because the future for decarbonisation is uncertain.

For a full list of all our initial planning assumptions please see Appendix – Assumptions.

We welcome your views:

Chapter:
Context

Question:
7. Do you agree with our summary of what is important context for our business planning? Are we missing anything from this summary?

Submit your feedback online here:

[1] http://www.ukerc.ac.uk/publications/the-future-role-of-gas.html

How to use this document
We want your feedback

Who is this consultation aimed at?

We are interested in the views of all stakeholders who are impacted by what we do and shaping the future of gas transmission. This includes the views of gas consumers, government and regulatory bodies, energy industry professionals and members of the public.

Tell us what you think

This consultation is open until 31 March 2019. You may give us feedback in the ways outlined below. We particularly seek your views in response to the specific questions we have posed. These are summarised on page 12. You may respond to all questions or just those relevant to your specific views.

Ways to feed back:

Make notes

Throughout the document, we have provided space for you to read and make notes at the start of each chapter (opposite). You can then type up your notes and send them in an email or submit them online.

Interactive pdf notes

Alternatively, we will be sending out editable pdf versions of this document with note fields for you to type directly into.

Email

We have a dedicated email address specifically for your feedback to this document. We welcome your thoughts at:
jennifer.pemberton@nationalgrid.com

Alternatively, you can put your thoughts in writing and send to: Jennifer Pemberton, National Grid House, Warwick Technology Park, Gallows Hill, Warwick. CV34 6DA.

Online

You can go directly to the website and submit your comments here.

Please share your thoughts:

Type here>