Future needs of the Gas Transmission System

Introduction to Speakers

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Jennifer Pemberton
- Stakeholder Strategy Manager

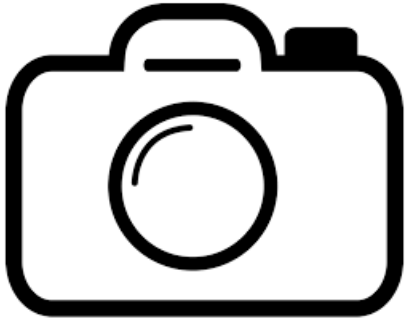
Bridget Hartley
- Gas Transmission Owner RIIO2 Manager

Jenny Phillips (St Fergus/Chester)
- Gas System Operator RIIO 2 Manager

John Perkins (London)
- RIIO-T2 Strategy Delivery Manager

Richard Pickup (Bacton)
- Gas Network Manager

Housekeeping



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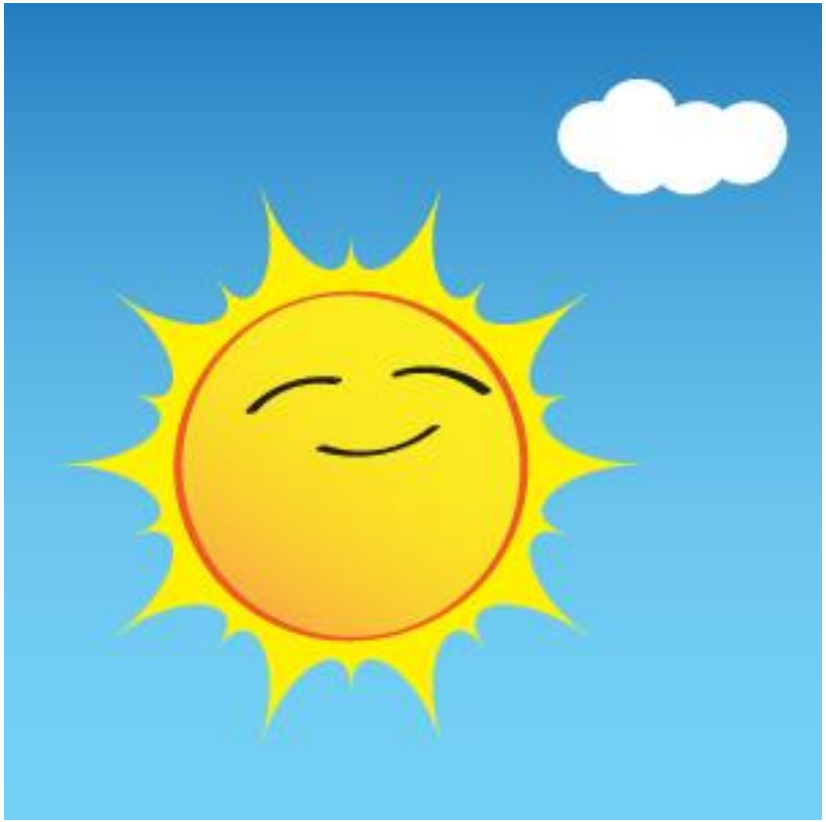
Safety Moment



Quick Poll

- What three words would you use to describe National Grid Gas Transmission?

Poll - to help us analyse your answers…

- *Which of the following best describes you / your organisation regarding your role here today?*

1. Customer, i.e. your organisation pays National Grid directly
2. Consumer interest organisation
3. Regulator or government (central or local)
4. Energy network owner or operator
5. University, think tank or academic
6. Supply chain
7. Environmental interest organisation
8. Other energy industry
9. Other non-energy industry

Poll - Knowledge of our operational activities

- *On a scale of 1 to 5, where 1 is know nothing and 5 is know a great deal, how much would you say you know about National Grid's operational activities?*

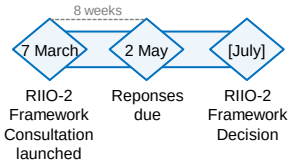
1. Know nothing
2.
3.
4.
5. Know a great deal

What is RIIO?

Timeline

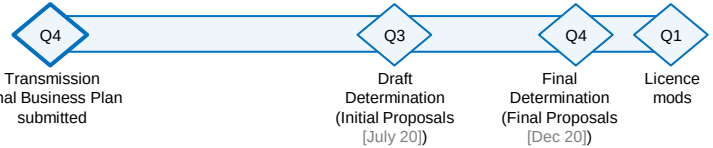
2018				2019				2020				2021
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Jan/Feb/Mar	Apr/May/Jun	July/Aug/Sept	Oct/Nov/Dec	Jan/Feb/Mar	Apr/May/Jun	July/Aug/Sept	Oct/Nov/Dec	Jan/Feb/Mar	Apr/May/Jun	July/Aug/Sept	Oct/Nov/Dec	Jan/Feb/Mar

RIIO Framework Review



T2 Specific

GT Business Plan



Start of RIIO-2 1

Listen
Establishing Stakeholder priorities
To shape our future Engagement plans

Co-create
Building elements of our plans with stakeholders
- Getting into detail

Propose
Sharing our plans with stakeholders to make sure we check we're meeting their needs

Scrutinise
Detailed scrutiny and integrating plans with stakeholder groups

Agreement
The final business plans submissions and stakeholder group reports re reviewed, and Ofgem publish their price control determination by the end of 2020

RIIO T2
New Price Control Starts

Stakeholder User Group Meetings

Ofgem Challenge Group Meetings

A message from Phil Sheppard

Why we're here today

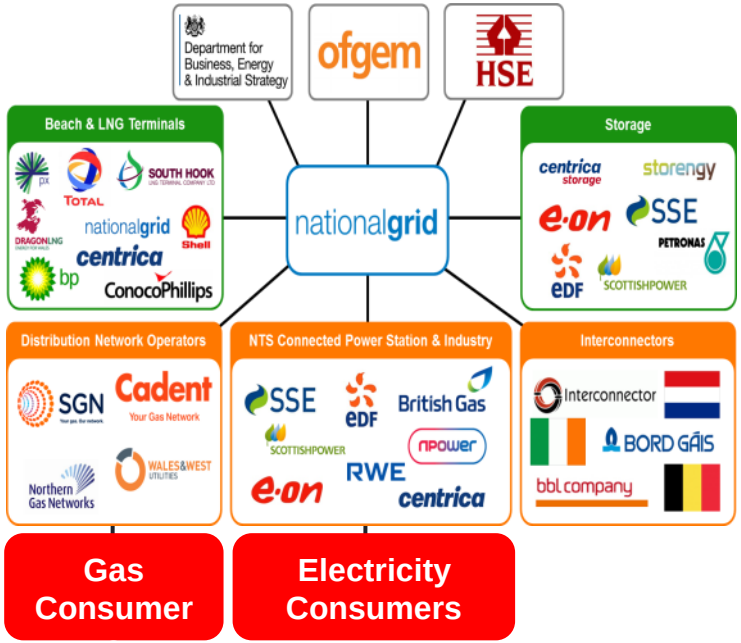
We know

Our customers and stakeholders rely on the service we provide

We haven't always spent enough time listening to your priorities

We're changing

To ensure your requirements are at the centre of our business plans



Please join the debate

We are at a time of significant change in the energy industry, and the vital role that gas plays will need to **evolve**

Today's workshop is focused on areas which you've already told us are important and which will directly **influence** our business plans

We are committed to **listening** to you, our customers and stakeholders, to develop the Gas Transmission Network you require for today and tomorrow

Take part

Have fun

Be honest and direct

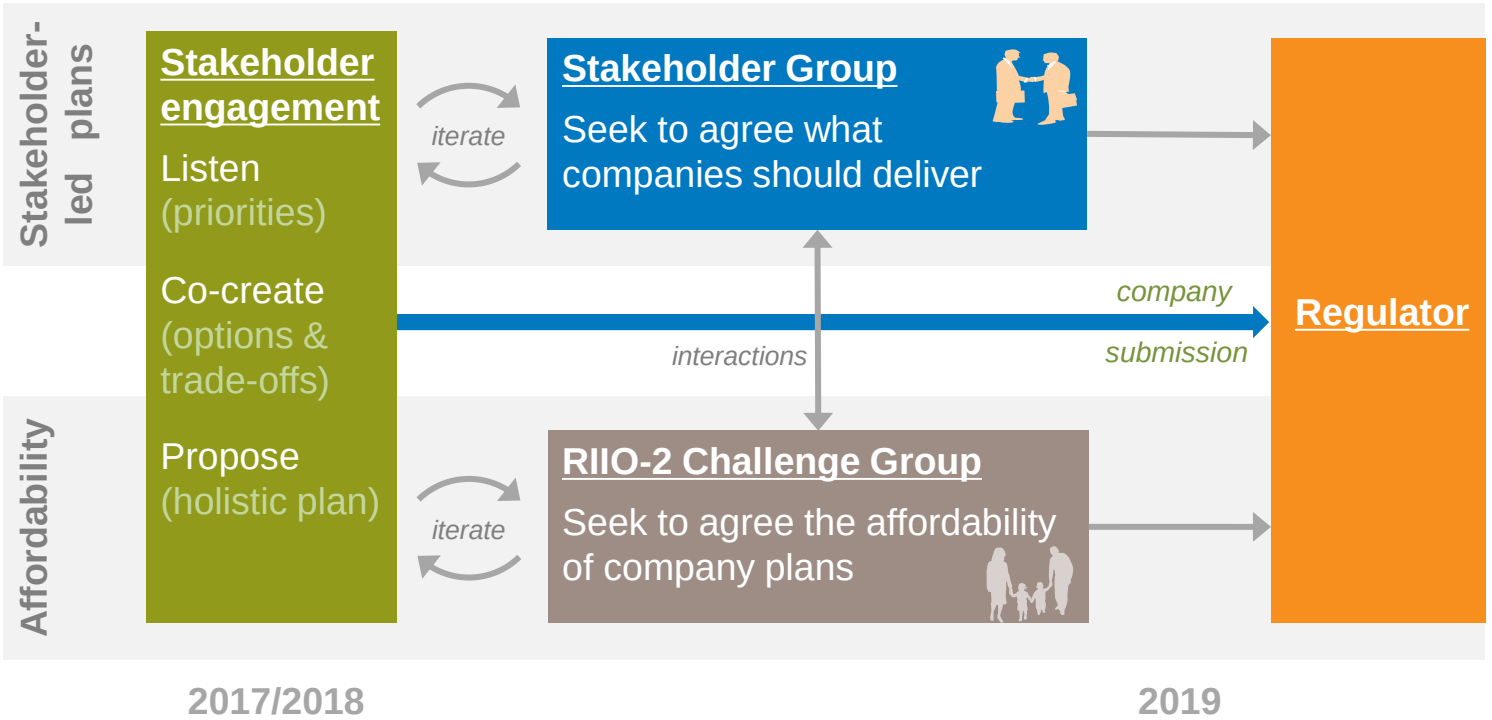
Our engagement approach

- Today is part of a wider programme of stakeholder engagement to help us build our business plans for RIIO-2

- This involves:

1. listening to what you need from us
2. creating our plans with you
3. then checking that our plans reflect what you've told us

Constructive engagement



Gas Transmission Stakeholder Priorities

Industrial and Domestic consumer priorities …

- I want an affordable energy bill
- I want to use energy as and when I want
- I want you to minimise disruption to my life

…are delivered through our stakeholder priorities…

- I want to take gas on and off the Transmission system where and when I want
- 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 the gas system to be safe
- I want you to protect the Transmission system from cyber and external threats
- I want you to care for communities and the environment
- I want you to facilitate the whole energy system of the future – Innovating to meet the challenges of an uncertain future
- I want you to be efficient and affordable

…these were developed by consulting with

- Consumers
- Landowners
- Other networks
- Customers
- Think tanks and academics
- Government
- Industry bodies
- Interest Groups

Timeline of engagement

	2018				2019
	Winter	Spring	Summer	Autumn	Winter
I want to take gas on and off the Transmission system where and when I want		Using the right scenarios to build our business plans	Delivering the right size of Gas Transmission system Asset Health investments	Tactical national gas transmission system reinforcement Investment programme Customer Service	
I want all the information I need to run my business and to know what you do and why			Information Provision Gas market balancing and capacity systems and services		
I want you to facilitate the whole energy system of the future		Gas industry change plan		Whole energy system Innovation	
I want you to leave a positive impact on our communities and environment			Environmental impacts to the national gas Transmission system Responsible demolition of assets		
I want to connect to the Transmission System			Facilitating the connections to the national gas Transmission system		
I want you to protect the Transmission system from cyber and external threats				Protecting the national gas Transmission system from external threats	
I want the gas system to be safe			Accidental interference from third parties	Delivering safety compliance	
I want you to be efficient and affordable			Outputs, products, incentives and services		

Today's Agenda

Morning	• Future of gas • Who we are and what we do • Our Performance • Scenarios – Our planning assumptions • I want to move gas on and off the network
Lunch	
Afternoon	• Asset management • Responsible removal of redundant assets • Information provision

Future of Gas

How gas can support a low carbon future

- Jenny Phillips

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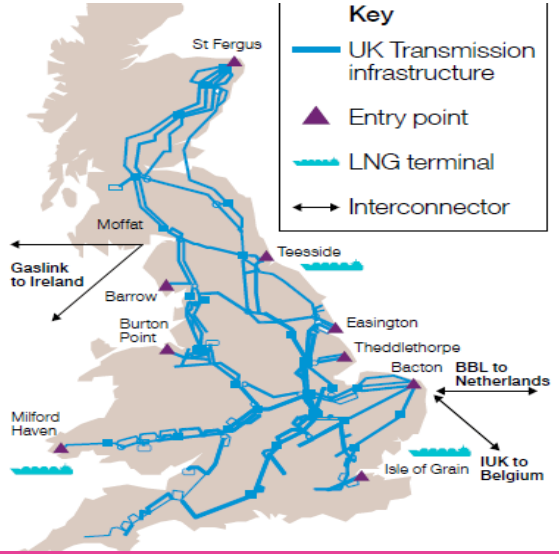
Gas plays an important role in the economy today

7,660km	Of gas pipelines through the GB National Transmission System
60,000	New customers connected to the gas networks each year
96,000	Gas connections have been made since 2007 to address fuel poverty
42%	Electricity generated from gas in 2016
8/10	UK homes use gas for heat



The gas networks deliver three times the energy delivered by the electricity networks.

Climate Change Act 2008

The Act requires the UK to have reduced carbon emissions by at least 80% by 2050 from 1990 Levels, whilst maintaining security of supply and providing energy at lowest cost

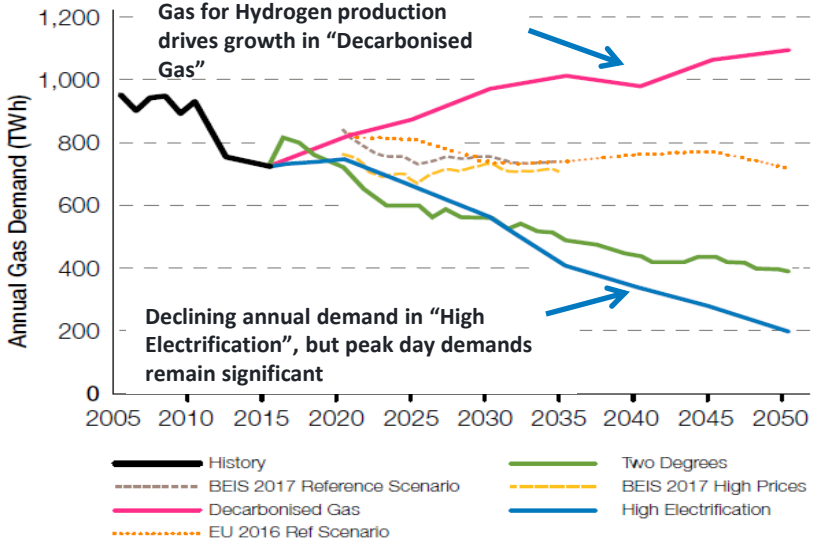
Future of Gas programme set out to:

- Understand customer & stakeholder views to set out what the future holds for gas
- Understand the potential future impacts on our network and the gas market
- Develop policy recommendations to support government and regulators
- Consider innovative solutions to future challenges

Stakeholder engagement and 2050 analysis has shown gas was important in all sensitivities

Circa 150 different organisations involved

Annual Gas Demand to 2050



We have presented a series of key themes

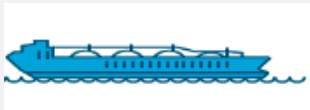
Decarbonisation of Heat
Demonstrates why gas is the ideal solution for decarbonising residential and commercial heat

Decarbonisation of Transport
Discusses why decarbonising transport through gas (and electricity) should be an early priority

Decarbonisation of Industry
Demonstrates why decarbonising the gas sector is the best option for much of GB industry

Whole Energy System
Establishes why the ability to work across all energy systems will become much more important

Future Networks & Markets
Discusses the products and services needed to facilitate the networks and markets of the future

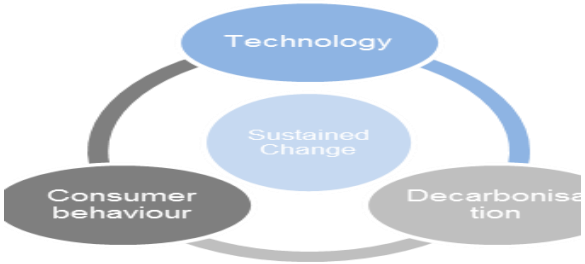


Carbon Capture Usage & Storage
Maintains that CCUS plays a critical role if decarbonisation is to occur at the lowest possible cost

We will set out:

- The challenge & potential solutions
- What National Grid will do
  No regrets actions
  Signposts/triggered actions
- A potential timeline for policy decisions and actions
- Our public policy recommendations

Next steps

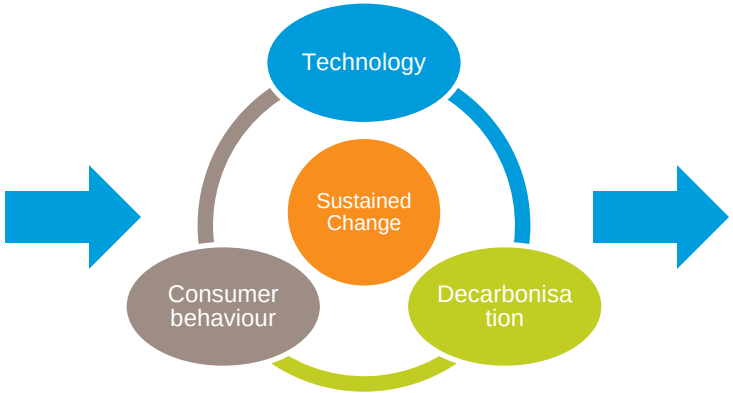


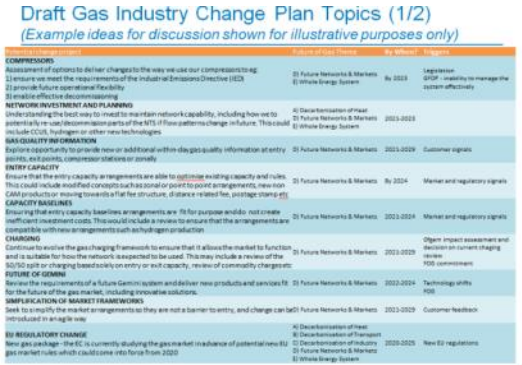
Continue the conversation with our stakeholders and further our policy recommendations

Deliver the National Grid committed actions as well as defining the market triggers for potential future work

Develop a Gas Industry Change Plan to take the next step in our future gas thinking, by establishing a long term, stakeholder backed programme of strategic change

Gas Industry Change Plan




Draft Gas Industry Change Plan Topics (1/2)

(Example ideas for discussion shown for illustrative purposes only)

Potential change project	Future of Gas Theme	By When?	Triggers
COMPRESSORS			
Assessment of options to deliver changes to the way we use our compressors to eg: 1) ensure we meet the requirements of the Industrial Emissions Directive (IED) 2) provide future operational flexibility 3) enable effective decommissioning	D) Future Networks & Markets E) Whole Energy System	By 2023	Legislation GFOP - inability to manage the system effectively
NETWORK INVESTMENT AND PLANNING			
Understanding the best way to invest to maintain network capability, including how we to potentially re-use/decommission parts of the NTS if flow patterns change in future. This could include CCUS, hydrogen or other new technologies	A) Decarbonisation of Heat D) Future Networks & Markets E) Whole Energy System	2021-2023	
GAS QUALITY INFORMATION			
Explore opportunity to provide new or additional within day gas quality information at entry points, exit points, compressor stations or zonally	D) Future Networks & Markets	2021-2029	Customer signals
ENTRY CAPACITY			
Ensure that the entry capacity arrangements are able to optimise existing capacity and rules. This could include modified concepts such as zonal or point to point arrangements, new non CAM product or moving towards a flat fee structure, distance-related fee, postage-stamp etc	D) Future Networks & Markets	By 2024	Market and regulatory signals
CAPACITY BASELINES			
Ensuring that entry capacity baselines arrangements are fit for purpose and do not create inefficient investment costs. This would include a review to ensure that the arrangements are compatible with new arrangements such as hydrogen production	D) Future Networks & Markets	2021-2024	Market and regulatory signals
CHARGING			
Continue to evolve the gas charging framework to ensure that it allows the market to function and is suitable for how the network is expected to be used. This may include a review of the SO/TO split or charging based solely on entry or exit capacity, review of commodity charges etc	D) Future Networks & Markets	2021-2029	Ofgem impact assessment and decision on current charging review FOG commitment
FUTURE OF GEMINI			
Review the requirements of a future Gemini system and deliver new products and services fit for the future of the gas market, including innovative solutions.	D) Future Networks & Markets	2022-2024	Technology shifts FOG
SIMPLIFICATION OF MARKET FRAMEWORKS			
Seek to simplify the market arrangements so they are not a barrier to entry, and change can be introduced in an agile way	D) Future Networks & Markets	2021-2029	Customer feedback
EU REGULATORY CHANGE			
New gas package - the EC is currently studying the gas market in advance of potential new EU gas market rules which could come into force from 2020	A) Decarbonisation of Heat B) Decarbonisation of Transport C) Decarbonisation of Industry D) Future Networks & Markets E) Whole Energy System	2020-2025	New EU regulations

- The *Gas Industry Change Plan* seeks to take the next step in our future of gas programme, by establishing a long term, stakeholder backed programme of strategic change
- The *Gas Industry Change Plan* is about more than just regulatory change. It could be driven by a number of future developments such as UNC or licence
- The plan is <u>not</u> a firm view of our work programme. It will include triggers and interdependencies and is designed to facilitate an open discussion about the future.

Questions for discussion

1. Do you agree with the concept of the change plan?

2. Do you have any initial feedback on the illustrative content of the plan?

3. How should it be managed & changed? How would you like to feed in?

Voting

Our impact on you

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

1. Not impacted at all
2.
3.
4.
5. Impacted a great deal

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Who we are and what we do

- Jenny Phillips

National Grid Gas Transmission – the network

Our role

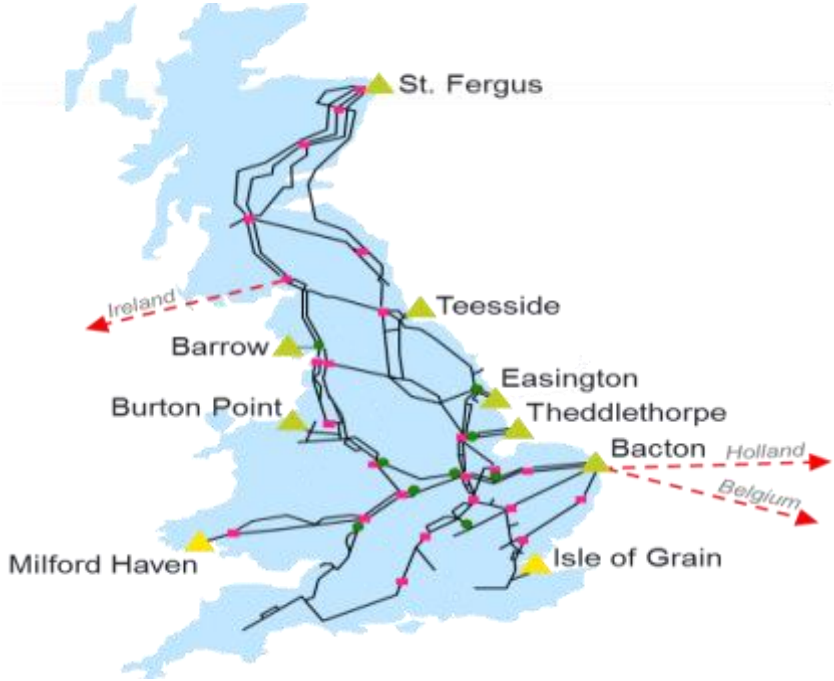
To connect millions of people to the energy they use safely, reliably and efficiently

We own & operate

7,660km of high pressure pipelines, 24 compressor stations and over 600 above ground installations

We transport

Over 3 times the energy provided by electricity each year



Gas Distribution

Distribution

- Four Distribution Network Companies (DNs)
- Operating Pressures 38bar to 22mbar
- Passive Networks
- DNs transports gas to domestic users, commercial properties and medium sized businesses
- Most gas through the DNs is for homes and small businesses
- A smaller proportion is for larger sites such as Power Stations and Large Industrial and Commercial Users

National Grid Gas Transmission - TO/SO

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Why we treat gas with respect

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How the Network use has evolved over time

Gas flow

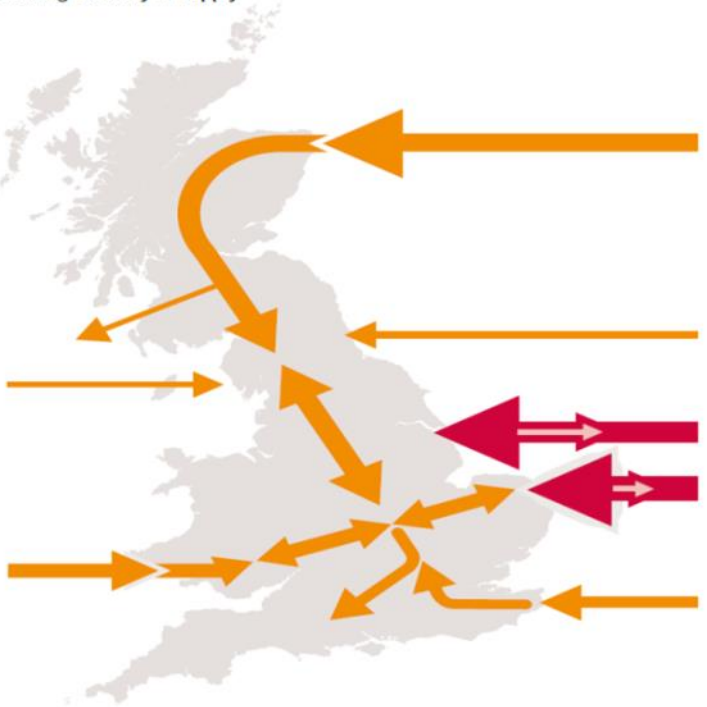
2000

Predominant North to South

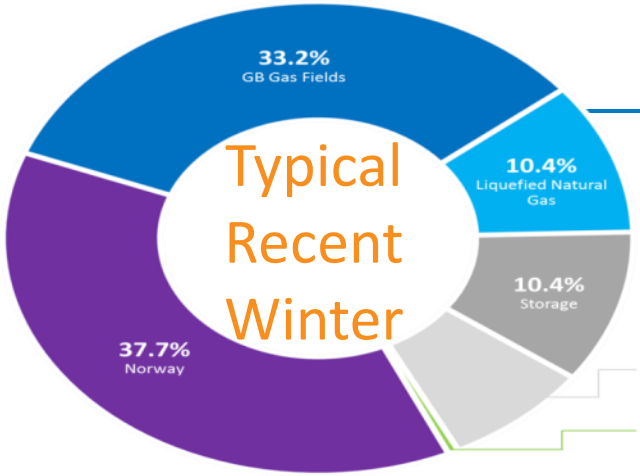
Gas flow

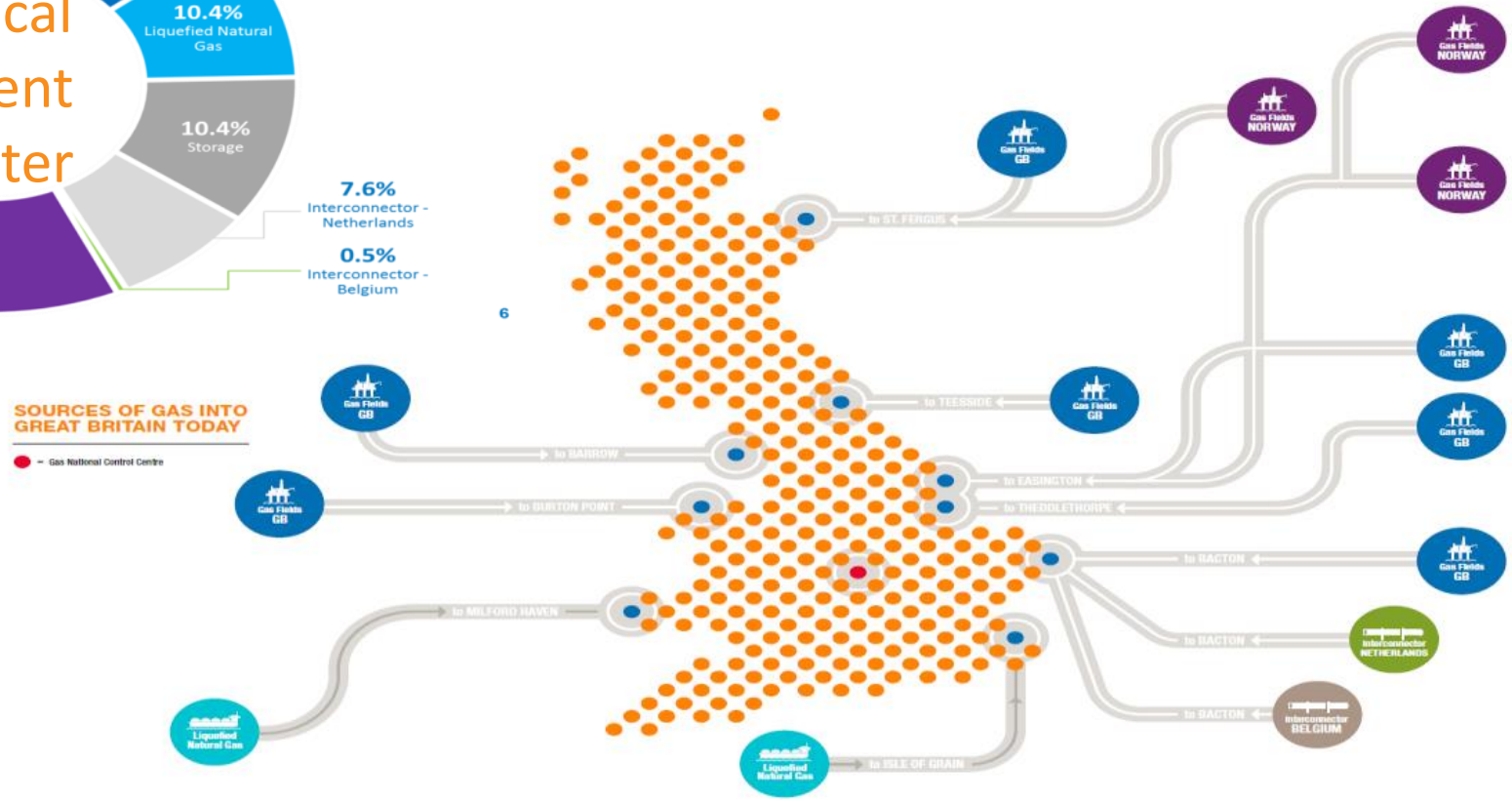
2014 onwards

Increasing diversity of supply

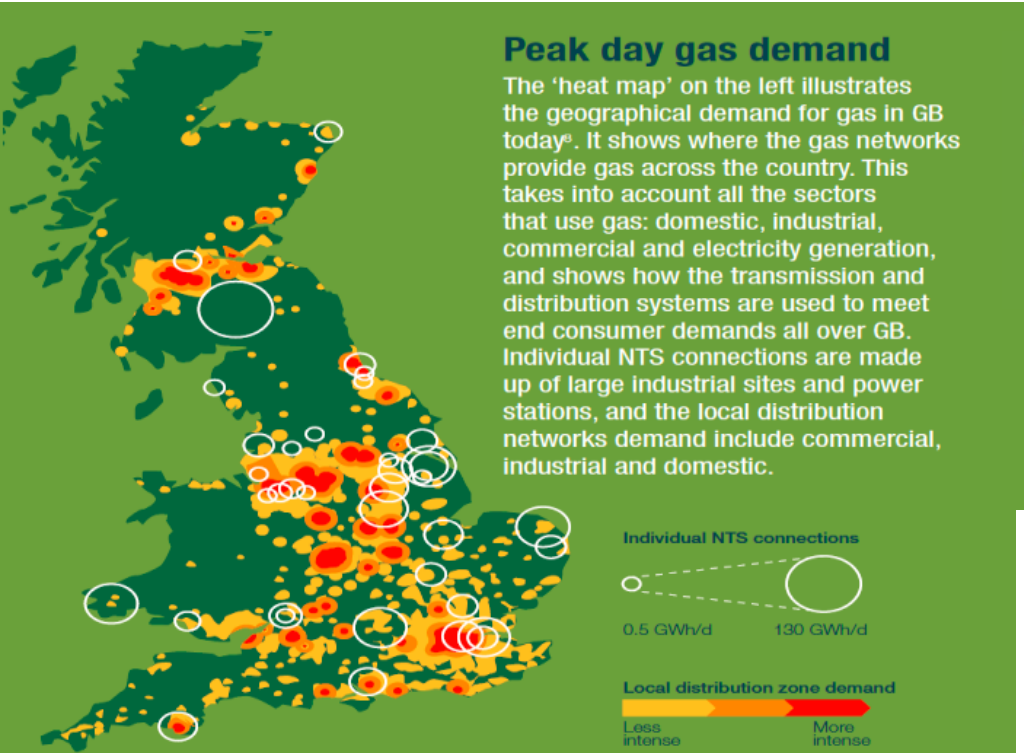


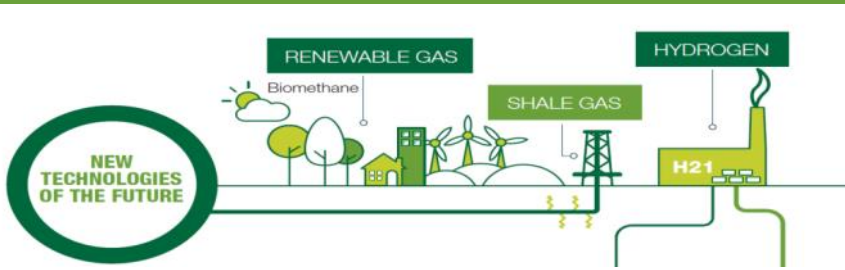
Supply Sources





Demand Distribution





Balancing: Meeting customer requirements

Responsibility

Safe, efficient and economic transport of gas to meet customer requirements.

Unconstrained

The ability for customers to put gas in to and take gas out, where & when they want and in the quantities they want.

Challenge

Providing a level playing field and where possible an unconstrained service to our customers. Facilitating an efficient market, whilst maintaining gas quality and pressure requirements.

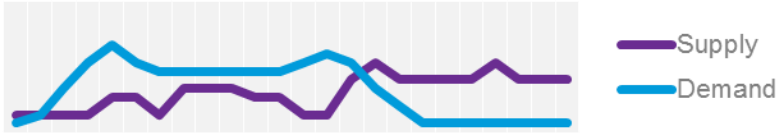
Operating the National Gas Transmission System

- Jenny Phillips

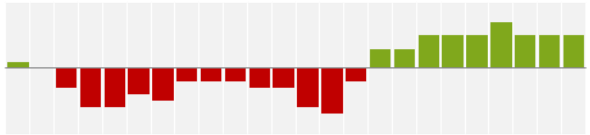
Operating the National Transmission System…

The NTS transports gas from entry point (supply) to exit points (demand).

The daily profiles of supply and demand can differ significantly.



The volume of gas in the NTS varies during the day.

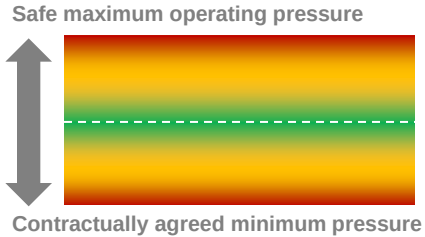


Typical daily balance

The volume of gas in the NTS at any one time is referred to as “Linepack”.

System pressure is directly related to linepack.

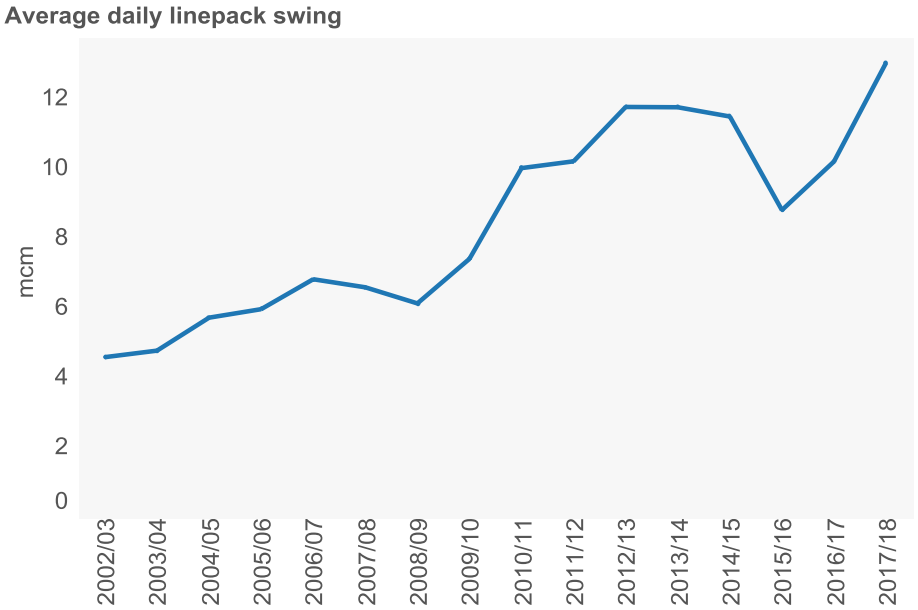
The NTS is able to operate within a range of pressure limits.

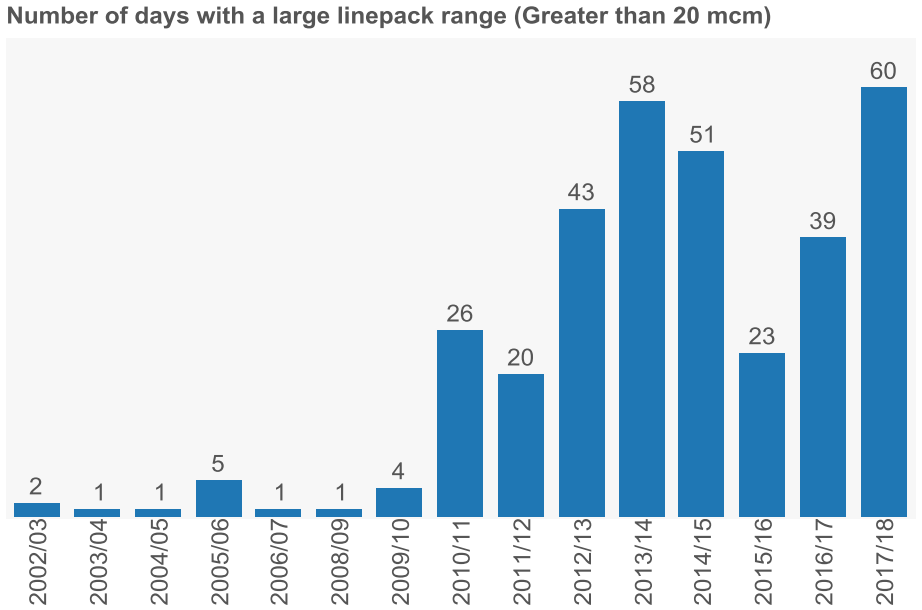


This allows for some flexibility to manage the daily imbalances and protect customers from short-term asset failures.

Note that the NTS was built to transport gas efficiently based on flat daily supply and demand profiles.

Reliance on linepack flexibility has increased





Varying within day supply & demand

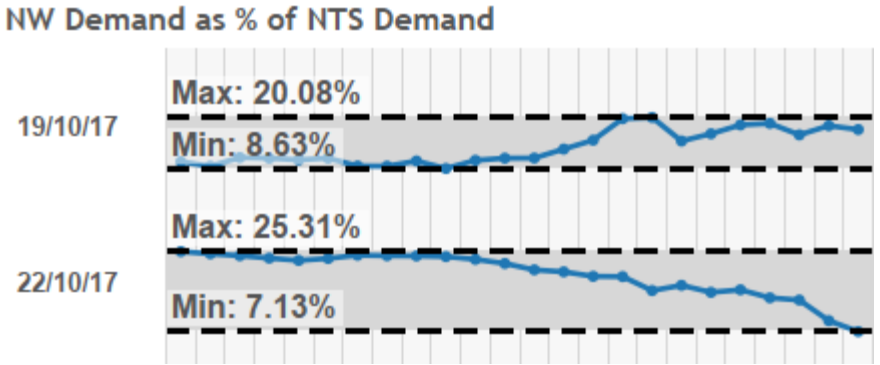
Within the day demand and supply will vary regionally.

Within day variability of demand tends to differ by region

Aggregate demand levels have been reducing;

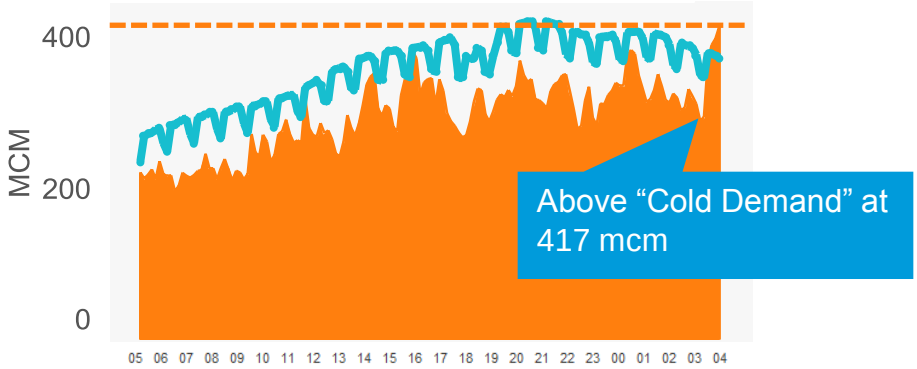
However demand profiles more volatile within day.

Example: North West demand percentage and profile variation

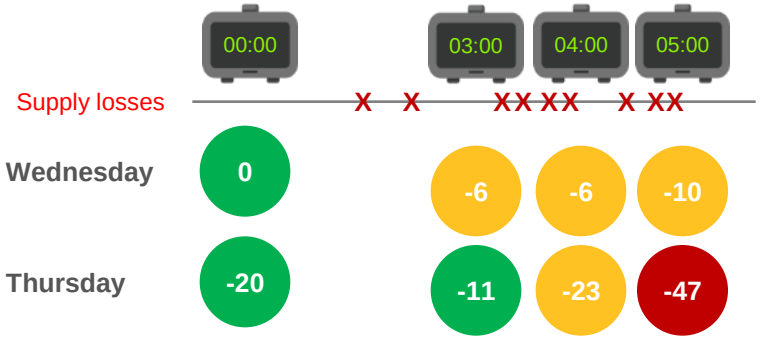


Example Day : 1st March Gas Deficit Warning Issue at 05:47

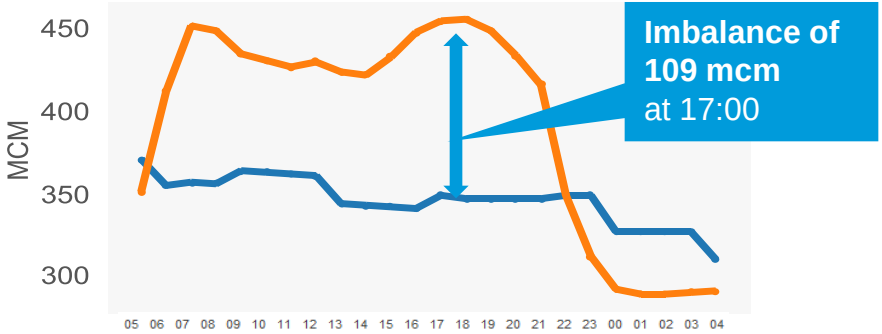
1.Unseasonably high Demand against significant cold front leading into the day



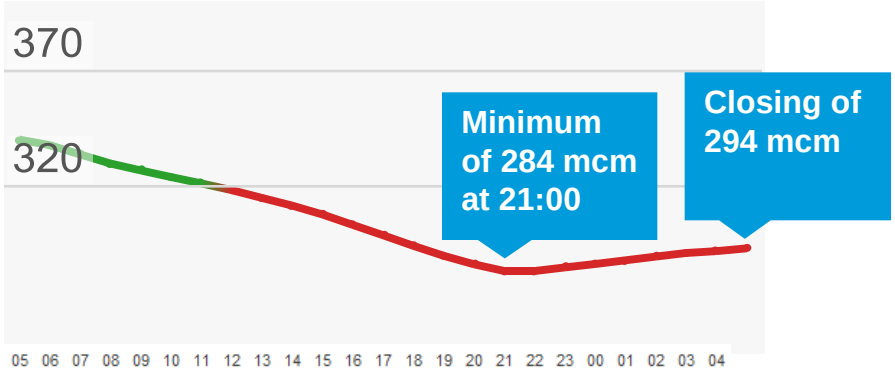
2.Multiple supply losses during the evening of the 28th between 01:00 and 05:00 leading to a significant shortfall



3.Projected large and sustained imbalance at 05:00 between Demand and Supply during the 1st March

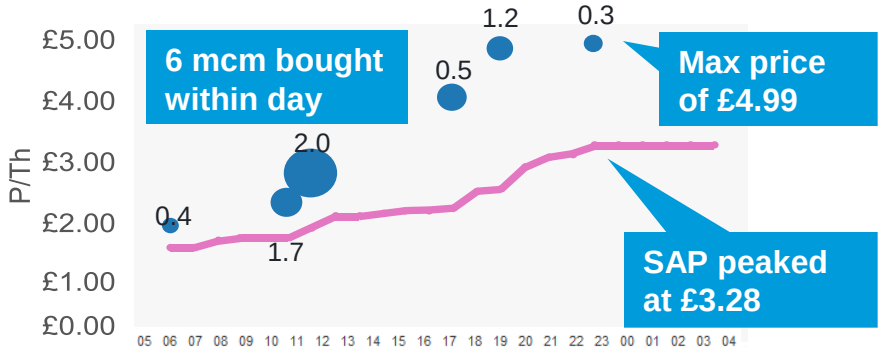


4. The resultant 05:00 projection for NTS Stock Level depletion meant that the NTS would fail against pressure obligations.

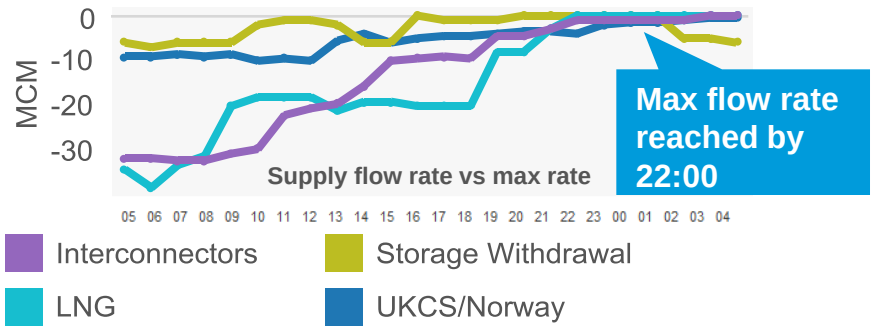


Example Day : 1st March National Grid Actions & Impact

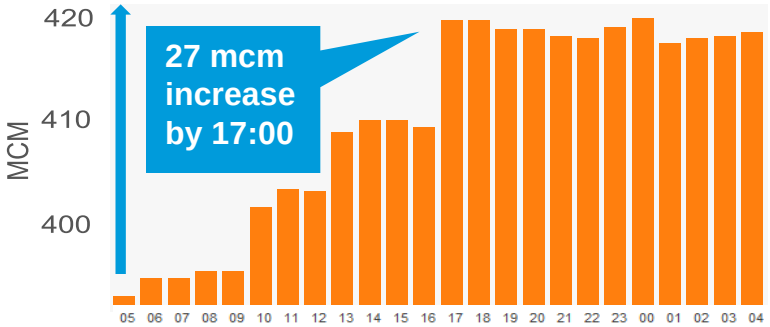
1. Consistent (Volume / Price) OCM trading throughout day accepting available offers.



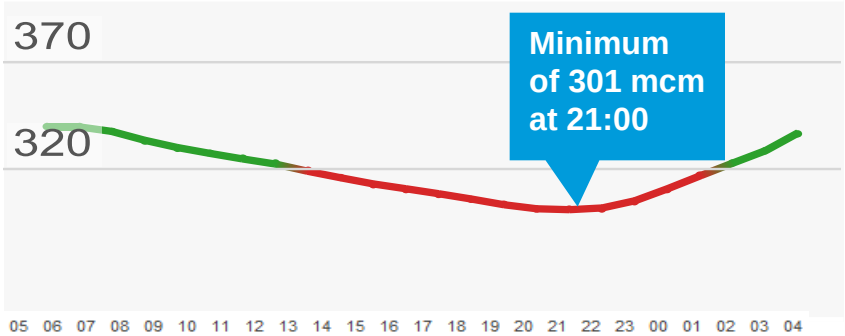
2. Only significant available supply response available via LNG (SH & Grain) and Interconnectors.



3. Major upward revision of end-of-day demand forecasts by distribution networks – no DSR evident



4. Lowest ever recorded linepack. OM required within-day to support extremity. Two assured DN pressures missed.



Example Day : 1st March National Grid Actions & Impact

Impact on Field based staff

Key Actions

- 24/7 manning of key sites
- Technicians staying in local hotels
- Clearing of ice and snow from compressor air intake filters (pic) using harnesses and brushes.
- Prioritising staff attendance at more critical sites
- Utilising specialist expertise to plan for emergency running of alternate compressors units
- Farmers assisting with site access utilising farm machinery.

Break

Our Performance

- Bridget Hartley

Current performance against outputs

Regulatory Performance Measures 2016/17	
Safety	
	No-one was injured as a result of our activities and we met all of our safety targets
Reliability	
	In general we operated and maintained the NTS to deliver the reliability that gas consumers and our stakeholders expect. There were a few days in the year where we couldn't provide the capacity that some of our stakeholders required.
Environment	
	Our work to modify our assets to reduce our impact on the environment was delivered to target. Additional compressor operation to meet challenging network conditions meant that we exceeded our emissions targets
Customer / Stakeholder	
	We have been able to meet our customer connection requests and we have received good feedback from our customers and stakeholders

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What you've told us…during the listen phase

Cyber Security?

Network review has delivered but needing long term plan to meet 2030 compliance

Interaction between networks not captured

'so what' test, what do outputs mean for consumers and society etc?

Air quality as an output rather than solely carbon emissions

No future of gas/ decarbonisation outputs

Reporting framework
Proactive if issues identified
Link issues together

Need to evolve framework is in place to deal with and support distributed gas

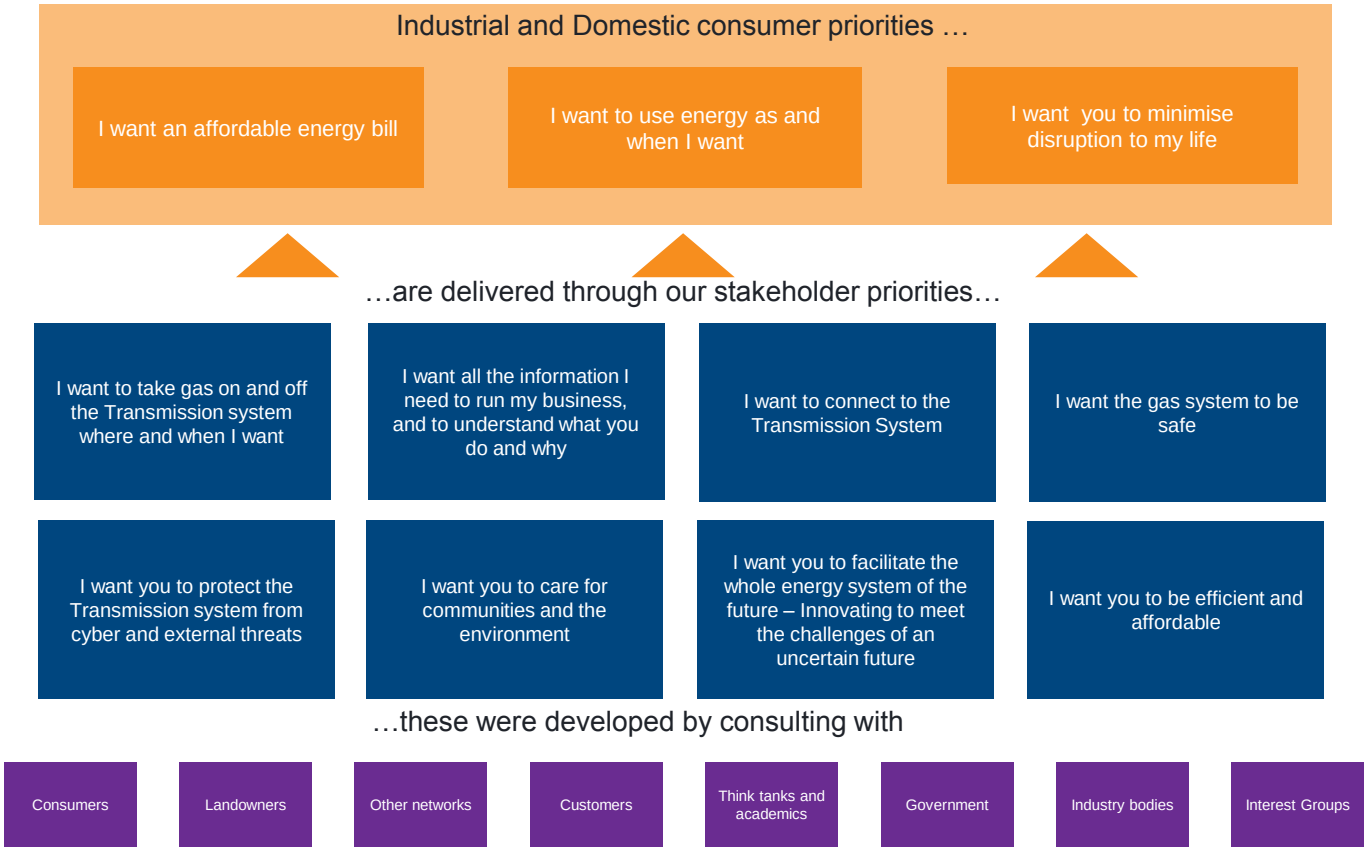
true cost of linepack, NTS vs DN cost

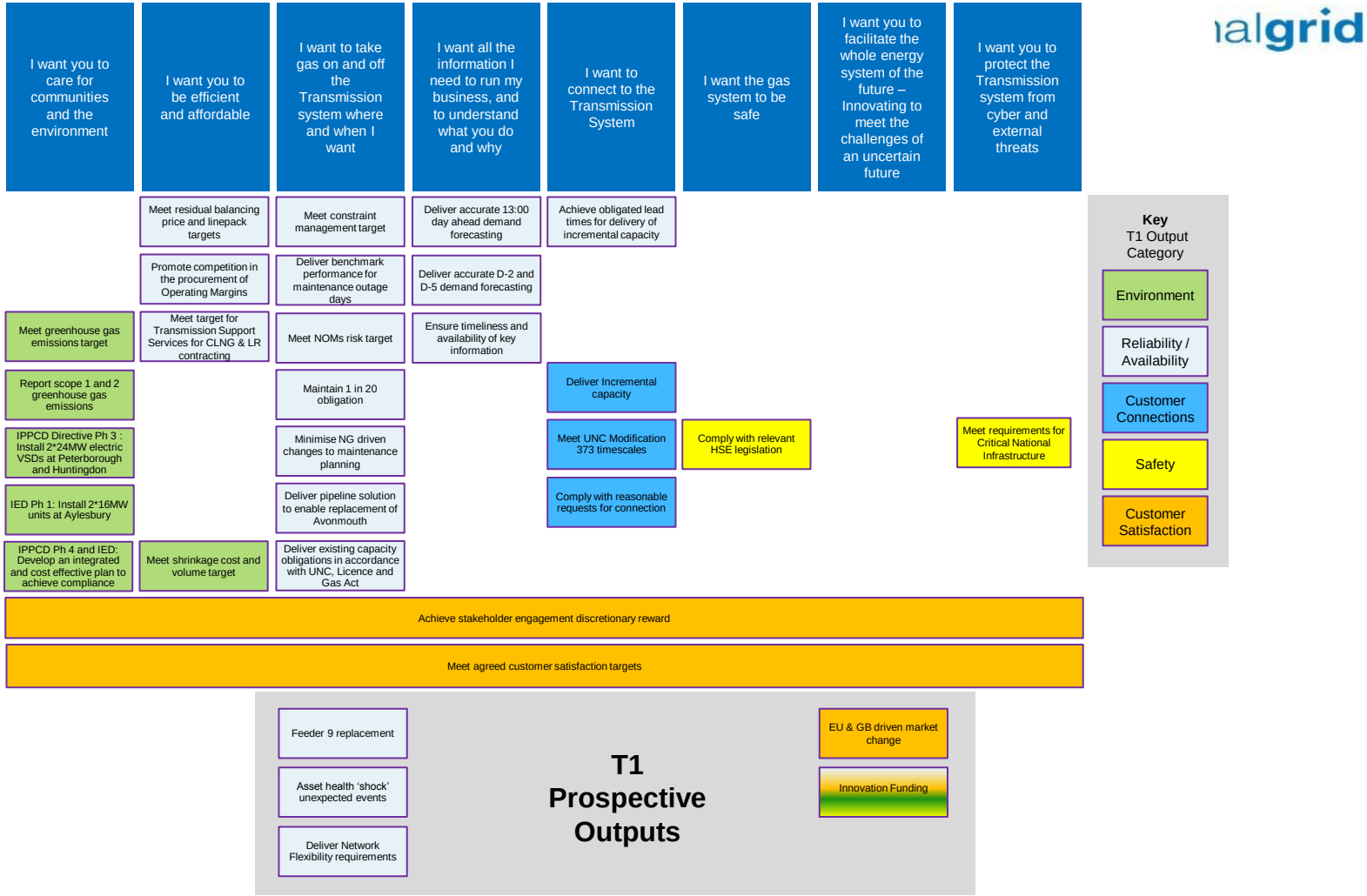
More 'outcome' focus needed, these are 'inputs', how is value for money demonstrated

One of the key aims of the RIIO price control framework is to support that transition. However, Sustainability First has found the fragmented nature of the current incentives in RIIO1 does not provide a coherent or necessarily strong signal to the networks on carbon reduction.

Do output measures sufficiently capture outputs that directly relate to delivering goal of wider energy policy?

Gas Stakeholder Engagement Priorities




I want you to care for communities and the environment
I want you to be efficient and affordable
I want to take gas on and off the Transmission system where and when I want
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 the gas system to be safe
I want you to facilitate the whole energy system of the future – Innovating to meet the challenges of an uncertain future
I want you to protect the Transmission system from cyber and external threats
Meet residual balancing price and linepack targets
Meet constraint management target
Deliver accurate 13:00 day ahead demand forecasting
Achieve obligated lead times for delivery of incremental capacity
Promote competition in the procurement of Operating Margins
Deliver benchmark performance for maintenance outage days
Deliver accurate D-2 and D-5 demand forecasting
Meet greenhouse gas emissions target
Meet target for Transmission Support Services for CLNG & LR contracting
Meet NOMs risk target
Ensure timeliness and availability of key information
Report scope 1 and 2 greenhouse gas emissions
Maintain 1 in 20 obligation
Deliver Incremental capacity
IPPCD Directive Ph 3 : Install 2*24MW electric VSDs at Peterborough and Huntingdon
Minimise NG driven changes to maintenance planning
Meet UNC Modification 373 timescales
Comply with relevant HSE legislation
Meet requirements for Critical National Infrastructure
IED Ph 1: Install 2*16MW units at Aylesbury
Deliver pipeline solution to enable replacement of Avonmouth
Comply with reasonable requests for connection
IPPCD Ph 4 and IED: Develop an integrated and cost effective plan to achieve compliance
Meet shrinkage cost and volume target
Deliver existing capacity obligations in accordance with UNC, Licence and Gas Act
Achieve stakeholder engagement discretionary reward
Meet agreed customer satisfaction targets
Key
T1 Output Category
Environment
Reliability / Availability
Customer Connections
Safety
Customer Satisfaction
Feeder 9 replacement
Asset health 'shock' unexpected events
Deliver Network Flexibility requirements
T1 Prospective Outputs
EU & GB driven market change
Innovation Funding

Question for discussion

1. Should we have measures against each stakeholder priority?

2. What would you like us to deliver for you under each priority?

Voting

Our impact on you

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

1. Not impacted at all
2.
3.
4.
5. Impacted a great deal

Question 1

Q: *Should our outcomes/performance measures be aligned to our stakeholder priorities?*

1. No

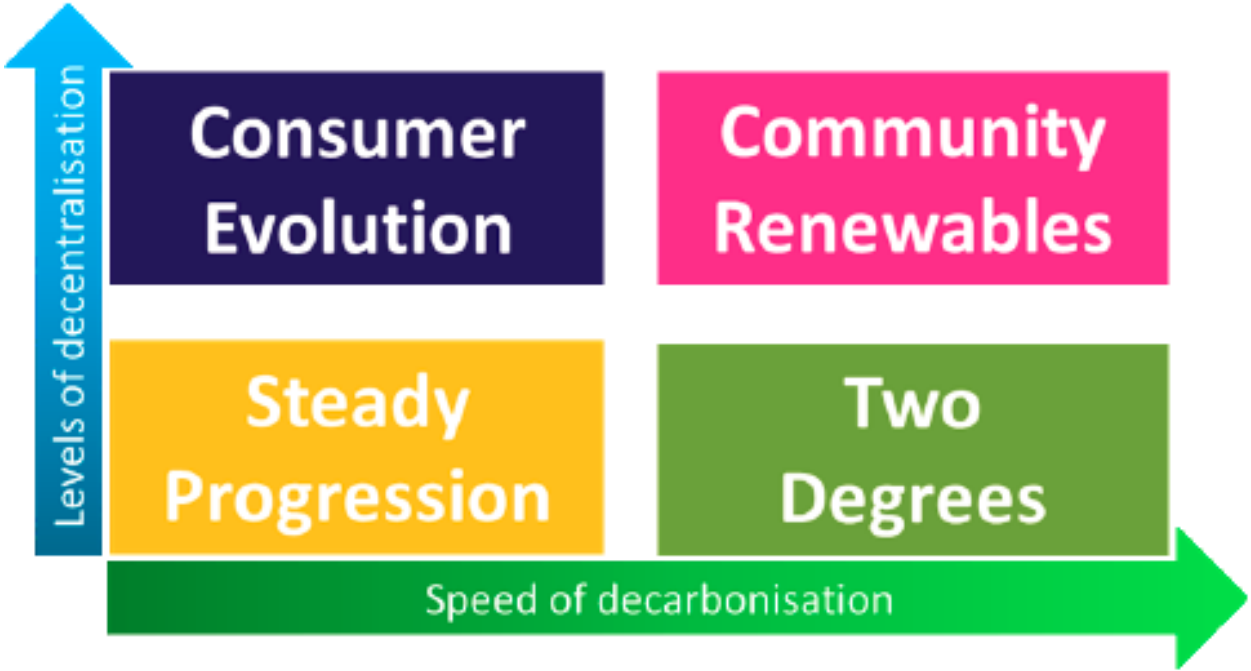
2. In some cases

3. Yes

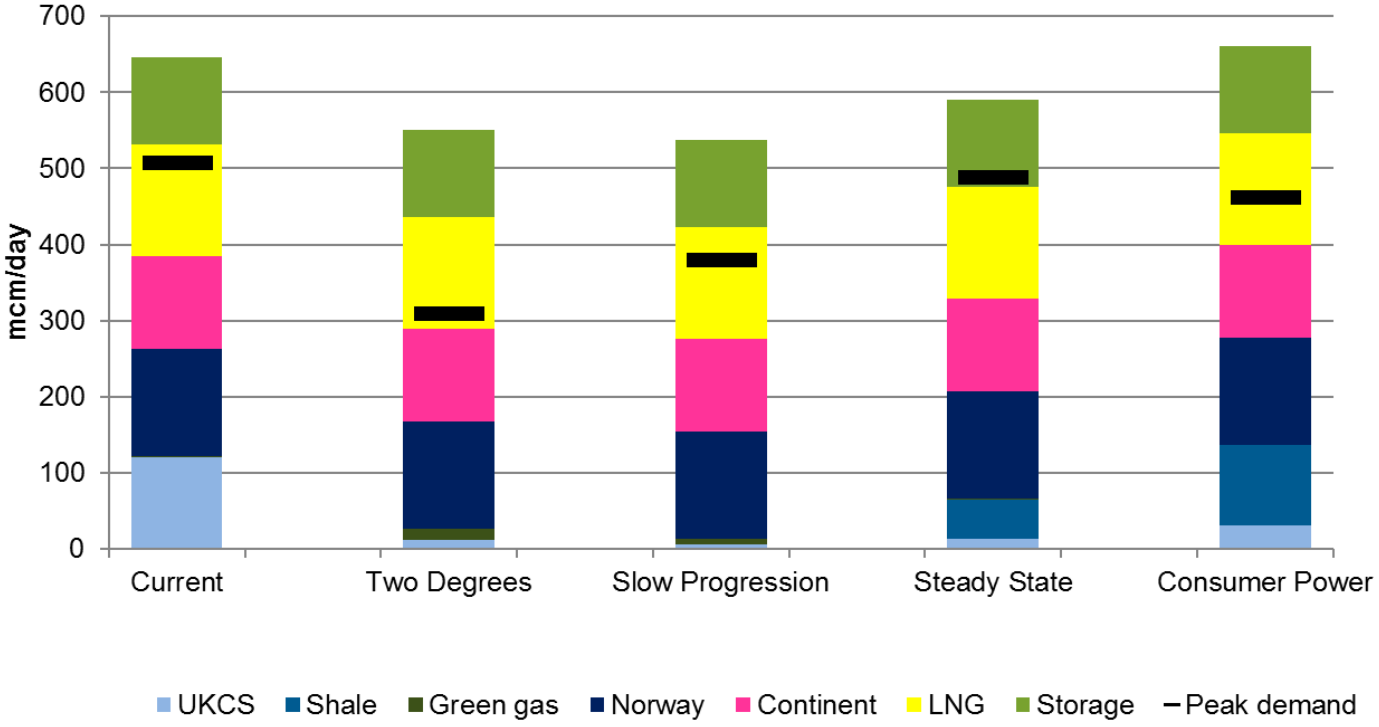
Scenarios – Our planning assumptions

- Jenny Phillips

FES helps us explore a range of credible futures and to better understand what is common and the uncertainties facing the industry



Range of potential supply mix in 2040



Source: FES17: Peak gas supply summary in 2040

Similar chart for demand is in the FoG slide

Our Approach

- FES shows a wide range of energy futures and a wide range of gas supply & demand patterns
- Looking to develop plans for the transmission network that will deliver against these scenarios
  - Mitigate risk to consumers
  - Mitigate risk to security of supply
- Use industry change plan to identify triggers to help us understand direction of travel and hence regularly review our plans

Question for discussion

1. What are your thoughts on our approach to using Future Energy Scenarios?

Voting

Our impact on you

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

1. Not impacted at all
2.
3.
4.
5. Impacted a great deal

Question 2

Q: *Do you support our approach to using Future Energy Scenarios?*

1. No

2. Unsure

3. Yes

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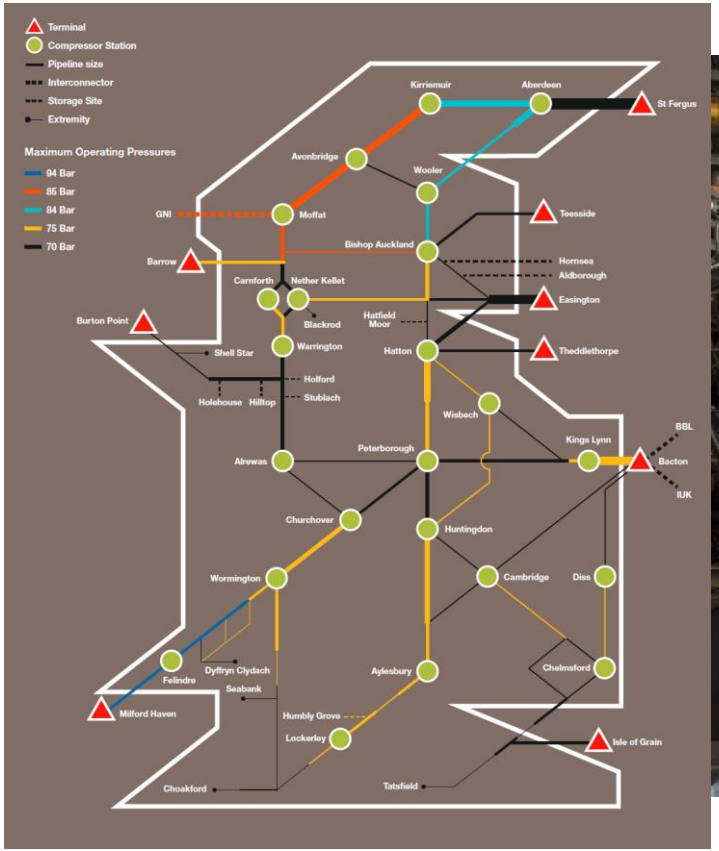
I want to move gas on and off the National Gas Transmission System, where and when I want

- Jenny Phillips

Simplified map of NTS



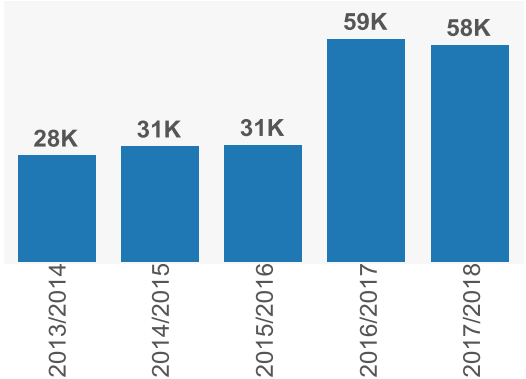
Moving gas around the NTS

We are reliant on using compression to move gas from the entry points to where it's needed.

87% **Increase in compressor running hours vs 2015/16**

- **Balance**
- **Uncertainty**
- **Reliability**

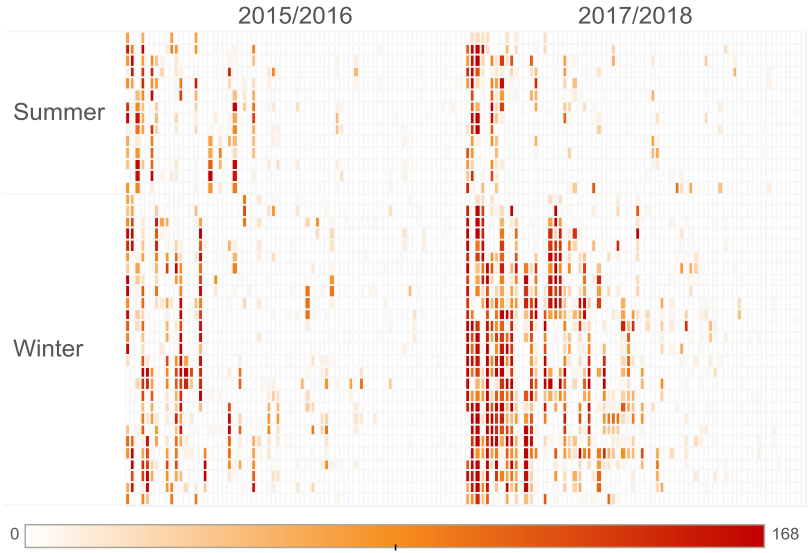
Running hours by gas year to date (Oct-Jun)



There is an environmental impact from running compressors

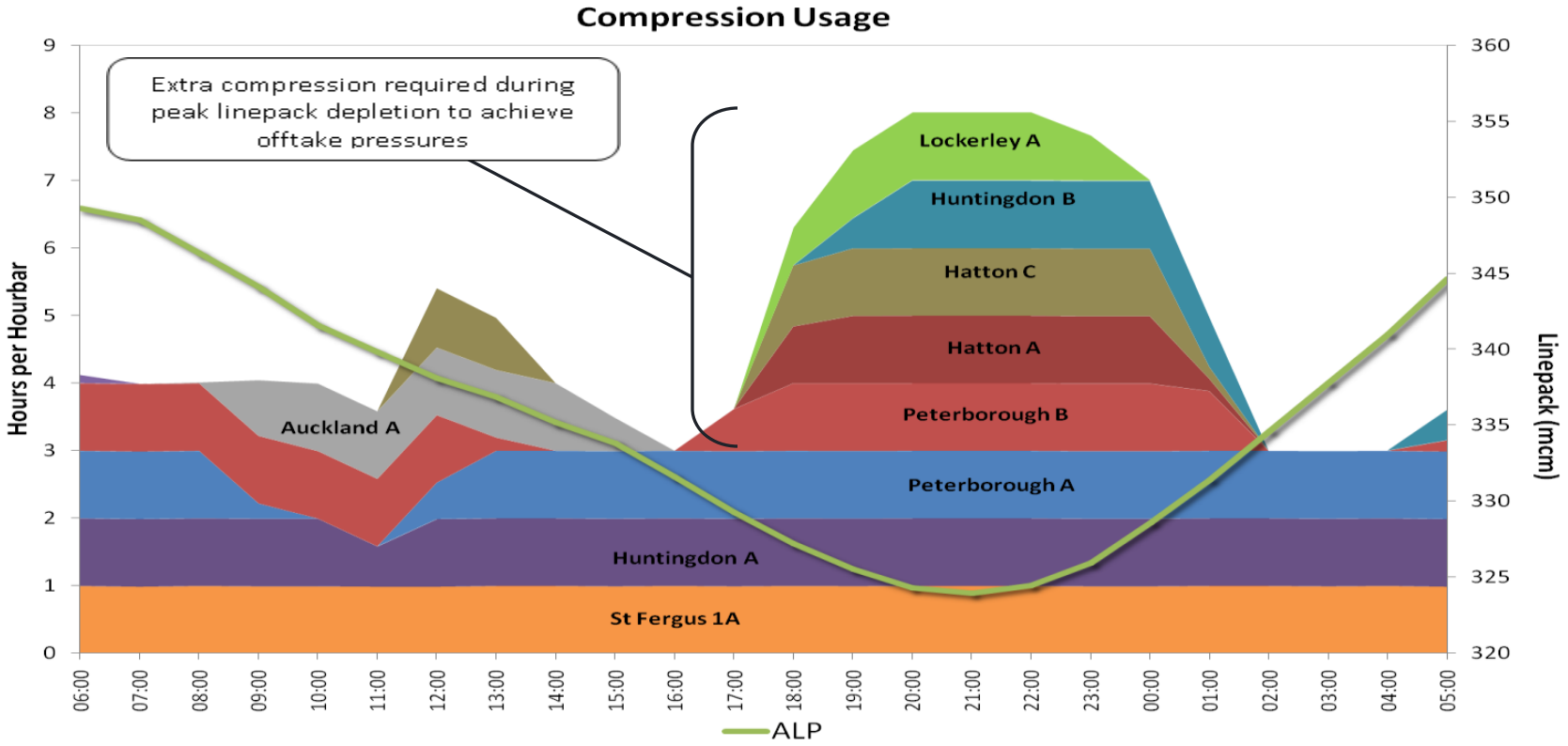
It is becoming increasingly challenging to plan and manage our outage requirements without causing customer disruption.

Running hours by site and week year to date (Oct-Jun)

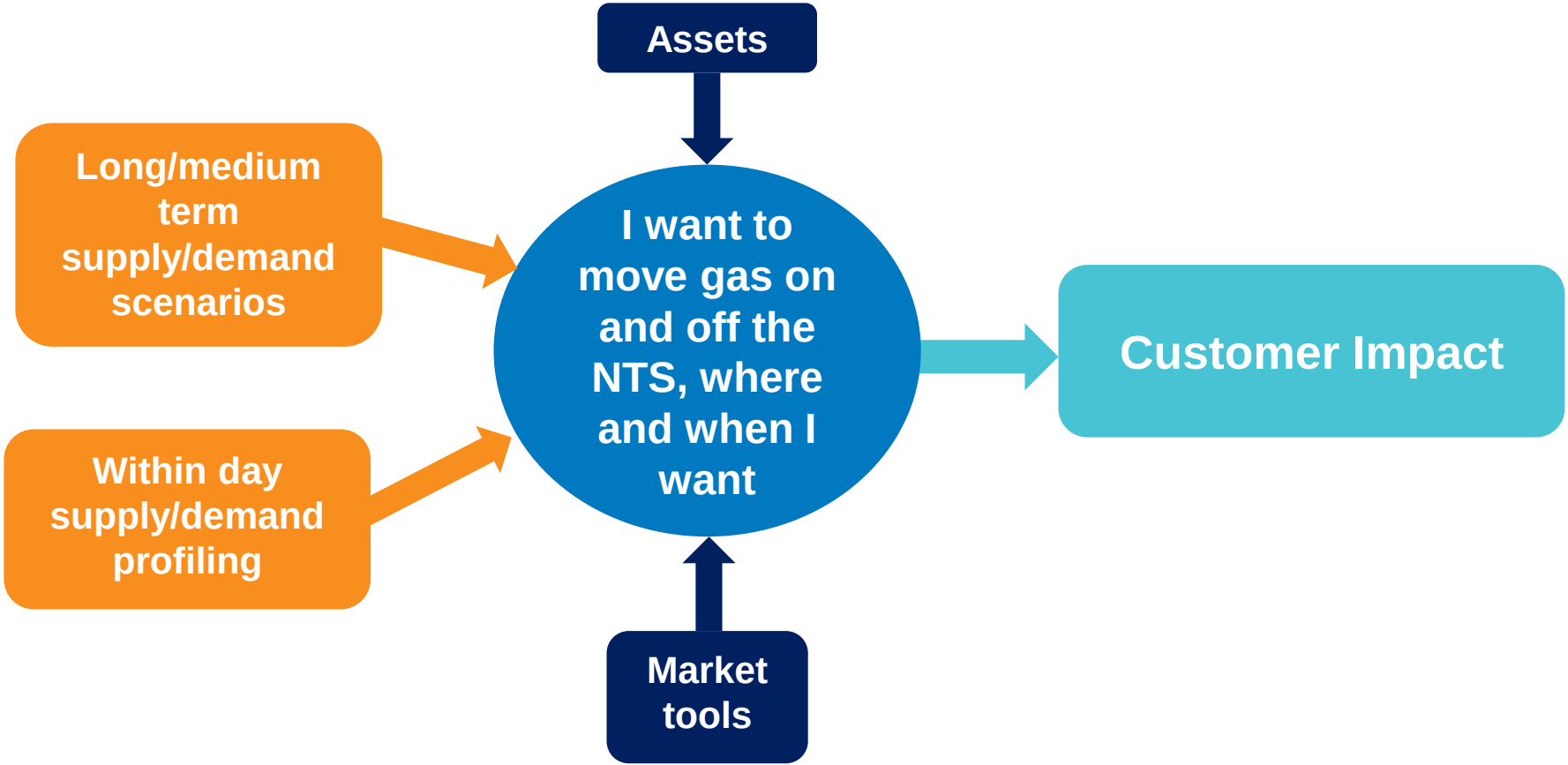


Swing Impact: Additional Compression

25th March 2014



Summary


Assets
Long/medium term supply/demand scenarios
I want to move gas on and off the NTS, where and when I want
Customer Impact
Within day supply/demand profiling
Market tools

Question for discussion

If you can’t put your gas on or take it off when and where you want, what processes are impacted?

Question for discussion

What are the different impacts?

Under current market conditions…What level of disruption would be acceptable to your business?

Question for discussion

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?

Maintenance / Supply interactions

National Grid has to maintain its assets

This has the potential to cause disruption to entry and exit flows

While we aim to minimise impact, there are certain sites where impact is inevitable

There are some site specific investments that could avoid impact

Voting

Our impact on you

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

1. Not impacted at all
2.
3.
4.
5. Impacted a great deal

Lunch

Welcome Back!

Quick Poll

- How alert are you?

  - 5: I could go for a run
  - 4
  - 3
  - 2
  - 1: I could do with a lie down

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Asset Management

- Bridget Hartley

Managing Asset Health of the Gas Transmission System

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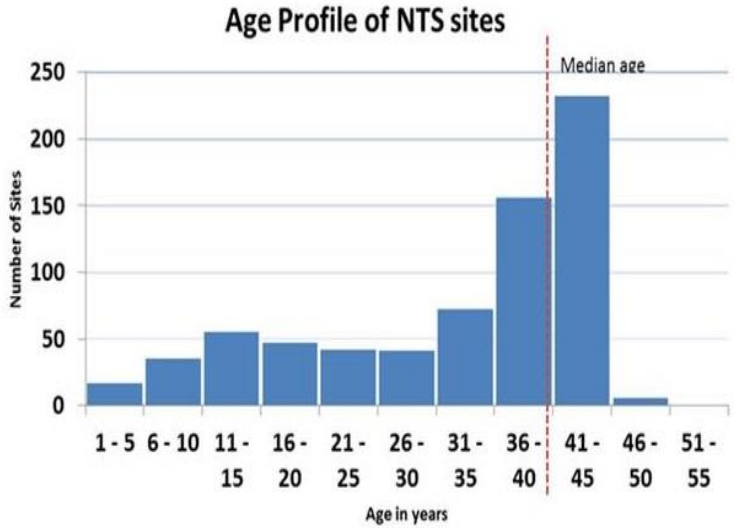
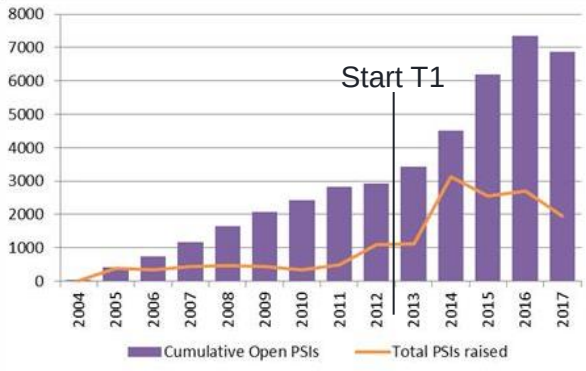
- Assets need the right interventions to:
  - Deliver the capability our consumers' and customers' need
  - Maintain safe operation

- Key focus areas to date:
  - Strengthening asset information to enable our asset management decisions
  - Efficient delivery of asset interventions, through project and contract management
  - Asset groupings are driven by the types of works, sites and contract strategy and our campaign approach.

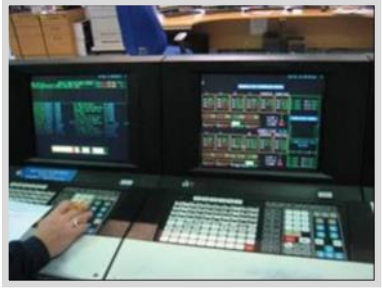


Asset condition

As we have undertaken asset health works, we now have an improved understanding of asset condition



Number of asset issues has increased significantly since the start of RIIO-T1



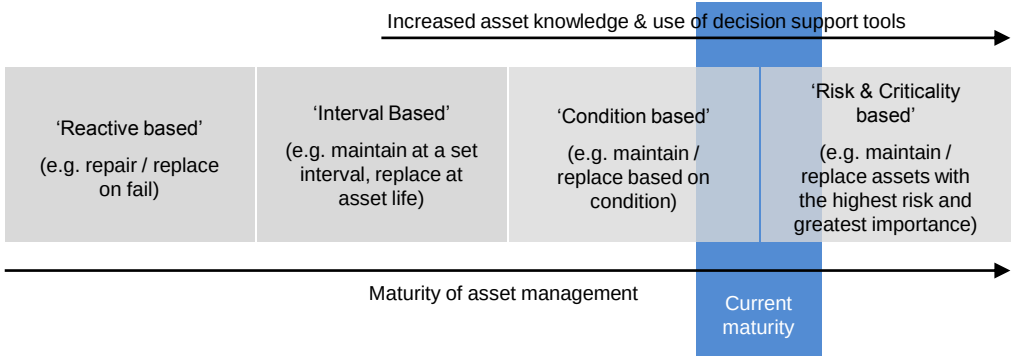
Consequence of failure?

Failure to deliver output commitments:

- **Safety**
- **Reliability**
- **Environmental**
- **Customer/Stakeholder**

Asset health strategy – How we decide what work to do

- Our plans are driven by:
  - Legislative requirements
  - Condition based assessment (focusing on critical assets, e.g. COMAH sites)
  - Interval based repairs and maintenance, i.e. compressor overhauls.



IAM Capital Investment Decision making

- Our use of Plant Status reports allows us to assess where our health spend should be targeted by assessing risk in terms of safety and reliability.
- Increase in network complexity brings in other assessments, such as compressors where there is a need to meet asset health requirements, supply and demand scenarios and environmental legislation through BAT assessments.

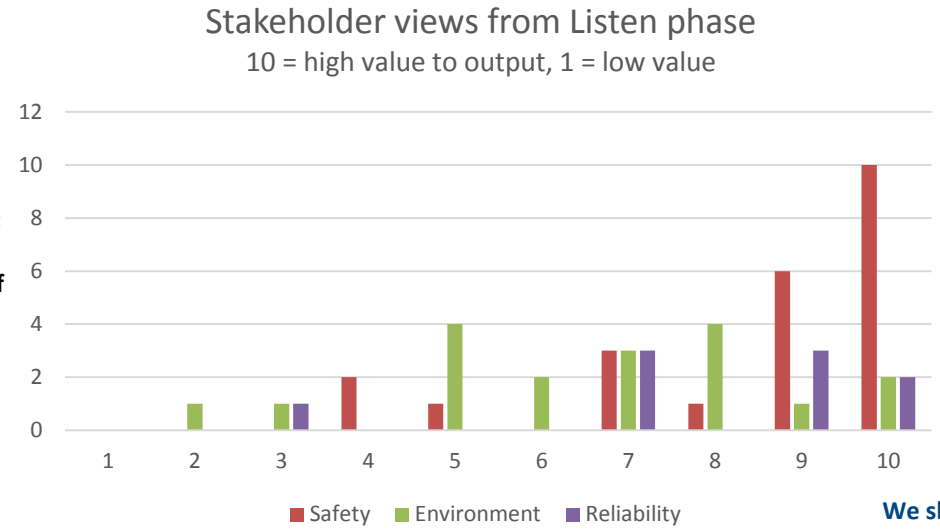
Development of new Methodology

- New approach developed and shared with Ofgem aligned to other energy utilities
- Currently in Validation, Testing and Calibration of model
- Industry consultation complete
- Implementation dependent on our data collection which will be complete in September 18

Cross Sector RIIO-T1 rebasing

- Working with Ofgem in how to translate existing RIIO-T1 targets into monetised risk
- Options being considered shared with Ofgem

Stakeholder Engagement Feedback



We should offer a range of investment scenarios based around different timescales for examining the benefit of investment. A 25 year timeframe is likely to be the optimum period

We should make investments so that we continue to operate a safe system that manages the risk to people who work with us or may be harmed by incidents on our network

We should show the costs to achieve the risk reduction, particularly where there are options about the level of service provided

National Grid should continue to invest efficiently at a level that ensures compliance with environmental legislation but not to reduce its impact on the environment

We should place greatest value in our investment planning against ensuring that we maintain the reliability of the gas supply to consumers and connected stakeholders

Application of new methodology

- This uses advanced modelling software enabling us to model almost infinite options

Category	Service Risk Measure
Safety	Health and Safety of the General Public and Employees
	Compliance with Health and Safety Legislation
Environment	Environmental Incidents
	Compliance with Environmental Legislation and Permits
	Volume of Emissions
	Noise Pollution
Availability and Reliability	Impact on Network Constraints
	Compensation for Failure to Supply
Financial	Shrinkage
	Impact on Operating Costs
Societal and Company	Property Damage
	Transport Disruption
	Reputation

Discussion question – Which additional options would you like us to?

These options will be costed

Option 1:
Keep costs the same for consumers as T1

Option 2:
Keep risk the same

Option 3:
Lowest whole lifecycle cost

Option 4:
10% increase in safety risk

Option 5:
10% reduction in safety risk

Option 6:
10% increase in environmental risk

Option 7:
10% reduction in environmental risk

Option 8:
10% increase in availability/reliability risk

Option 9:
10% reduction in availability/reliability risk

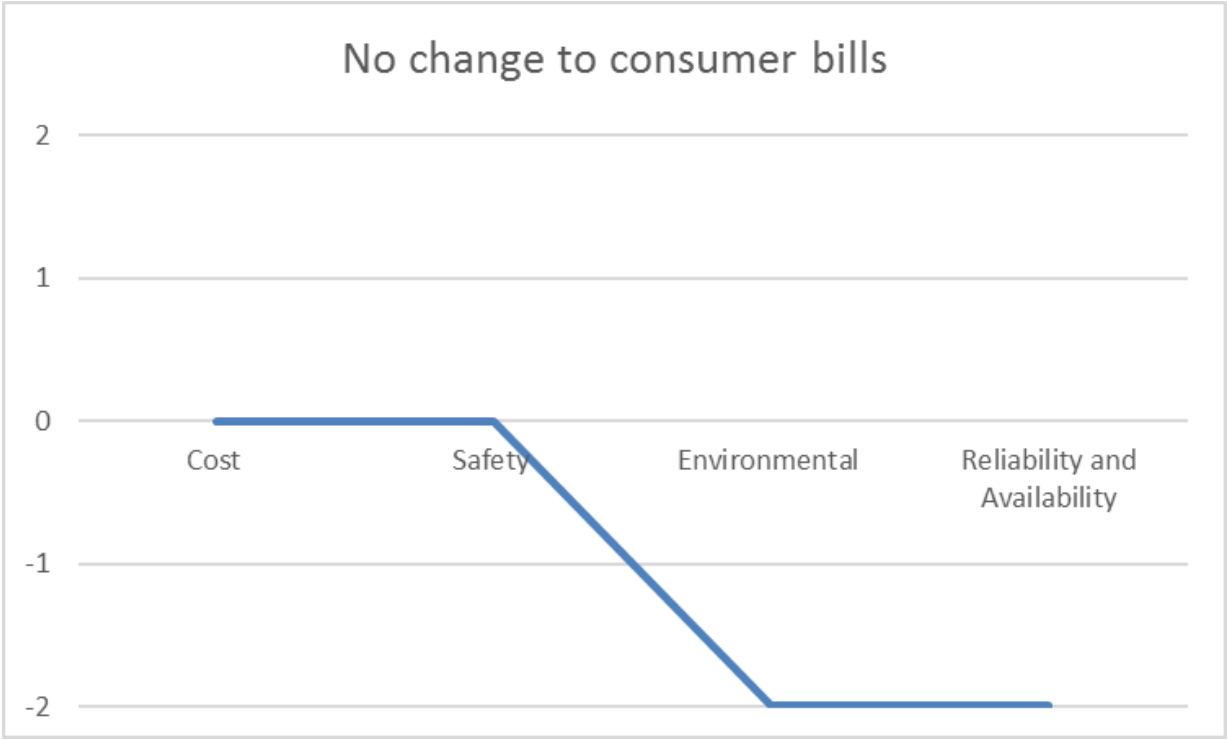
Discussion question –
Which options would you like us to develop in to costed options?

Option 1:
Keep costs the same for consumers as T1

Y Axis show Risk Performance Impact

An Example:
Positive Cost Impact = Reduced Costs

Negative Risk Impact = Increased risks across the network



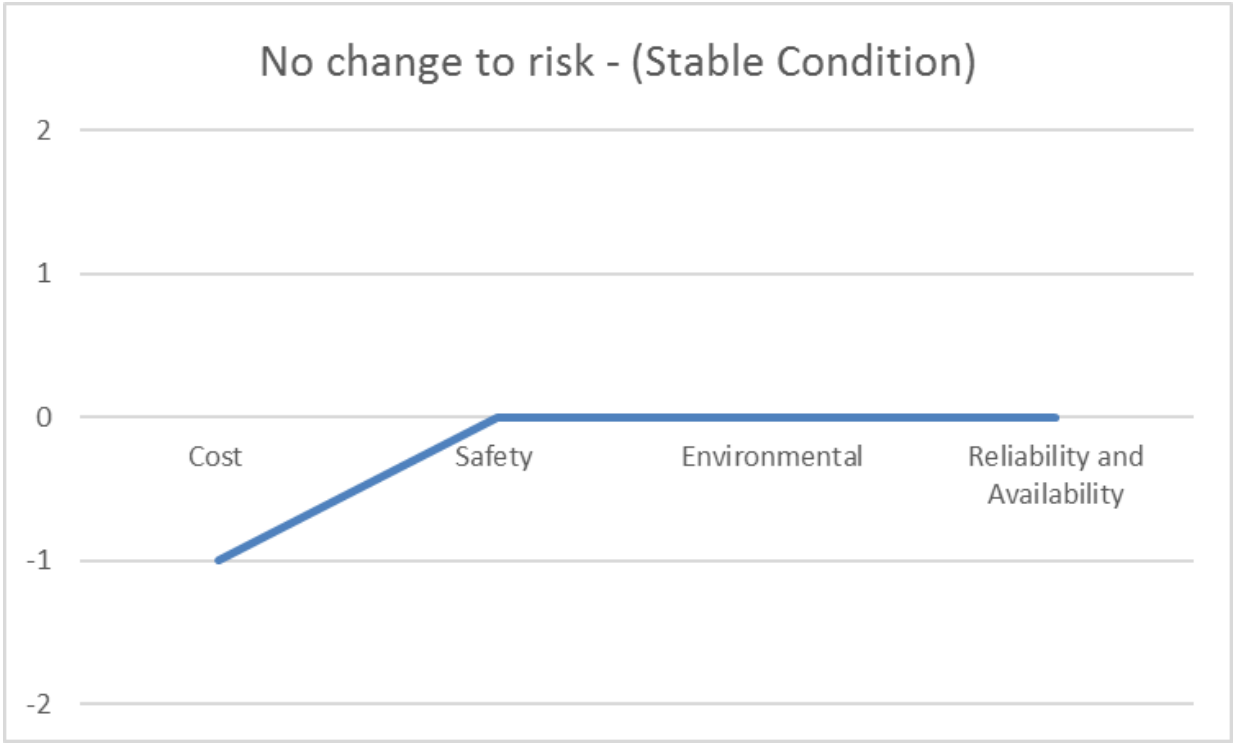
Discussion question –
Which options would you like us to develop in to costed options?

Option 2:
Keep risk the same

Y Axis show Risk Performance Impact

An Example:
Positive Cost Impact = Reduced Costs

Negative Risk Impact = Increased risks across the network



Discussion question –
Which options would you like us to develop in to costed options?

Option 3: Lowest whole lifecycle cost

Y Axis show Risk Performance Impact

An Example:
Positive Cost Impact = Reduced Costs

Negative Risk Impact = Increased risks across the network

Discussion question –
Which options would you like us to develop in to costed options?

Option 4:
10% increase in safety risk

Y Axis show Risk Performance Impact

An Example:
Positive Cost Impact = Reduced Costs

Negative Risk Impact = Increased risks across the network

Discussion question –
Which options would you like us to develop in to costed options?

Option 5:
10% reduction in safety risk

Y Axis show Risk Performance Impact

An Example:
Positive Cost Impact = Reduced Costs

Negative Risk Impact = Increased risks across the network

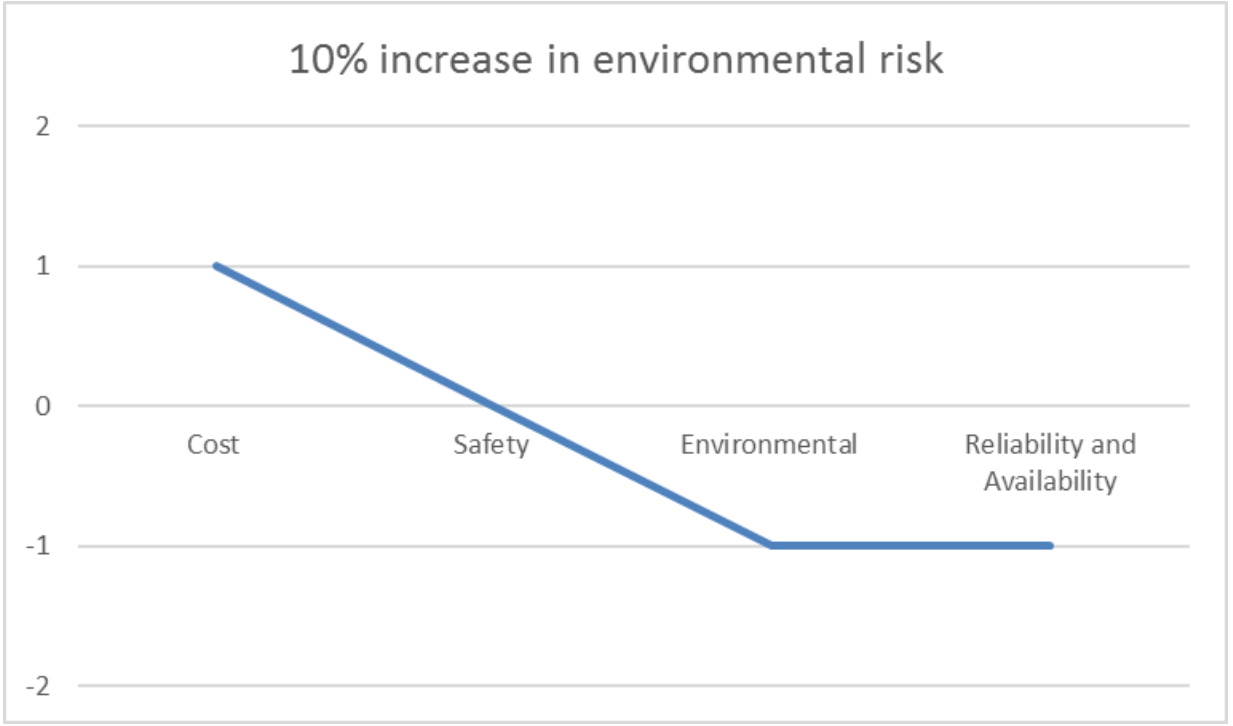
Discussion question –
Which options would you like us to develop in to costed options?

Option 6:
10% increase in environmental risk

Y Axis show Risk Performance Impact

An Example:
Positive Cost Impact = Reduced Costs

Negative Risk Impact = Increased risks across the network



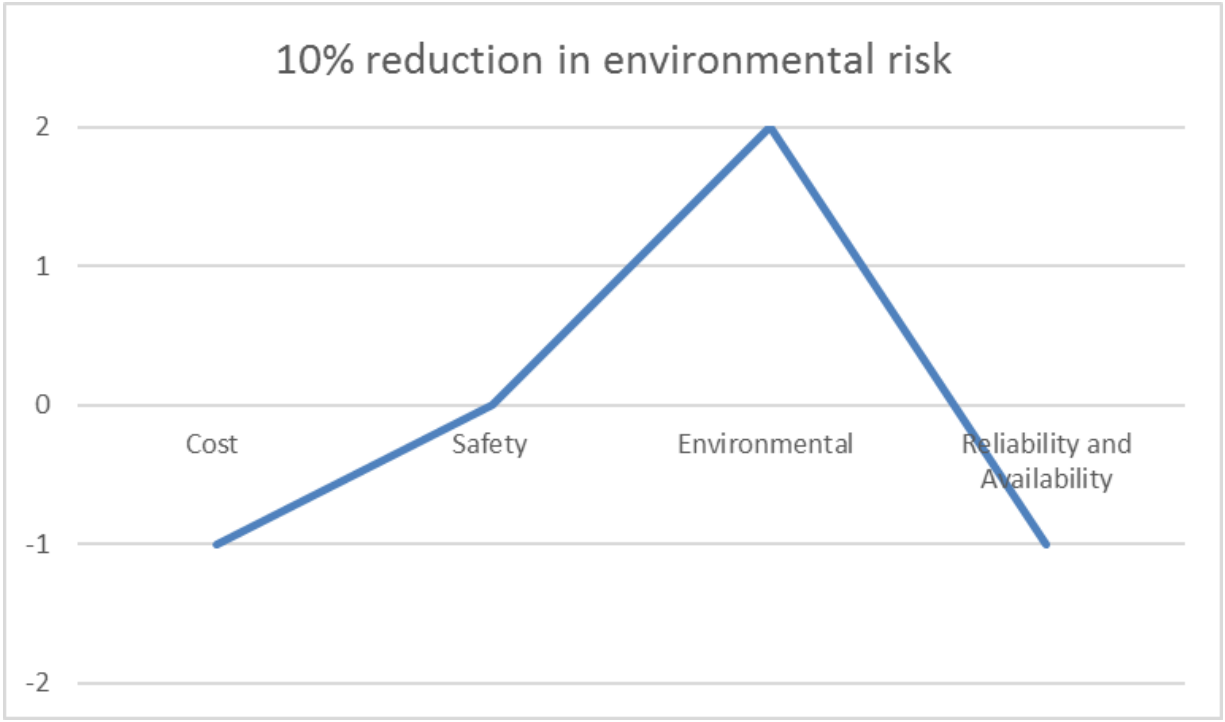
Discussion question –
Which options would you like us to develop in to costed options?

Option 7:
10% reduction in environmental risk

Y Axis show Risk Performance Impact

An Example:
Positive Cost Impact = Reduced Costs

Negative Risk Impact = Increased risks across the network



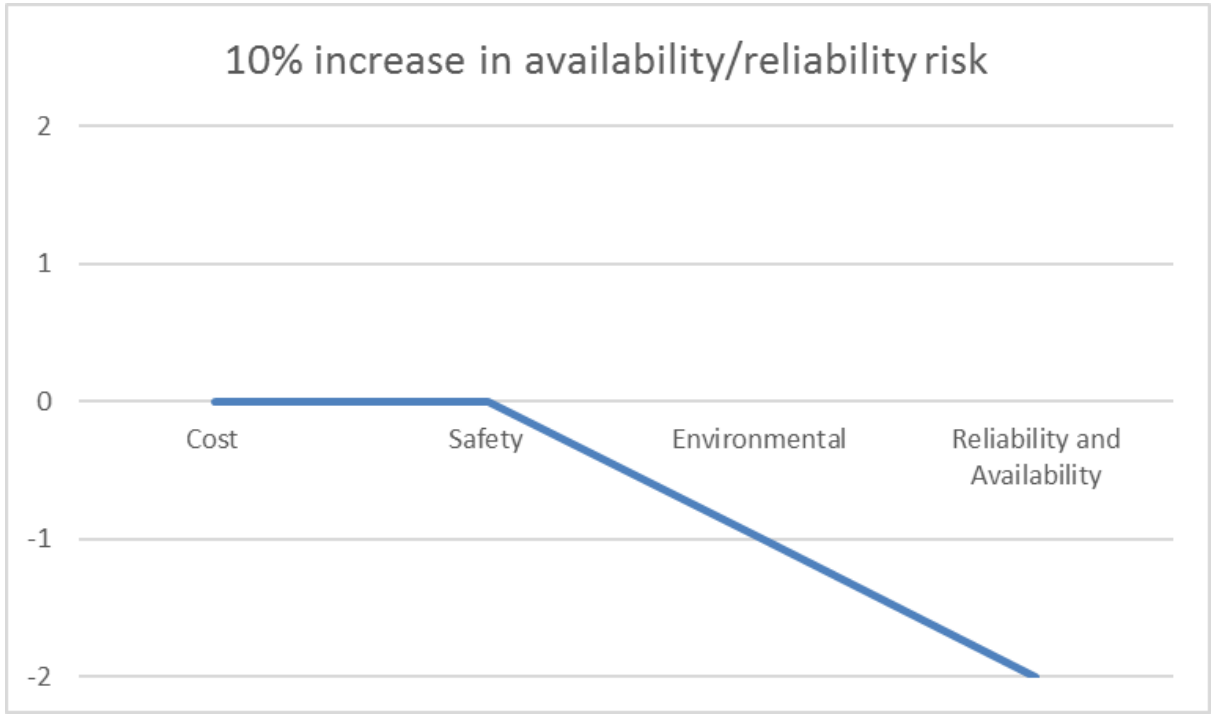
Discussion question –
Which options would you like us to develop in to costed options?

Option 8:
10% increase in availability/reliability risk

Y Axis show Risk Performance Impact

An Example:
Positive Cost Impact = Reduced Costs

Negative Risk Impact = Increased risks across the network



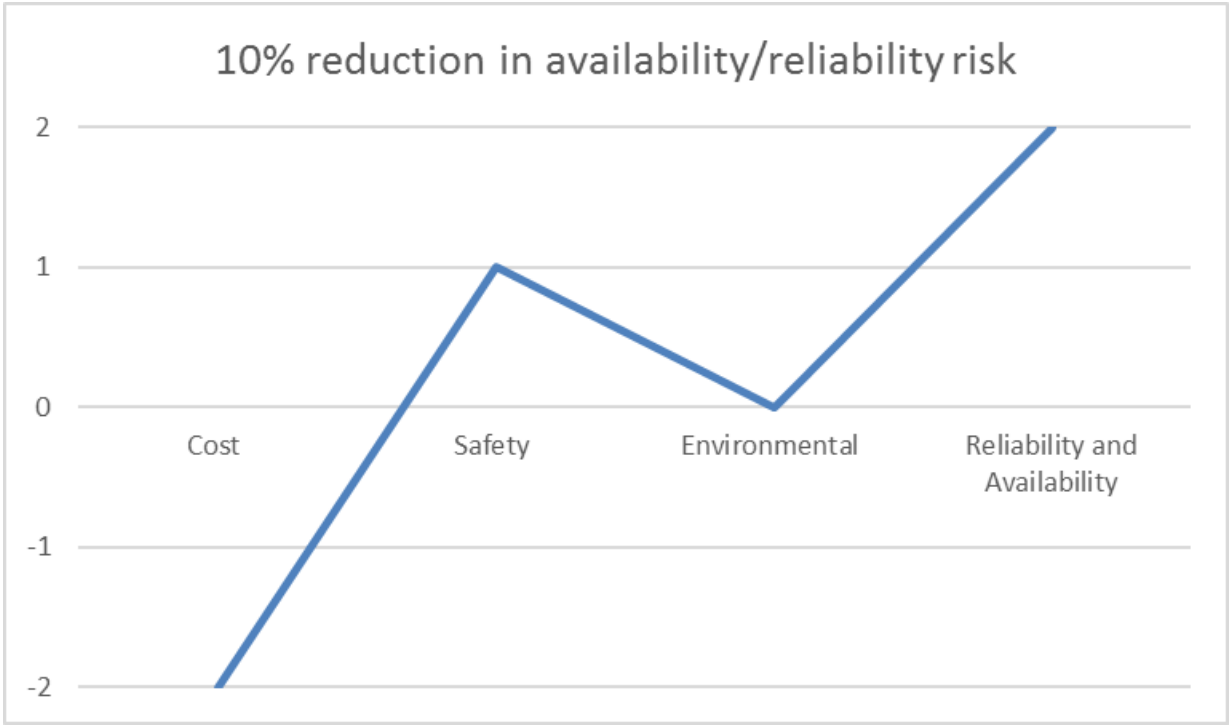
Discussion question –
Which options would you like us to develop in to costed options?

Option 9:
10% reduction in availability/reliability risk

Y Axis show Risk Performance Impact

An Example:
Positive Cost Impact = Reduced Costs

Negative Risk Impact = Increased risks across the network



Question for discussion

Which options would you like us to model and turn in to fully costed options?

Over what period of time should we test our investment plans to demonstrate benefit to consumers?

Voting

Our impact on you

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

1. Not impacted at all
2.
3.
4.
5. Impacted a great deal

Question 3

Q: *Are the default options the correct options?*

1. Yes

2. Unsure

3. No

Question 4

Q: *Is 25 years the right period of time to test our investment plans to demonstrate benefit to consumers?*

1. Too short
2. About right
3. Too long

What we will do next with your input:

- Collate results from this and other stakeholder engagement events
- Determine Stakeholder preferences for modelling focus
- Model options with stakeholder influenced modelling approach
- Present costed options back to Stakeholders in Autumn

Responsible removal of redundant assets

- Bridget Hartley

Environmental Requirements - Process

Remove environmental hazards that potentially risk polluting the land (and to an extent other environmental media)

Remove/ Remediate pollution which may have occurred during the life of the permit

Demonstrate that the site is in the same state as at the start of the permit

What do we mean by…

Decommissioning

Isolate / Mothball

- Plant and equipment is separated from every source of energy
- A positive isolation from the NTS and the Customer, involving a physical air-gap between the two assets
- Ongoing maintenance needed

Demolish

- Redundant assets have been fully removed from the site
- Useful spares have been harvested
- Land returned to brownfield/ greenfield and potential alternative use where possible.

New Build

- Having removed the asset, a new asset is required in the future

Relative costs of 100km Pipeline

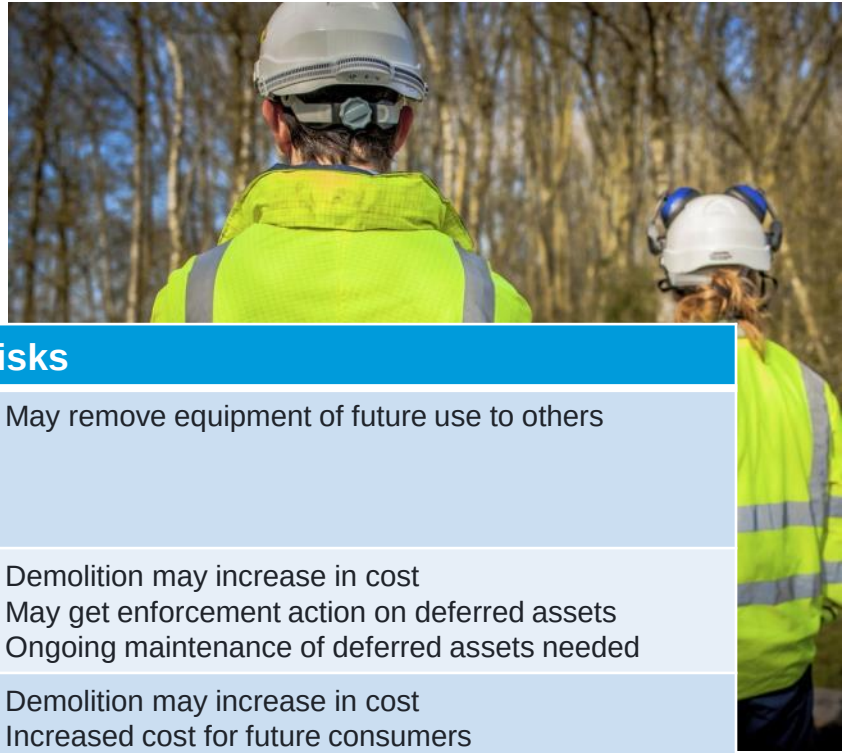
x1	X 88	X 124

Relative costs for a Compressor

X 1	X 17	X 333+

When should we do this work?

- Timing needs consideration
  - Managing operational risks
  - Which consumers should pay?
  - Can we or others re-use assets?
  - Phasing of work & decisions



Option	Benefits	Risks
Deliver all in T2	• Current consumers fund removal of assets they benefited from • No ongoing risk to manage • No ongoing maintenance costs	• May remove equipment of future use to others
Prioritise high risk projects and maintain remaining	• Costs are split between current and future consumers • Lower costs in T2	• Demolition may increase in cost • May get enforcement action on deferred assets • Ongoing maintenance of deferred assets needed
Defer all works and manage risk	• Minimises costs in T2	• Demolition may increase in cost • Increased cost for future consumers • Significant maintenance costs required to manage risk • Likely to get some enforcement action

Question for discussion

Q1: What are the implications of each option to:

- Customer
- End consumer
- Local community

Deliver all in T2	Prioritise high risk projects and maintain remaining	Defer all works and manage risk

Q2: What factors should we consider when we no longer require assets for operational use?

Voting

Our impact on you

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

1. Not impacted at all
2.
3.
4.
5. Impacted a great deal

Question 5

Q: *As a principle should current or future consumers pay for demolition of assets that are no longer required for operational use?*

1. Deliver all in T2
Increased costs for current consumers

2. Prioritise projects based on risk and maintain remaining
Cost is shared between current and future consumers

3. Defer all works and manage risk
Majority of cost is picked up by future consumers

Information Provision

- Jenny Phillips

Scope of today

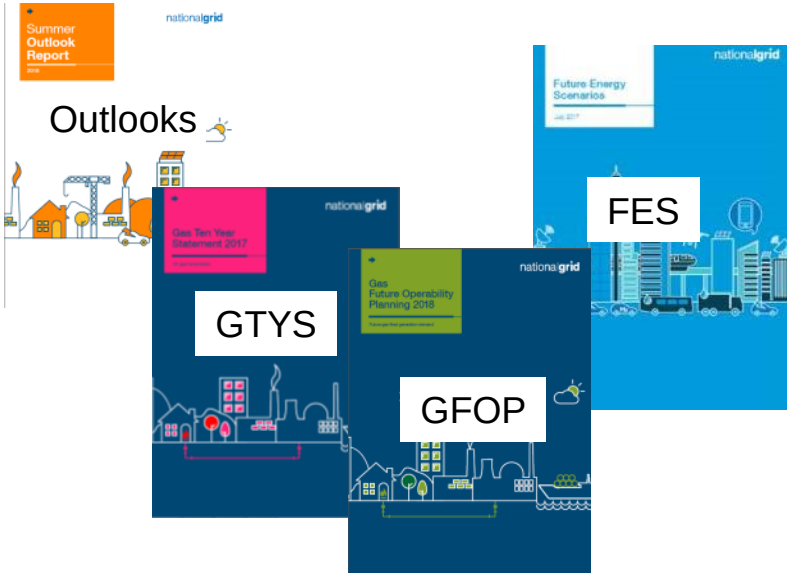
In scope

Close to real time operational data

	Timing of Availability				
	Before the day	On the day	Instantaneous	After the day	Current Platform
Supply	✓	✓	✓	✓	Gemini/MIPI
Demand	✓	✓		✓	Gemini/MIPI
NTS Linepack (PCLP)	✓	✓		✓	Gemini/MIPI
Capacity		✓		✓	Gemini/MIPI
Weather		✓		✓	MIPI
Shrinkage				✓	Gemini/MIPI
Commercial Nominations	✓	✓			Gemini/MIPI
Price	✓	✓		✓	Gemini/MIPI
Pressure					
Gas Quality					

Out of scope

Medium to long term information



Voting

Our impact on you

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

1. Not impacted at all
2.
3.
4.
5. Impacted a great deal

Questions for discussion

What operational processes do you run that are dependent on National Grid data / information / insight?

What decisions do you make that are dependent on National Grid data?

When you view operational data, do you view it in its original source?

What do you value / what are you trying to solve by having visibility of National Grid decisions being made?

Question for discussion

What do you view as our key systems and what aspects of those systems do you value?

For the key means by which you gather data today, are there any aspects you would propose we improve or take-away?

Question for discussion

Against the categories of data / information / knowledge that we currently provide, are there any factors that you would start / continue/ enhance?

Are there any data / information / knowledge areas we don't currently provide that you would value?

Q&A

Poll - Knowledge of our operational activities

- *On a scale of 1 to 5, where 1 is know nothing and 5 is know a great deal, how much would you say you know about National Grid's operational activities?*

1. Know nothing
2.
3.
4.
5. Know a great deal

Able to contribute?

Q: B*ased on all of the information available to you and thinking about the workshop as a whole, were you able to contribute to today's topics?*

1. Yes	2. Some what	3. No

- And finally, what three words would you use to describe National Grid Gas Transmission?

What happens next

- Our commitment
  - We'll process everything you've told us today
  - We'll combine what we've heard today with the outcomes of the other regional and terminal events and send it to you by the end of July
  - We'll ask our Stakeholder Group to scrutinise this and we'll use it to form our RIIO-2 business plan
  - We'll publish our plan and all updates on our website, and keep you informed through our webinars and newsletters

How to get in touch…

- Jennifer Pemberton – Stakeholder Strategy Manager: Jennifer.Pemberton@nationalgrid.com
- Bridget Hartley – Gas Transmission Owner RIIO2 Manager: Bridget.Hartley@nationalgrid.com
- Jenny Phillips – Gas System Operator RIIO2 Manager: Jenny.Phillips@nationalgrid.com

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