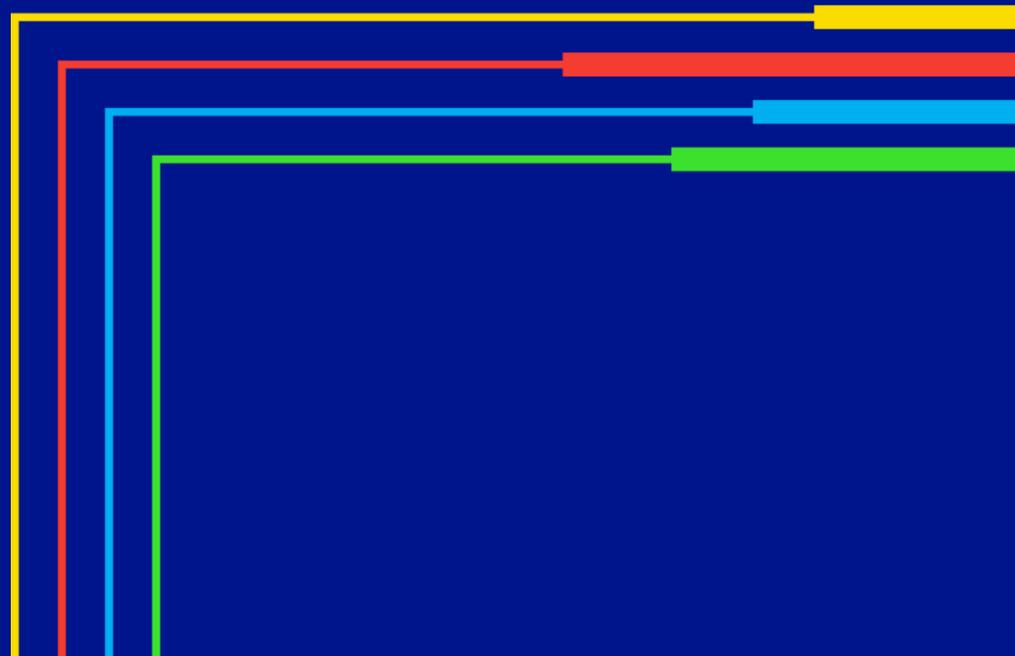


Shaping the Gas Transmission system of the future

Feedback Webinar

nationalgrid



Logistics

Webinar should last for approximately an hour

All delegates will be placed on mute

Your questions are welcomed via the chat function

We invite feedback for each section via open polls

Slides and a recording of today's webinar will be circulated following the call

Who will be speaking today?

Jennifer Pemberton
Stakeholder
Strategy Manager



Bridget Hartley
NGG RIIO-2
Manager



Jen Randall
Commercial
Codes Change
Manager



Harjinder Kandola
Data Integrity
Manager



Charon Balrey
Regulatory
Stakeholder
Manager



Quick poll

1. Please tell us your name

2. Which of the following best describes you / your organisation?

3. Did you attend one of our 'Shaping the Gas Transmission System of the future Workshops?'

Yes

No

Agenda

Round up of workshops

Network Capability

Towards Net Zero

Stakeholder Priorities

Continuing the conversation

Next steps

Q&A



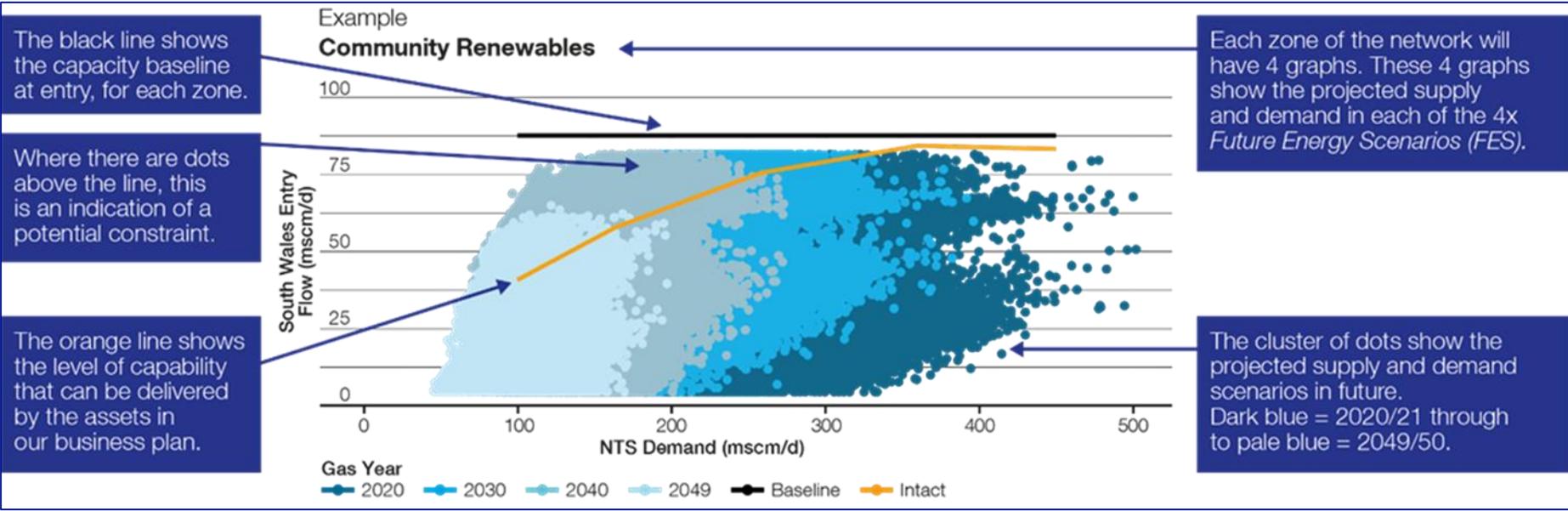
Gas
Transmission

Network Capability

nationalgrid



Network Capability – a reminder...



These visuals are based on Future Energy Scenarios (FES) and show the level of network capability within a region

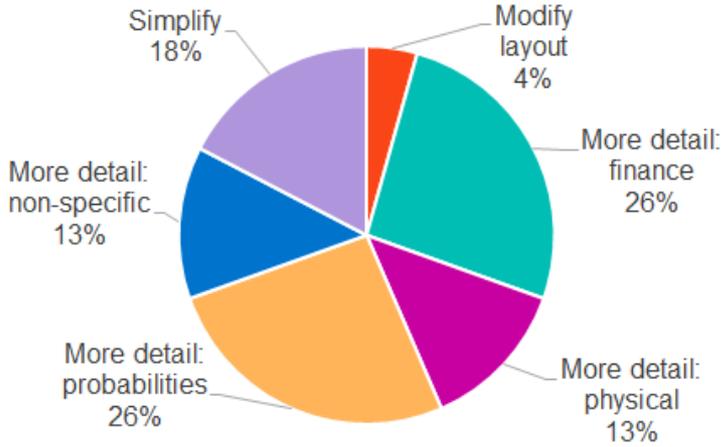
Network Capability – Our engagement

Engaged with stakeholders to understand your views on these visualisations

94%

Said the way network capability is articulated, either fully or somewhat worked for them

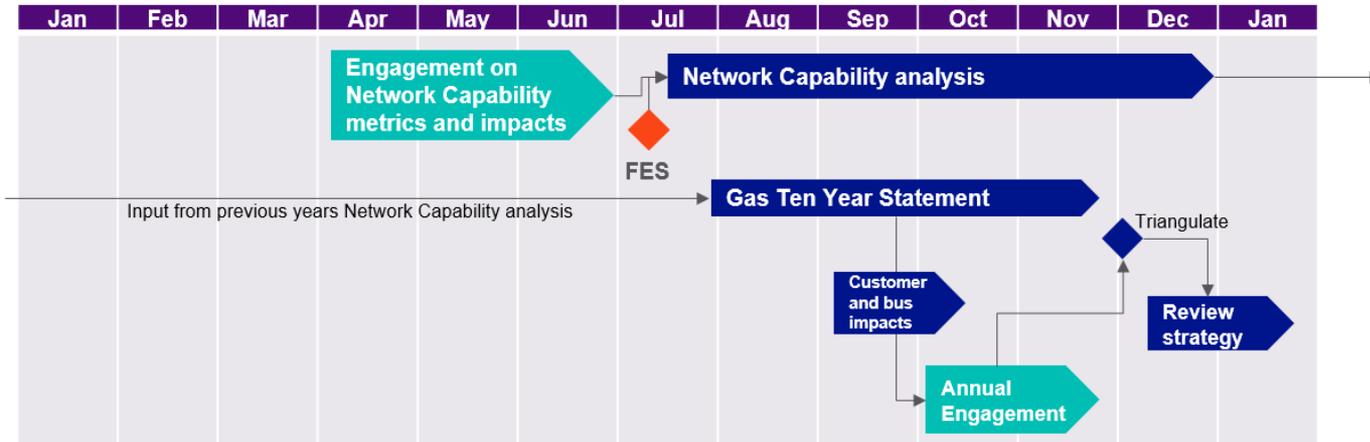
When asked how it could be improved, you said:



Network Capability – Where are we now

1

Establish an annual iterative process



2

Standardise how we use network capability within our network development investment process

3

Analyse and refine the outcomes with stakeholders

Towards Net Zero



Solving the decarbonisation challenge is the biggest problem of our time

The use of natural gas accounts for 50% of the UK's carbon emissions today

Industry

- Conversion is required to alternative low-carbon fuels, whilst maintaining efficiency and minimising the impact to them

Heat

- 20,000 homes will have to transfer to a low-carbon heating system every week until 2050, compared to 220 today

Transport

- 20,000 internal combustion engine vehicles will have to be exchanged for alternative-fuelled ones each week from now to 2050, compared to 1,200 in today

To decarbonise, we believe it will be a **mix of hydrogen, renewable gas and renewable electricity generation** supported by **CCUS**

What we've been up to...



Future of Gas Forum



Hydrogen Development Programme Group

Enabling the Gas Markets Plan
Planning today for a successful tomorrow.

Gas Transmission

Shaping the Gas Transmission System of the future



Scottish Government Network Visions Summit



Blending webinar

National Grid

Hydrogen - What we've heard

No silver bullet – gas or electric

Delivering Net Zero requires a range of technologies in all scenarios; clean gas or renewable power alone will be insufficient. We have to find the right balance of vectors and technology to minimize cost and disruption to consumers whilst maintaining reliability.

Hydrogen is flexible and safe

Already in use for many years in an industrial setting, hydrogen can be safely stored and transported in similar ways to natural gas. Hydrogen is hugely flexible with applications across the power, heat, industry and transportation sectors.

Hydrogen is abundant and clean

Most abundant element on the planet has zero carbon emissions at point of use.

We can utilise existing assets

Research indicates that we can repurpose the current natural gas pipelines to carry hydrogen. This would allow hydrogen boilers in the home, reducing consumer disruption.

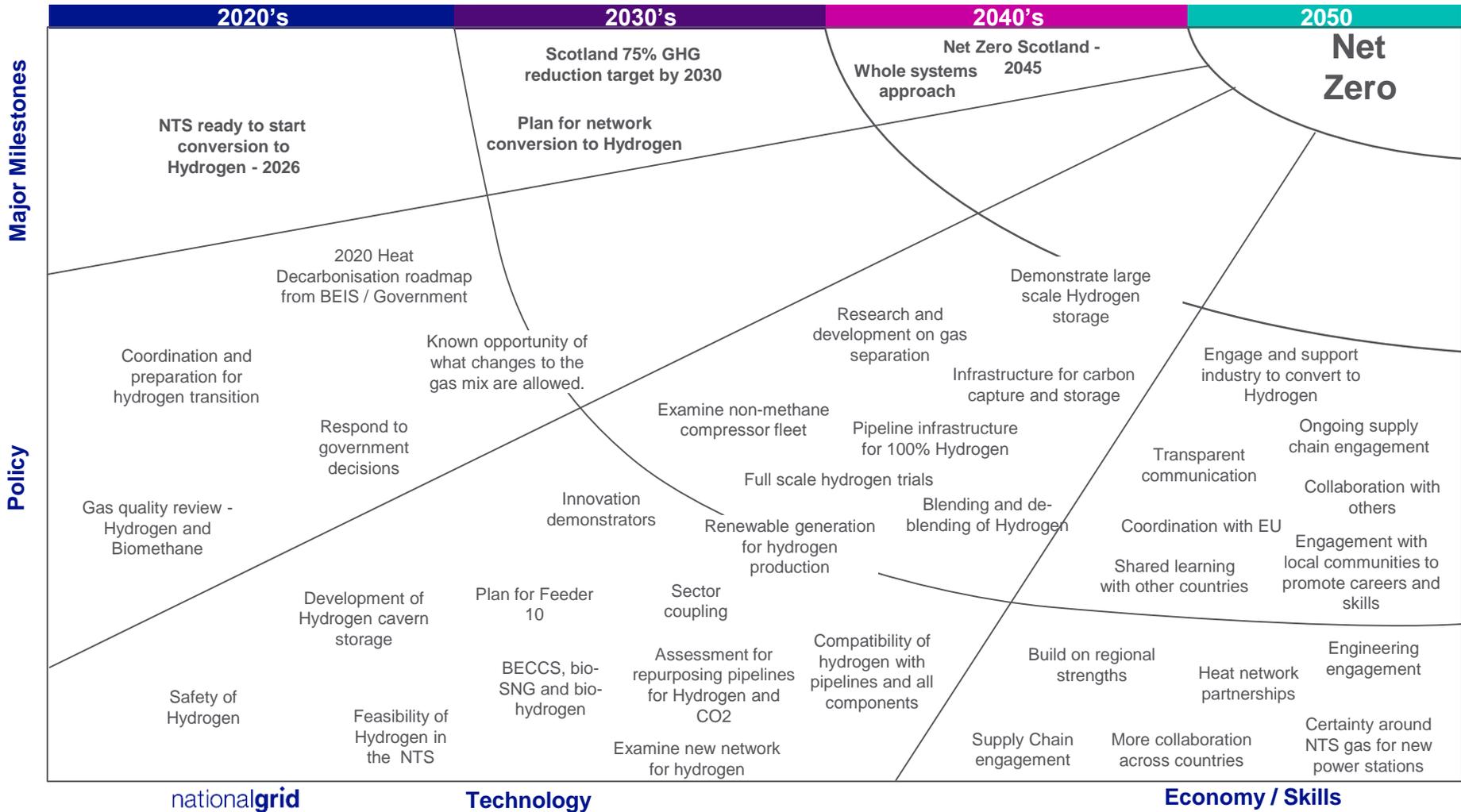
Huge opportunity for the UK – today

Pilot projects are underway and industry is looking to help drive the needed change. The UK has the potential to lead the world, develop the appropriate skills and export it's know-how.

New policies are required now

Policy changes are needed now to unlock the potential of the hydrogen economy, allowing for investment for the future.

Net Zero Roadmap – What you asked of us...



HyNTS FutureGrid Roadmap to Hydrogen

This ambitious programme puts our stakeholder's needs at the heart of the hydrogen challenge. Providing an innovative testing facility that allows the design, testing and demonstration of hydrogen within the National Transmission System (NTS) in order to facilitate live hydrogen transportation on the NTS and achieve Net Zero 2050.

Planning Phase Pathway to FutureGrid

The principles and specification of the test facility will be designed through an NIA project so that the facility can be built, and testing started, in a timely manner. The design will include the pipeline configuration, the assets to be tested, injection and mixing points, storage capabilities and flows.

Duration

May 2020 – Mar 2021

Funding

NIA Funding

Phase 1 NTS Hydrogen Test Facility

Using decommissioned NTS assets to build a complete NTS Test Facility that allows the testing of Entry and Exit Points, Filters, Valves, Meters and Pre-Heaters with 10%, 20% and 100% hydrogen in Natural Gas. The facility will connect to the existing H21 distribution testing facility providing a representative 'beach to meter' set up.

Duration

Apr 2021 – Apr 2023

Funding

NIC 2020 Bid

Phase 2 Deblending & Compression

Trialling separation technologies such as cryogenics and membrane to demonstrate the capabilities to transport a hydrogen / natural gas blend and separate these at offtakes. Also assessing the impact of hydrogen on compressors and compressor fuel systems.

Duration

2022 – 2024

Funding

BEIS Funding Competition

Phase 3 Third Party Testing & Collaboration

Opening up the test facility for a wider range of Third Party Testing, operating a number of innovation projects that allow manufacturers to trial new technologies and assess the impact of hydrogen on their assets. Potential trials include Inline Inspection and Metering.

Duration

2023 Onwards

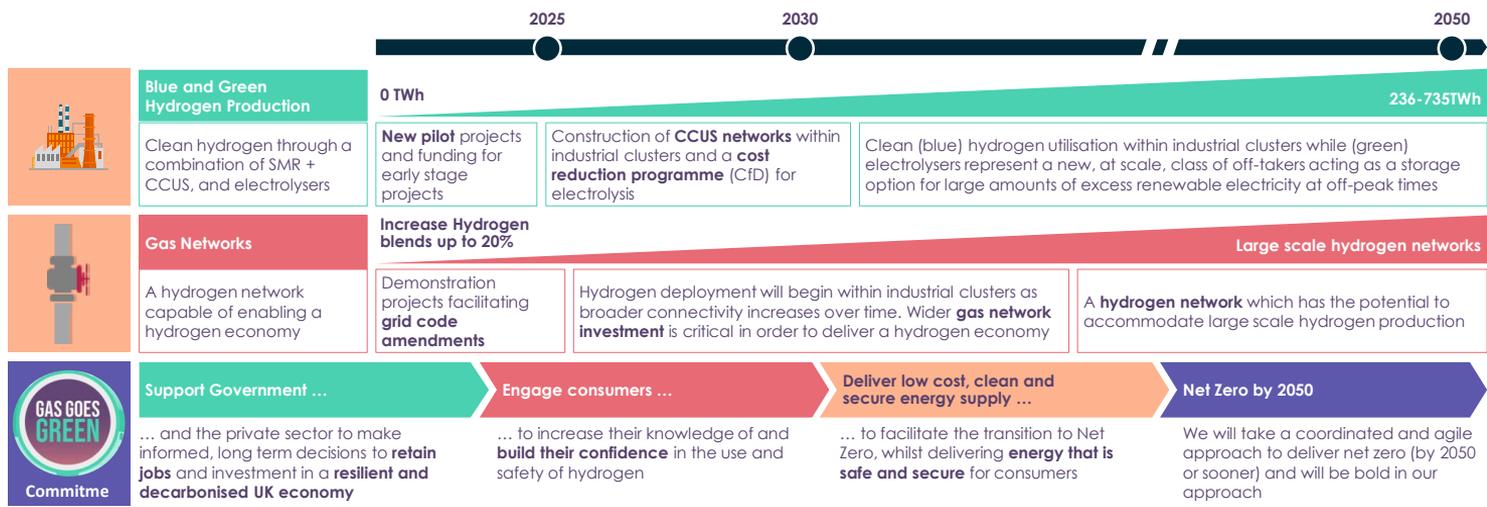
Funding

Various Innovation Funds



Gas Goes Green are committed to working collaboratively using our extensive experience to support the UK Government in reaching Net Zero by 2050

A whole system approach is key, there is no realistic Net Zero scenario by 2050 which does not involve clean gas **and** increasing electrification



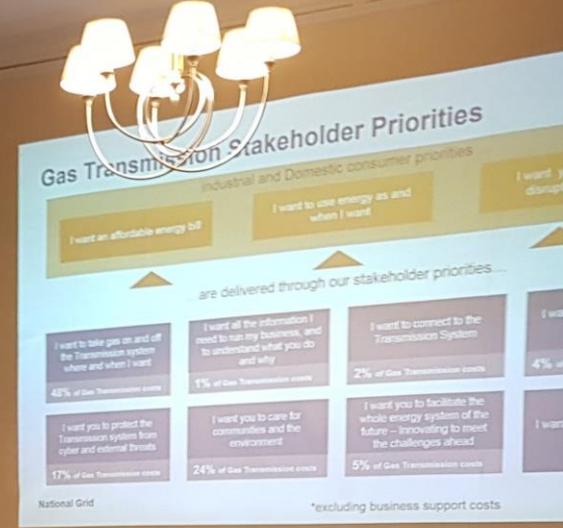
Source: National Grid FES, Element Energy, Navigant,

https://www.energynetworks.org/assets/files/GGG_Launch_Doc_FINAL.pdf



DELIVERING THE PATHWAY TO NET ZERO

Business plan feedback



Our business plan is based around your priorities

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

I want you to care for the environment and communities

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

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

I want the gas system to be safe

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

I want to connect to the transmission system

I want you to be efficient and affordable – focusing on incentives



The golden threads

Gas
Transmission

I want the gas
system to be safe

nationalgrid



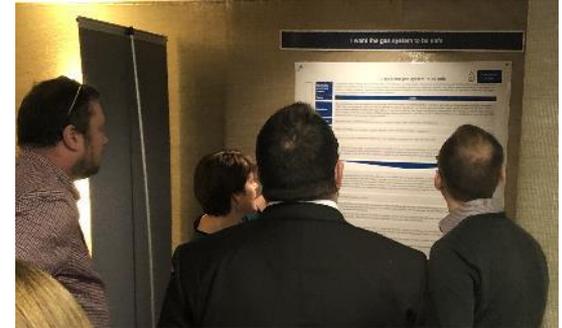
I want the gas system to be safe

Cost per annum

£14m

Our proposals

We will **maintain our first class level of safety** whilst continuing to pursue the highest level of safety culture maturity, making efficiencies in our systems and people-related costs.



I want the gas system to be safe

Cost per
annum

£14m

You said:

You support the
commitments in our
plan

We should aim to
comply with HSE
regulations

Agree that there is no more
risk than today, particularly
as move towards Hydrogen

- Safety is and will continue to be a **key priority**
- We have and will maintain our **World class** safety record
- We will work closely with the HSE as we develop the **safety case** for **Net zero**



Gas Transmission

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

nationalgrid



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

Cost per annum
£280m

Asset Health
(including Bacton and Kings Lynn projects)

Efficient system operation and asset management

Network and Environmental Resilience

Our proposals

- We will ensure we have the **right gas transmission system**, maintained to the right level alongside a complimentary commercial framework to meet stakeholder and consumer needs
- We will **increase expenditure to maintain the health** of our ageing assets



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

Cost per annum
£280m

You said:

Supportive of our plans and recognition that asset health spend provide immediate and long term benefits

Managing and minimising disruption is critical for customers

More engagement with distribution networks to meet energy and consumer needs of the future

Agree we should keep options open

Greater transparency over flex capacity at offtakes needed

Collaboration is key – particularly with supply chain to ensure plans are deliverable

Are you leaving it too late to engage with alternatives such as hydrogen?

- Our plan is based on **Network Capability** and aims to keep reliability the same as today
- We will **keep options open** until landscape is more clear
- We have undertaken a deliverability exercise to identify and **minimise** any **impact** on customers



I want to put gas on and off the transmission system where and when I want - Bacton

Cost per annum
£28m

Our proposals

- We will **redevelop** the Bacton Terminal

You said:

Minimising disruption is critical to customers

Whole systems approach

Engaging with supply chain early is critical for successful delivery

Support for proposals to redevelop the Bacton terminal

Significant support for a hydrogen hub at Bacton

Engagement with local stakeholders throughout

A lot of support and nervousness for undertaking a net zero construction project



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

Cost per annum
£280m

Your questions:

Is your plan cost effective?

- 10 year granular plan
- Competitive tenders

How are you future proofing your plans with regards to hydrogen and biogases?

- Flexible to innovation
- Working with supply chain
- Net Zero roadmap

How will BREXIT impact the plan?

- Plan assumes Brexit has limited impacts on our supply chain and activities
- Brexit impacts taken into account during business planning

Next steps:

Asset Health

1. Responding to significant quantities of supplementary questions from Ofgem
2. Preparing our workplans for Year 1 of RIIO-2 and beyond

Bacton

1. Preparing our scope to enable us to tender and start work in 2021
2. Building the next stage of the project team, and developing our engagement programme



Questions – Gas on and off

Do you feel the proposals future proof the assets considering how significant they are going to be for a considerable number of years yet? Is there enough focus on new technology and innovation?

We've requested an increase in **asset health funding**. In the current regulatory climate this isn't going to be easy for Ofgem to approve. We're proposing investment in both **BAU innovation** and **net-zero innovation** in our business plan proposals.

With a super mature basin in the SNS terminals, you will have to become more flexible to accommodate peaks and troughs in production and the blend of gas from different sources including the potential for hydrogen

We are currently investigating the potential for National Grid to offer **gas quality blending services** at St Fergus and Bacton and intend to consult the industry later this year about this.

How can NGG support compliance with say a 2% hydrogen blend limit with minute by minute notable swings in gas flow through key NTS intake points?

If the allowable hydrogen limit were increased from 0.1% to 2%, we could amend the **Network Entry Agreements** we have with terminal operators to give effect to that change. We would **manage compliance** in the same way we do today by monitoring the **hydrogen concentration** being delivered and **taking action** to curtail flows whenever the limit is breached.

Does NGG plan to support a wider GSMR spec, which could increase the sources of gas that can be delivered to the UK?

We can see the case for change and have done some **asset impact assessment** work which indicates that the NTS would continue to operate acceptably at the wider Wobbe Index range that is being proposed. We are also mindful of the potential challenges that a wider spec may bring for **end users** that are **sensitive** to gas quality variation and will shortly be launching a **GMaP** project on this.

Questions – Gas on and off...Bacton

What are your plans for Bacton?

Our current plans are to provide the **same overall capability** at Bacton, but via a **smaller, modern re-developed terminal**. We're at an **early stage** in the process and are likely to be subject to an **uncertainty mechanism** with Ofgem. Therefore, we can **adapt** our plans if we can justify it's in the interest of gas consumers. We won't proceed much further until we have clarity on regulatory funding.

Gas
Transmission

I want you to care for
the environment and
communities

nationalgrid



I want you to care for the environment and communities

Cost per annum

£55m

Compressor emissions

Redundant assets

Climate change commitment, inc. natural environment

Supporting the communities in which we work



Our proposals

- We will **reduce our impact on the environment and keep options open** to move to net zero carbon by 2050 with the lowest societal impact
- We will **increase our expenditure on compressor emissions compliance**



I want you to care for the environment and communities

Cost per annum
£55m

You said:

You support the commitments in our plan

You want us to do more in this area

You support our community strategy

Support for compressors programme and keeping options open

Your questions:

Are assets climate resistant?

- Existing assets are but we're keeping this under review

Is there enough spend associated with future proofing pipelines/ compressors to receive hydrogen?

- Spend planned to scope projects
- Trials and rollout of new technology to be funded by innovation or uncertainty mechanisms

- The compressor decisions we've made are based on the outputs of the **network capability** work
- We have asked for **uncertainty mechanisms** to allow us to defer decisions to the **right time**
- Our compressor emissions plan is based on being **compliant with legislation**

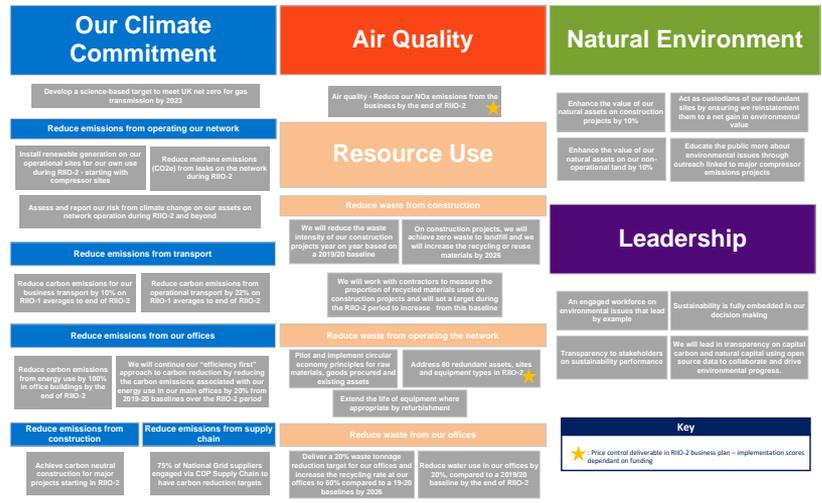


I want you to care for the environment and communities – Environmental Action Plan (EAP)

Our EAP sets out further detail on the environmental commitments in our plan including:

- Measures
- Methodology
- Next steps towards developing a science based target

We asked you to prioritise these targets in order of importance to you



Cost per annum

£55m

I want you to care for the environment and communities – Environmental Action Plan (EAP)

Our Climate Commitment

Resource Use

Leadership

1. Reduce methane emissions (CO2e) from leaks on the network during RIIO-2

4. Extend the life of equipment where appropriate by refurbishment

6. An engaged workforce on environmental issues that lead by example

2. Develop a science-based target to meet UK net zero for gas transmission by 2023

5. On construction projects, we will achieve zero waste to landfill and we will increase the recycling or reuse materials by 2026

Leadership

3. Install renewable generation on our operational sites for our own use during RIIO-2 - starting with compressor sites

7. Achieve carbon neutral construction for major projects starting in RIIO-2

8. 75% of National Grid suppliers engaged via CDP Supply Chain to have carbon reduction targets

We will always comply with legislation



I want you to care for the environment and communities

Cost per annum

£55m

Next steps:

Compressors

1. Agree our **investment processes** with Ofgem and Environmental regulators, incorporating our RIIO-2 outcomes supported by our stakeholders
2. Develop our **investment cases** for compressors for the start of RIIO-2, incorporating all that we have heard from stakeholders



Environmental Action Plan

1. We continue to **develop our commitments** to deliver Net Zero by 2050 to ensure we spend customer money at the **right time**, for the **right environmental benefit**
2. We are developing **climate change risk assessments** to improve our confidence in our commitment to stakeholders



Questions – Environment and communities

Would be keen to understand what options/methods are being considered to meet net zero target?

We know that the majority of our emissions come from the **running of compression**, therefore we know we need to focus in this area. Presently, we have a range of options available to us, which fall into two categories; the **fuel** we use to drive compression and the **technology** used for compression. We are reviewing these technologies and fuel types as part of our wider **decarbonising heat strategy** as well as the **science-based target** work later in the price control period

Have you identified the technology/providers of hydrogen fuelled compressors?

We are **talking** to our supply chain to identify what's possible.

We continue to be involved in the development of **hydrogen deployment** within the NTS. We are linked into various working groups, innovation projects and supplier discussions to ensure that we are at the **leading edge** for hydrogen deployment within gas transmission.

I want you to facilitate the
whole system of the
future, whilst innovating to
meet the challenges ahead



I want you to facilitate the whole system of the future, whilst innovating to meet the challenges ahead

Cost per annum

17m

Markets

Decarbonisation of the gas transmission system

Innovation

Systems

Our proposals

We will **lead the gas industry through the energy transition** in a way that delivers benefits to consumers



I want you to facilitate the whole system of the future, whilst innovating to meet the challenges ahead

GMAP Focus Areas for 2020

Each focus area will explore how likely and potential changes to the way gas is supplied and used could impact the need for market evolution

1

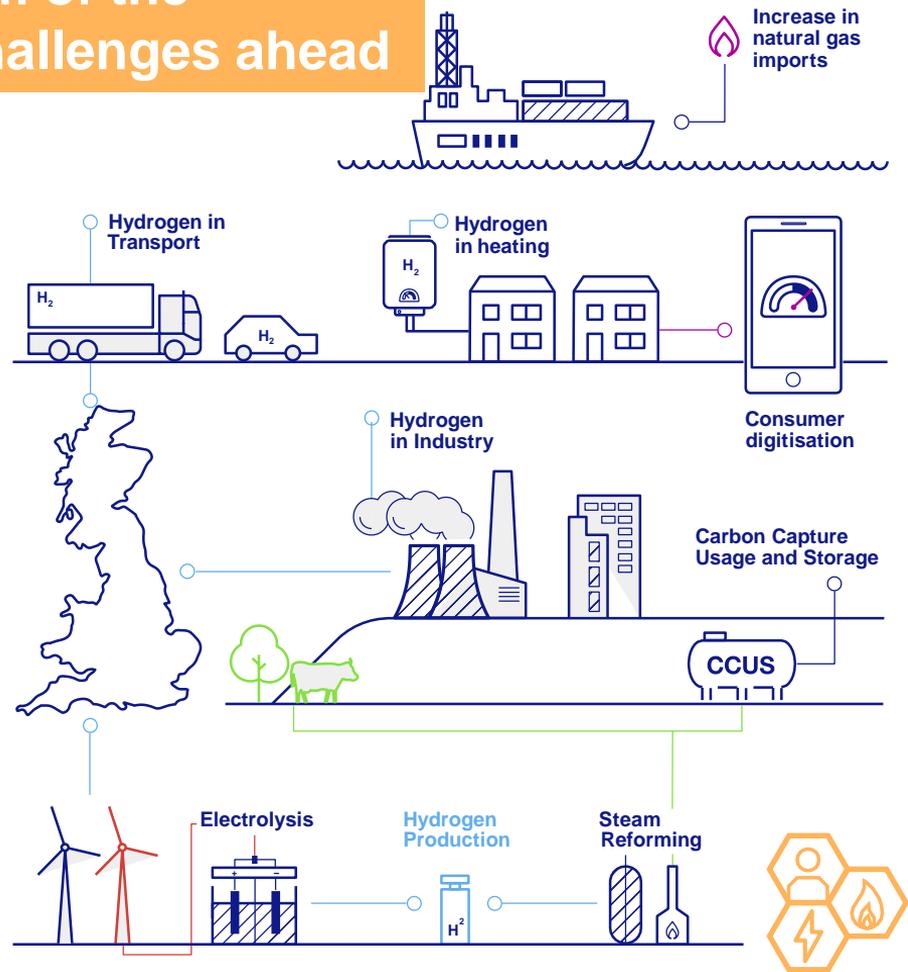
Gas Quality: how the **changing sources of gas** could require market rules changes in order to allow **diverse, local and low carbon** gases in the GB

2

Balancing: how the rules that **incentivise** the gas industry to balance the **supply and demand** of gas may need to change to ensure **efficient operation** of the market, as gas supply and demand becomes **more variable**

3

Hydrogen: the possible market rules given the potential **production** methods, how hydrogen will **integrate** with natural gas and the **end uses**



I want you to facilitate the whole system of the future, whilst innovating to meet the challenges ahead - Systems

Gemini enables capacity and balancing services to be carried out. These services are at the core of how the gas industry operates and is our main interface with shippers

1. This system will become unsupported in 2025
2. Need to adapt to the industry change
3. Required enhancements identified by industry

Do the basics well

Greater automation and increased reporting functionality

Minimise the impact of change

Business Plan proposed the 'Enhanced Solution' option

- Investment to provide an ongoing sustained infrastructure platform
- Deliver enhancements to improve capability and functionality to meet stakeholder needs

We have been working with Xoserve and stakeholders to develop the scope of the replatform and developing the program for delivery of enhancements



Questions – Whole Energy System

Are we looking at Hydrogen production?

Through our work on '**Gas Goes Green**' we are **collaborating** across the industry to identify what is needed to deliver a net zero future. We are **talking to potential producers** of hydrogen to understand **their needs** and timescales to help shape our plans. BEIS are coordinating several work groups across industry as is the Scottish Government.

Hydrogen for HGV transport may be the future but what are NGG doing to promote CNG in the short term

Our quicker and cheaper connections process should enable connections onto the NTS to create filling stations.

How will interday and interseasonal gas storage requirements be met with a future biogas & hydrogen mix?

This is one of many system operation issues that would need to be addressed and will depend on what **concentrations** of hydrogen different **offtake customers** are **able to accept**. **De-blending** may provide a solution.

The GB network will no longer have locational signals after unc mod 678 is implemented with the postage stamp methodology. How will you ensure investment is attracted to the right areas on the network in future, including hydrogen investments

Part of this answer could be that the initial investment locations are likely to be determined by where **suitable infrastructure** already **exists**, e.g. Humber and Teesside industrial clusters and availability of carbon storage, where hydrogen is produced from SMR.

**Gas
Transmission**

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

nationalgrid



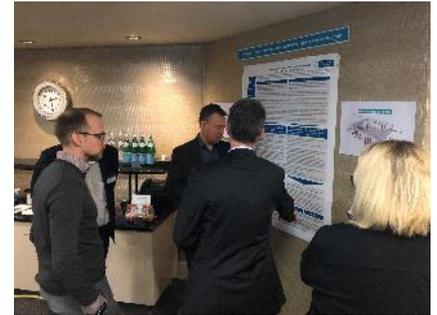
I want you to protect the transmission system from cyber and external threats

Cost per annum

£118m

Our proposals

We will **increase our cyber resilience expenditure** driven by age and obsolescence of existing operational technology, growing cyber threat and new legislative requirements



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

Cost per annum
£118m

You said:

You support the commitments in our plan

Agree with our approach to engagement

How do we quantify the level of risk?

- **Working across networks** to identify and manage the risks effectively
- Our plan takes in to consideration the **pace of change** in external environment
- **Removing functionality** and **assets** to reduce cost and minimise risk rather than adding additional security



Gas
Transmission

I want to connect
to the transmission
system

nationalgrid



Cost per annum
£3m

I want to connect to the transmission system

Connections

Customer and stakeholder satisfaction

Incremental capacity

Our proposals



- We will **be more responsive to the needs of our customers**
- We will continue to support the liquidity of the market by **providing an efficient process for connection and capacity applications**



I want to connect to the transmission system

Cost per
annum
£3m

You said:

Support for
commitments in
our plan

You are aligned with
our efforts to simplify
the system

Is substituting capacity
sustainable and
justifiable in the future

Next steps:

Continue to **enable new connections** to the NTS – particularly low carbon (Biomethane/Green gasses) by:

- Making this option **visible**
- Make it **easier**, **quicker** and **cheaper** to connect

<https://www.nationalgridgas.com/connections>



**I want all the
information I need to
run my business, and
to understand what
you do and why**

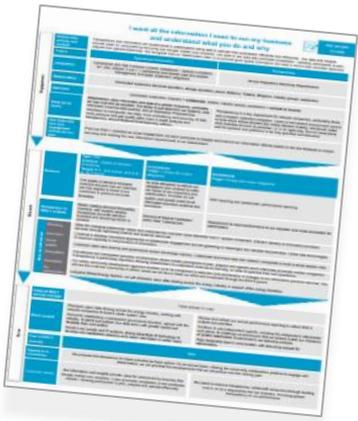


I want all the information I need to run my business, and to understand what you do and why

Cost per annum
£8m

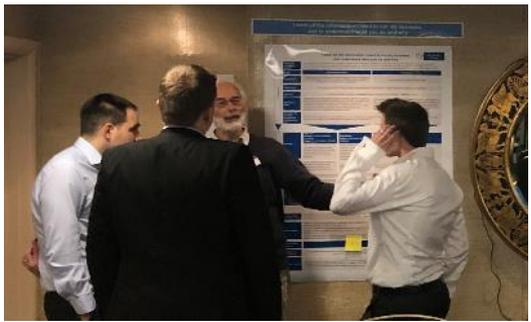
Operational Information

Transparency



Our proposals

- **We will provide data and insight** to the industry allowing stakeholders to operate their businesses efficiently and effectively



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

Cost per annum

£8m

You said:

Supportive of our plans to focus on information quality

Consider what implications hydrogen and biogas will have on what data is required

The data and information we provide is a key enabler for Net Zero

Next steps:

- Continue to **collaborate** with you to **develop** and **enhance** the information we offer via **Collaboration area** and **operational forums**
<https://datacommunity.nationalgridgas.com/>
- Continue to work with industry to provide you the data you want, how you want it, via **open source platforms**.

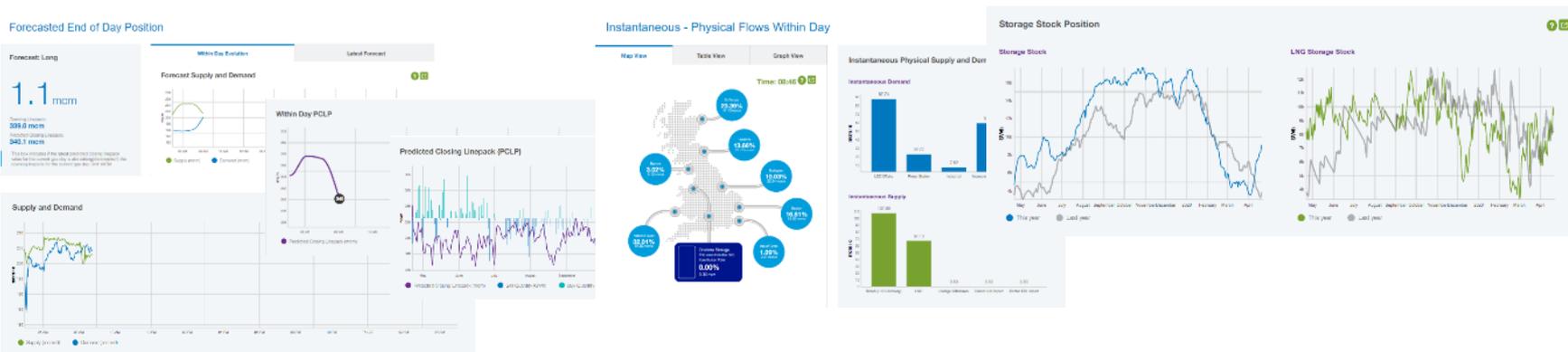


I want all the information I need to run my business, and to understand what you do and why

Cost per annum
£8m

Latest updates:

- **Relaunched Prevailing View** <http://mip-prod-web.azurewebsites.net/StatusView>



- **Operational webinars:** Update on our response and the impacts of Covid-19
- **Pressure Forecasting Service:** based on industry demand we are exploring the possibility of pressure forecasts for different areas of the NTS

For information on either of these, please contact Box.OperationalLiaison@nationalgrid.com



Gas
Transmission

I want you to be
efficient and
affordable

nationalgrid



I want you to be efficient and affordable

8%
efficiency



Our proposals

- We have **built on our RIIO-1 learnings to drive an enhanced efficiency ambition in RIIO-2**
- We have an **efficiency ambition of 8% on total costs**



I want you to be efficient and affordable

You said:

Some uncertainty about the move from 45 to 25 year asset life

Consider what implications hydrogen and biogas will have on what data is required

Next steps:

- Work with Ofgem to agree an **appropriate RIIO-2 deal**
- Investigate **cost implications** of net-zero investments – refurbishment / IT requirements
- Work with suppliers to **deliver efficiency commitments**



Gas
Transmission

Continuing the conversation

nationalgrid



Measuring stakeholder engagement – We asked...

Q How would you like us to report our engagement?

Quality of experience



Are stakeholders happy with their experiences with us?

Effectiveness of engagement



Have we involved the right people and made it easy to engage with?

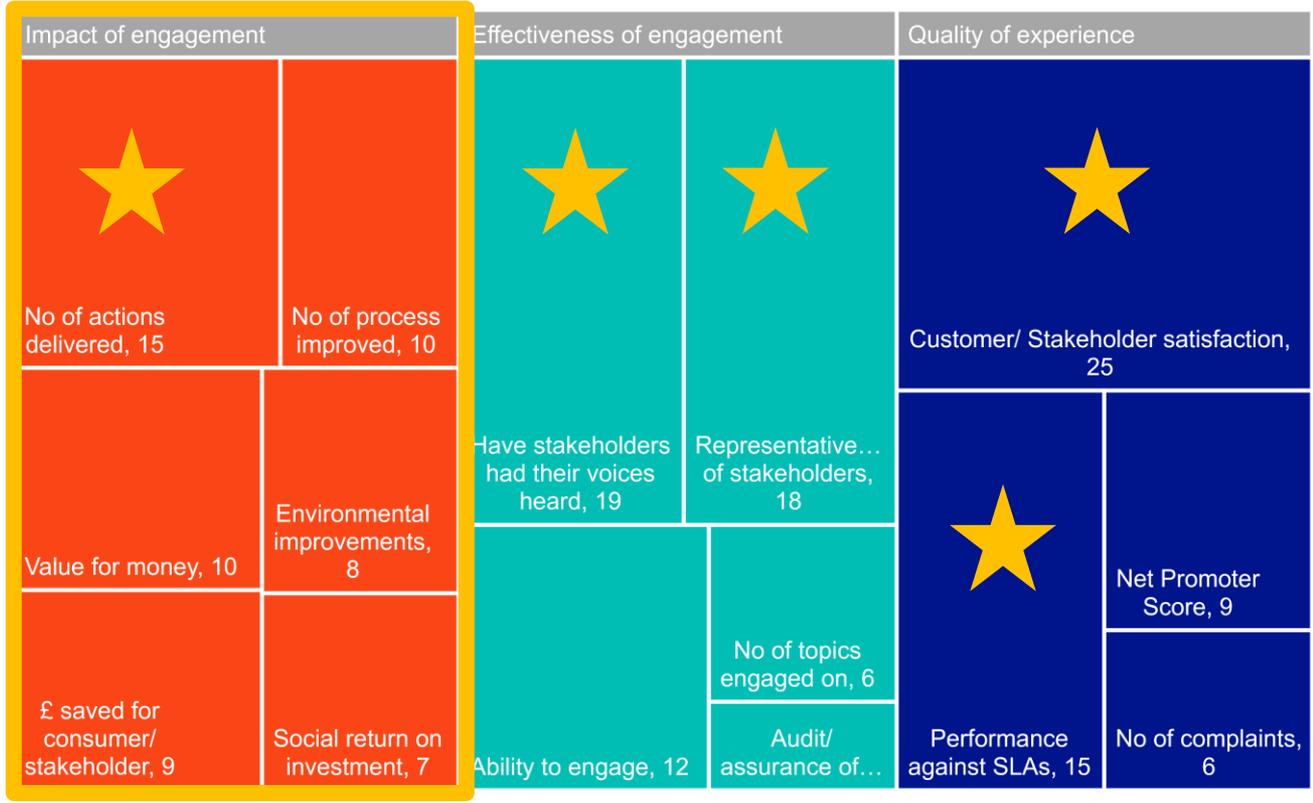
Impact of engagement



What's changed as a result of our engagement?

Measuring stakeholder engagement – you said...

■ Quality of experience
 ■ Effectiveness of engagement
 ■ Impact of engagement



★ Our proposal is to initially report against these

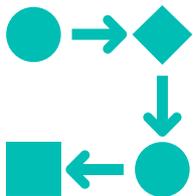
Engagement approach – you’ve told us...

How we engage



- Mix of formats (preferred options being email, webinars and workshops)
- We should utilise existing forums (including NG and external)
- Regional events work as it brings people together with a common interest
- Would like cross regional engagement (mix people from different locations)
- Consider targeted supply chain engagement

Process of engagement



- Like staged process
- Clear on you said, we did – explain why decisions have been made



Topics



- Wider topics (not just RIIO-2)
- Appreciate the wider overview of NGG inc drivers etc
- You liked the format of the Golden Threads

Engagement approach – We will...

Continue our **annual engagement**, bringing a broad range of stakeholders together to talk about stakeholder and consumer priorities, our performance against commitments and a round up of all our other engagement

Continue to **utilise BAU channels**

Develop **targeted engagement** programmes using a variety of channels for relevant topics

Make it clear **what is changing** as a result of engagement

Report on engagement



Next steps

RIIO process

- No open hearings due to Covid 19
- Publish and consult on draft determinations in early July 2020
- Final determinations by end of 2020
- RIIO-2 to start in April 2021

Stakeholder Engagement

Independent User Group

Net Zero engagement

Network Capability engagement

Annual stakeholder-led business planning

Project specific stakeholder engagement

Quick poll

Do you feel like your voice has been reflected in what we've just talked about?

Yes

Partly

No

**Not
Applicable**

Please give a reason for your answer

Questions

Jennifer Pemberton
Stakeholder
Strategy Manager



Bridget Hartley
NGG RIIIO-2
Manager



Jen Randall
Commercial
Codes Change
Manager



Harjinder Kandola
Data Integrity
Manager



Charon Balrey
Regulatory
Stakeholder
Manager



Questions – Gas on and off

Do you feel the proposals future proof the assets considering how significant they are going to be for a considerable number of years yet? Is there enough focus on new technology and innovation?

We've requested an increase in **asset health funding**. In the current regulatory climate this isn't going to be easy for Ofgem to approve. We're proposing investment in both **BAU innovation** and **net-zero innovation** in our business plan proposals.

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We are currently investigating the potential for National Grid to offer **gas quality blending services** at St Fergus and Bacton and intend to consult the industry later this year about this.

How can NGG support compliance with say a 2% hydrogen blend limit with minute by minute notable swings in gas flow through key NTS intake points?

If the allowable hydrogen limit were increased from 0.1% to 2%, we could amend the **Network Entry Agreements** we have with terminal operators to give effect to that change. We would **manage compliance** in the same way we do today by monitoring the **hydrogen concentration** being delivered and **taking action** to curtail flows whenever the limit is breached.

Does NGG plan to support a wider GSMR spec, which could increase the sources of gas that can be delivered to the UK?

We can see the case for change and have done some **asset impact assessment** work which indicates that the NTS would continue to operate acceptably at the wider Wobbe Index range that is being proposed. We are also mindful of the potential challenges that a wider spec may bring for **end users** that are **sensitive** to gas quality variation and will shortly be launching a **GMaP** project on this.

Questions – Gas on and off...Bacton

What are your plans for Bacton?

Our current plans are to provide the **same overall capability** at Bacton, but via a **smaller, modern re-developed terminal**. We're at an **early stage** in the process and are likely to be subject to an **uncertainty mechanism** with Ofgem. Therefore, we can **adapt** our plans if we can justify it's in the interest of gas consumers. We won't proceed much further until we have clarity on regulatory funding.

Questions – Environment and communities

Would be keen to understand what options/methods are being considered to meet net zero target?

We know that the majority of our emissions come from the **running of compression**, therefore we know we need to focus in this area. Presently, we have a range of options available to us, which fall into two categories; the **fuel** we use to drive compression and the **technology** used for compression. We are reviewing these technologies and fuel types as part of our wider **decarbonising heat strategy** as well as the **science-based target** work later in the price control period

Have you identified the technology/providers of hydrogen fuelled compressors?

We are **talking** to our supply chain to identify what's possible.

We continue to be involved in the development of **hydrogen deployment** within the NTS. We are linked into various working groups, innovation projects and supplier discussions to ensure that we are at the **leading edge** for hydrogen deployment within gas transmission.

Questions – Whole Energy System

Are we looking at Hydrogen production?

Through our work on '**Gas Goes Green**' we are **collaborating** across the industry to identify what is needed to deliver a net zero future. We are **talking to potential producers** of hydrogen to understand **their needs** and timescales to help shape our plans. BEIS are coordinating several work groups across industry as is the Scottish Government.

Hydrogen for HGV transport may be the future but what are NGG doing to promote CNG in the short term

Our quicker and cheaper connections process should enable connections onto the NTS to create filling stations.

How will interday and interseasonal gas storage requirements be met with a future biogas & hydrogen mix?

This is one of many system operation issues that would need to be addressed and will depend on what **concentrations** of hydrogen different **offtake customers** are **able to accept**. **De-blending** may provide a solution.

The GB network will no longer have locational signals after unc mod 678 is implemented with the postage stamp methodology. How will you ensure investment is attracted to the right areas on the network in future, including hydrogen investments

Part of this answer could be that the initial investment locations are likely to be determined by where **suitable infrastructure** already **exists**, e.g. Humber and Teesside industrial clusters and availability of carbon storage, where hydrogen is produced from SMR.

national**grid**