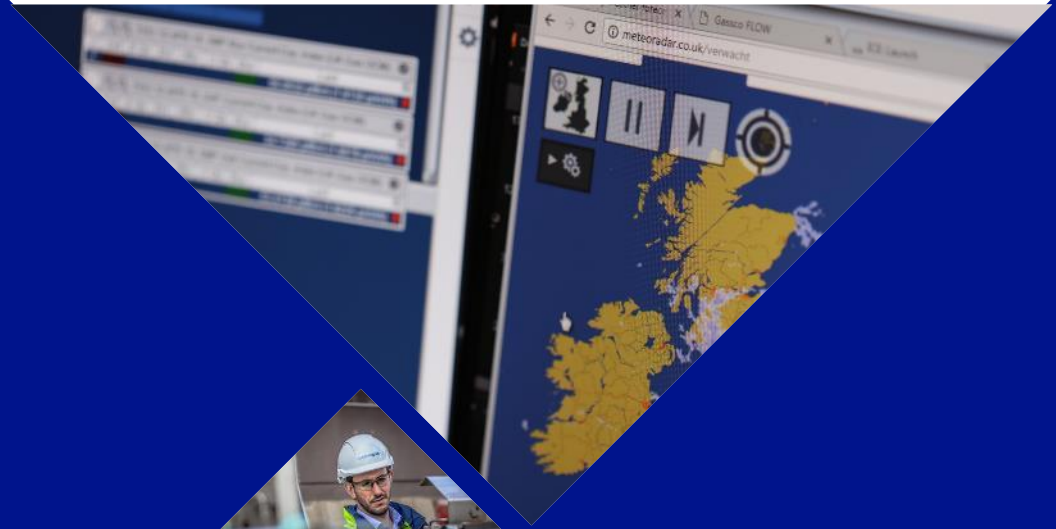
Gas Transmission

Asset Health

Shaping the Gas Transmission System

28 June 2019



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Thank you for joining us

Bridget Hartley

Business Planning and Strategy Manager

Bridget.Hartley@nationalgrid.com

Jenny Pemberton

Stakeholder Engagement Manager

Jennifer.Pemberton@nationalgrid.com

Today we're going to update you on our asset health programme…

Update you on engagement with consumers and OFGEM…

…share our proposals for our upcoming business plan…

…and finally we'll ask you for your view.

Logistics

- Should last for approximately an hour
- Polling via Webex
- Your questions are welcomed throughout via chat function
- All callers will be placed on mute

Quick Poll – Getting to know you

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

2. On a scale of A to E, where A is know nothing and E is know a great deal, how much would you say you know about National Grid's operational activities?

A. Know nothing

B.

C.

D.

E. Know a great deal

Gas Transmission

01

Network Context

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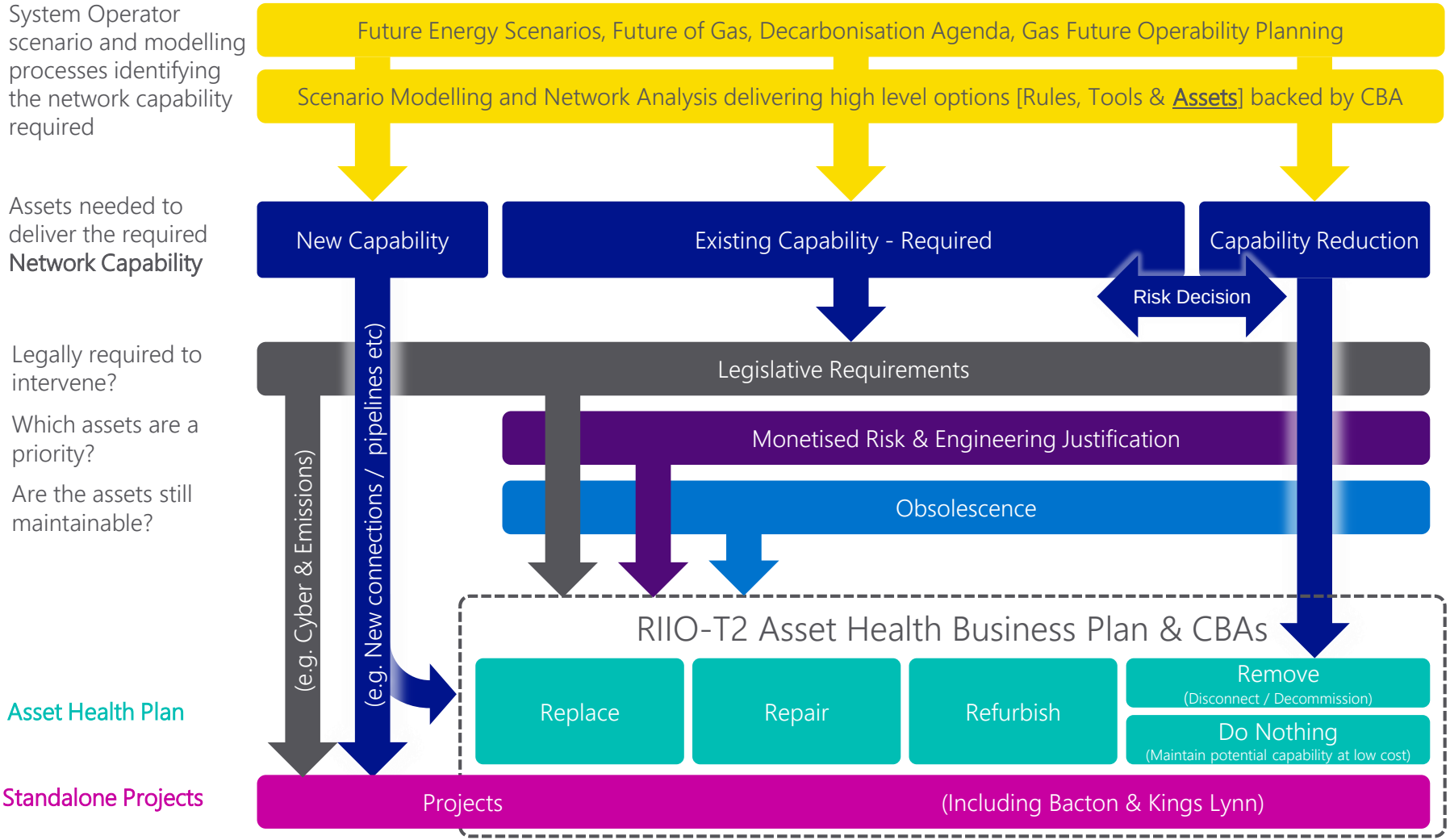

System Operator scenario and modelling processes identifying the network capability required
Future Energy Scenarios, Future of Gas, Decarbonisation Agenda, Gas Future Operability Planning
Scenario Modelling and Network Analysis delivering high level options [Rules, Tools & Assets] backed by CBA
Assets needed to deliver the required Network Capability
New Capability
Existing Capability - Required
Capability Reduction
Risk Decision
Legally required to intervene?
Legislative Requirements
Which assets are a priority?
Monetised Risk & Engineering Justification
Are the assets still maintainable?
Obsolescence
(e.g. Cyber & Emissions)
(e.g. New connections / pipelines etc)
RIIO-T2 Asset Health Business Plan & CBAs
Asset Health Plan
Replace
Repair
Refurbish
Remove
(Disconnect / Decommission)
Do Nothing
(Maintain potential capability at low cost)
Standalone Projects
Projects
(Including Bacton & Kings Lynn)

Network Capability: The capability of the network can be measured by its ability to accommodate levels of gas flows onto and off the network.

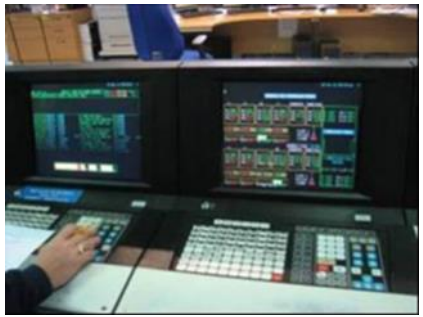
	The July draft business plan takes account of or measures:	We intend to engage further on how we describe or measure:
Entry and exit flows	✓	✓
Pressure levels and ranges	✓	✓
Exceptional winter obligations	✓	✓
Long term supply and demand changes	✓	✓
Flow profiling	✓	✓
Asset data	✓	✓
Capacity baselines	✓	✓
Commercial arrangements	✓	✓
Boundary transfers	✓	✓
Environmental obligations	✓	✓
Customer driven changes to flows		✓

Impact of network capability on our business plan

In our July draft business plan, our asset proposals are based on the network capability we believe you need.

The work we need to do to manage those assets, can be broken down into the following categories:

Asset health



Cyber resilience

Environmental impact

Gas Transmission

02

Asset Health background

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Asset Health – Background

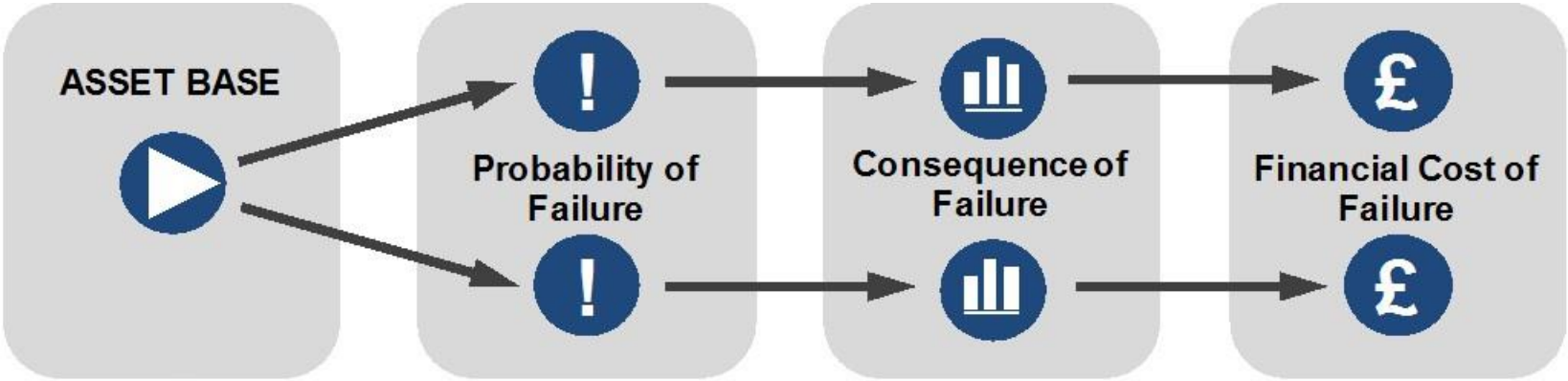
What is it?

- ~65% of our assets will be over 40 years old by the end of RIIO 1 and therefore past their design life
- We're managing this through condition monitoring and increased maintenance
- Parts and skills are becoming difficult to source for some of these assets

Why it's important?

- Maintaining these assets ensures a reliable and safe National Transmission System
- More interventions are being needed leading to increased costs

NARMS: A reminder

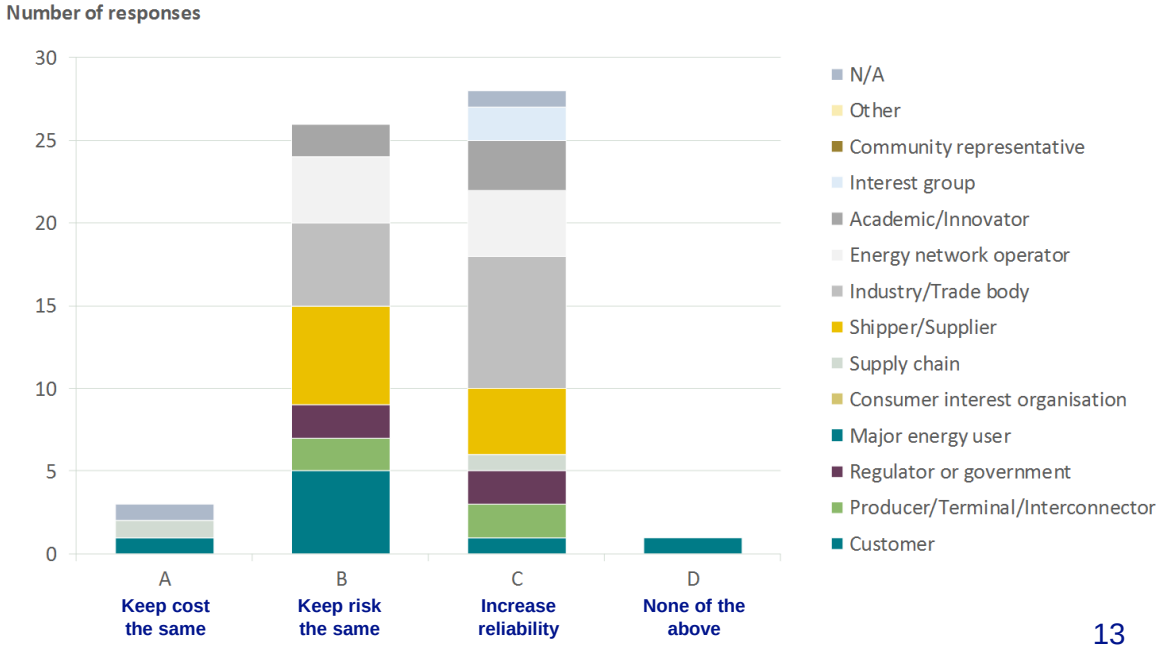


- Network Asset Resilience Metric: allows us to assign a common value across all the risk areas on the network creating MONETISED RISK
- Based on the principles of monetised risk we can forecast cost, risk and service performance of the assets in the long term
- Enables more transparent reporting and more holistic decision making, leading to more efficient spend

Asset Health – Summary of what you told us:

- Increased risk to safety and the environment is not acceptable

- There is strong support for both keeping risk the same as T1 and increasing reliability by 10%
- You want us to continue pursuing how we can future proof the Gas Transmission System
- You want to see a reduced cost to consumer option



Gas Transmission

03

Consumer engagement update

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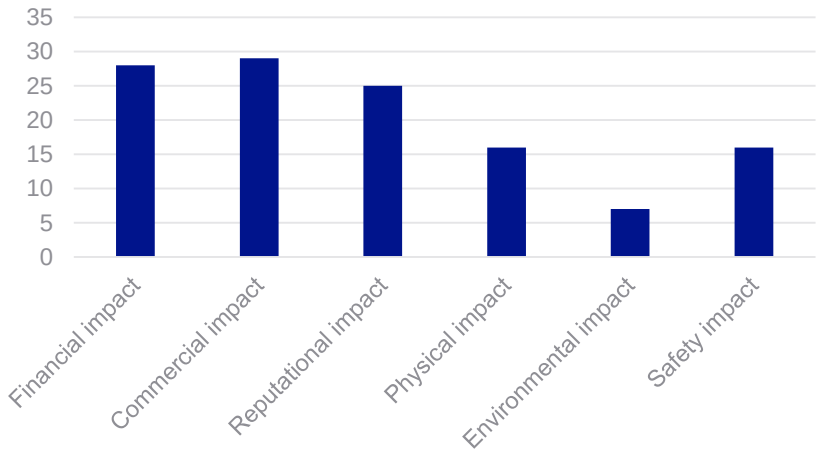
Consumer engagement

Willingness to pay (Quantitative)	We have undertaken a nationally representative research study to understand consumers (Domestic and non-domestic) views on a number of topics including interruptions to their gas supply	If Transmission reliability levels were to fall below current levels, consumers would expect a significant reimbursement on their bills to compensate: • Domestic consumers would expect to be reimbursed by £6.31 per year (Current average gas bill: £9 per year) • Non-Domestic consumers would expect to be reimbursed by £46.10 per year
Consumer listening (Qualitative)	This is an independently facilitated session designed to understand what consumers think about key topics including levels of reliability of the Gas Transmission System	• Reliable supply of gas ranked No 1 across all social economic groups • Consumers expect us to keep a safe reliable supply of gas. They don't want to have to think about it.

Consumers take for granted an uninterrupted, safe gas supply.

Major Energy Users: What impact will you see if you can't use gas when you want?



63% Can cope with a level of reduced gas supply

37% Can NOT cope with any sort of disruption of gas supply

24/7 production requirements

irreparable damage to the facility

Without gas many schools could be forced to close during winter.

impacts on biogas generation through difficulty with running anaerobic digestion without gas boilers

Gas is used as a process input as well as for combustion and as such is crucial to us.

Gas Transmission

03

Asset Health – Options

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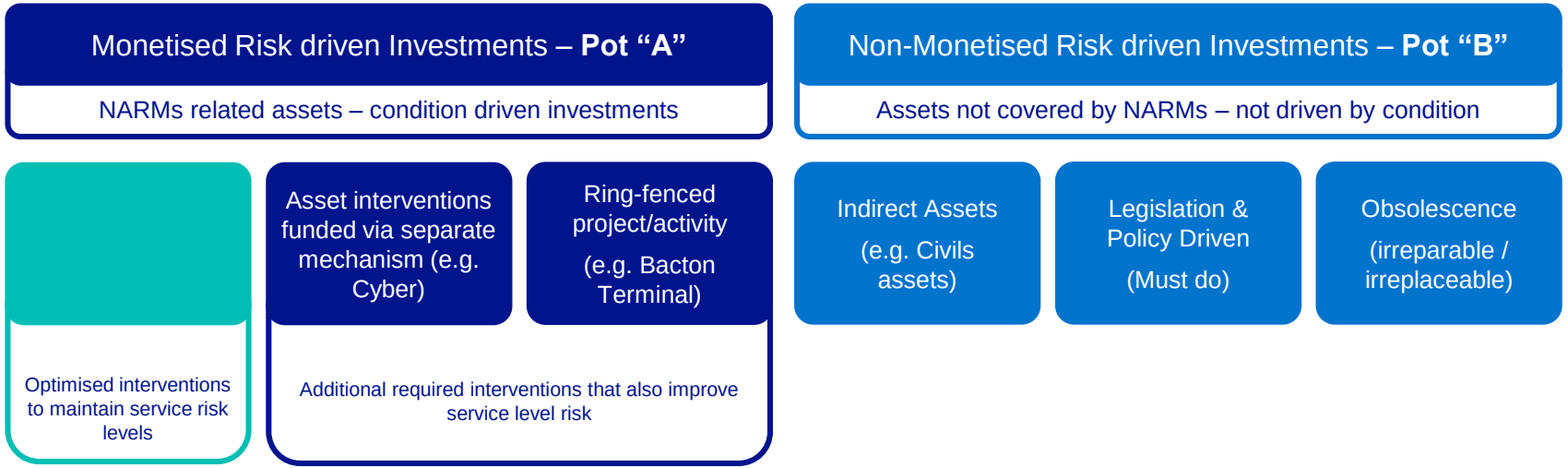
The options – A reminder

	Option	Ten year T2 spend £m	Indicative £/consumer bill / year	Health and safety risk	Availability & Reliability risk	Environmental risk
Default options	Keeping cost the same	812	0.07	Same (at risk)	Likelihood of incident increased by 32%	Likelihood of incident increased by 4%
	Keeping risk the same	1,218	0.11	Same	Same	Same
Requested by stakeholders	Increasing reliability by 10%	1,243	0.11	Same	Likelihood of incident reduced by 10%	Same
	Reduced cost to consumer	731	0.07	Same (at risk)	Likelihood of incident increased by 38%	Likelihood of incident increased by 5%

Numbers using 17/18 figures

Asset Health Plan Components



Proposal in July business plan

Option	Ten year T2 spend £m	Indicative £/consumer bill / year	Health and safety	Availability & Reliability	Environment
Keep risk the same	1,218	0.11	Same	Same	Same
Keep risk the same Plus*	1,623	0.15	Same	Same	Same

***Above figures show risk levels within 'Asset interventions driven from direct impact on Service Risk' category.**

Additional benefits will be seen that are not articulated here including reduction in site Health and Safety risk (66% reduction in risk) and reduction in transportation disruption (16% reduction in risk)

Numbers using 17/18 figures

We are looking at future proofing the NTS

- **HyNTS**
  - Feasibility of Hydrogen in the NTS
  - Project Cavendish
  - Aberdeen Vision
  - Hydrogen Hub

- **Review of other hydrogen projects**
  - Gasunie: Hydrogen Pipeline (12.4km pipeline, 70% H_2: 30% CH_4 ~35bar)
  - Snam: Successful hydrogen (5%) and natural gas blend into transmission network to industrial users
- **Challenge to supply chain to look at new technology**
- **Alternative uses for the NTS – Including CCS**

Summary

We will use FES scenarios

- Legislative requirements
- Obsolescence
- Monetised risk and engineering justification

We will deliver a Gas Transmission System that meets the needs of stakeholders and consumers:

Keep risk the same (plus)

Questions

Quick Poll – Impact and Interest

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

A. Not impacted at all
B.
C.
D.
E. Impacted a great deal

On a scale of A to E, where A is not interested at all and E is interested a great deal, how interested are you (or those you represent) by what we've just spoken about?

A. Not interested at all
B.
C.
D.
E. Interested a great deal

Quick Poll…

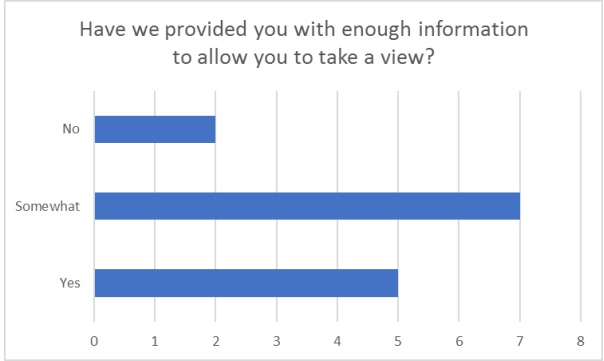
Have we provided you with enough information to allow you to take a view?

A. Yes

B. Somewhat

C. No

Please give a reason for your answer



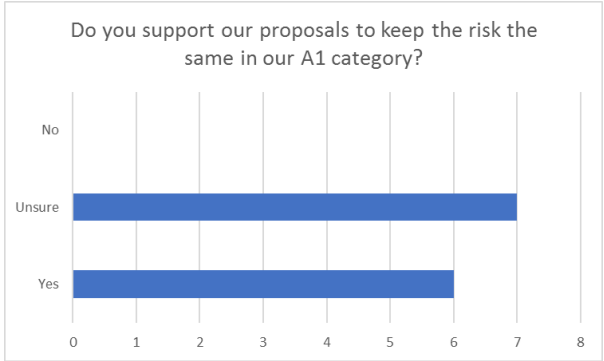
Do you support our proposals to keep the risk the same in our A1 category?

A. Yes

B. Unsure

C. No

Please give a reason for your answer



Quick Poll…

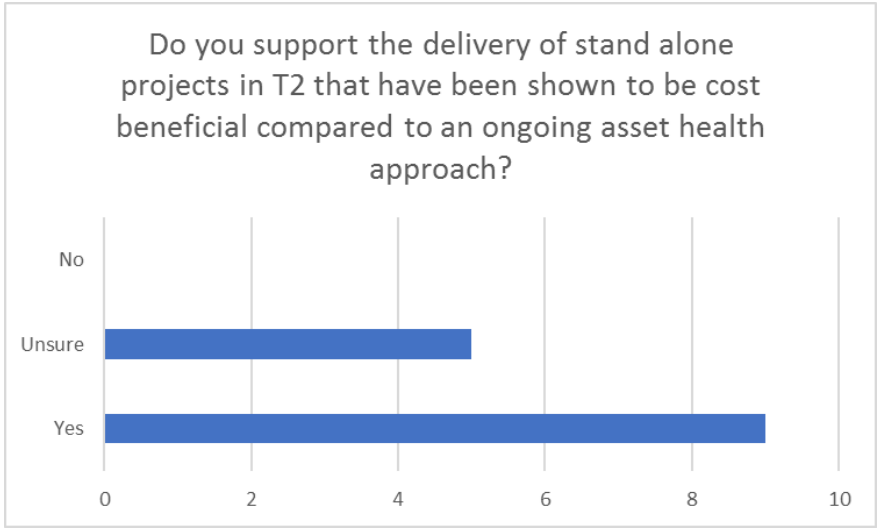
Do you support the delivery of stand alone projects in T2 that have been shown to be cost beneficial compared to an ongoing asset health approach?

A. Yes

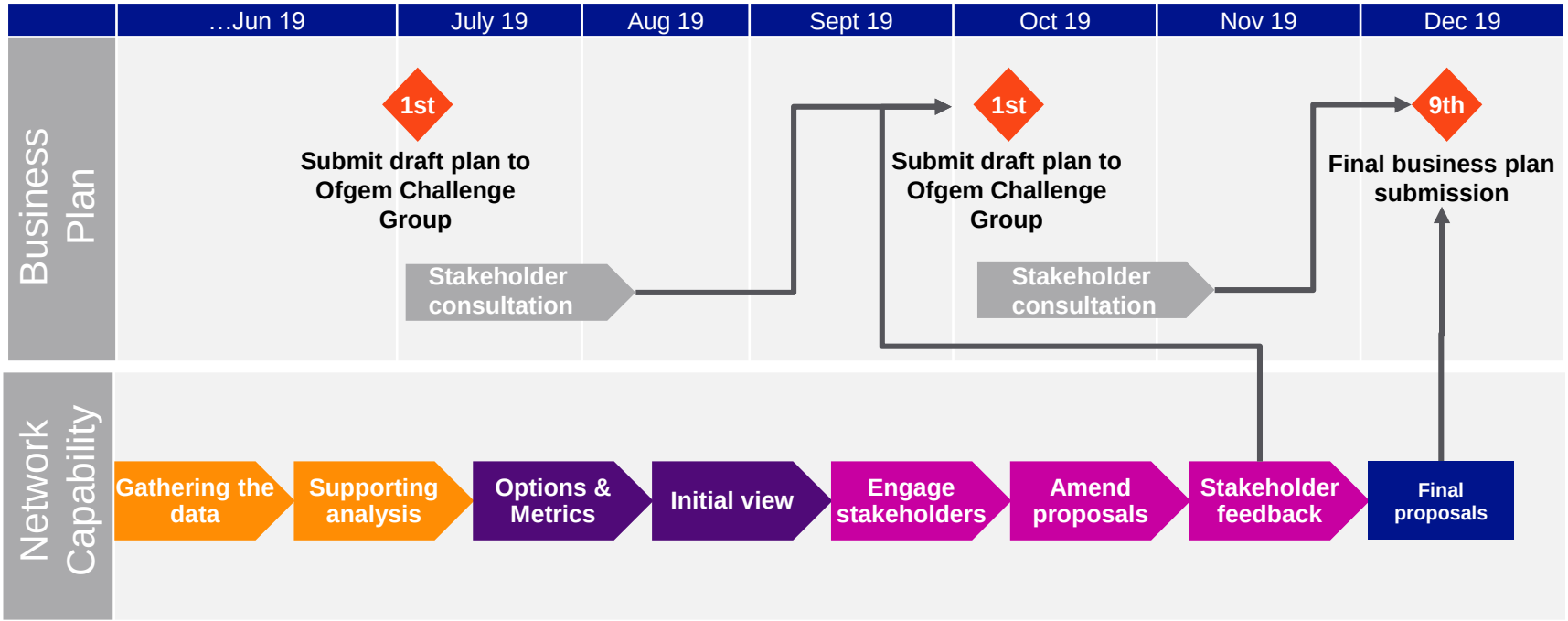
B. Unsure

C. No

Please give a reason for your answer



Timeline

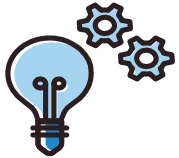

…Jun 19
July 19
Aug 19
Sept 19
Oct 19
Nov 19
Dec 19
Business Plan
1st
Submit draft plan to Ofgem Challenge Group
Stakeholder consultation
1st
Submit draft plan to Ofgem Challenge Group
Stakeholder consultation
9th
Final business plan submission
Network Capability
Gathering the data
Supporting analysis
Options & Metrics
Initial view
Engage stakeholders
Amend proposals
Stakeholder feedback
Final proposals

Thank you for joining the call today

Visit our website

- You will find everything we've engaged on, updates and plans for our RIIO T2 journey as well as ways to engage:

  www.nationalgridgas.com



Newsletter

- If you've entered your email address you will receive our regular newsletter that contains:
  - Updates on our RIIO 2 plans
  - Deep dive on key topics
  - Upcoming events and activities
  - Signpost relevant events

Contact us directly

- Jennifer.Pemberton@nationalgrid.com

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Asset Health – The story so far…

To be updated

Progress so far

- T1 – We're spending over our allowance to deliver a safe and reliable network
- Working hard to deliver the right interventions by focusing on:
  - Strengthening our asset information
  - Efficient delivery of interventions through campaign approach

Links to Network capability

- Extensive engagement to understand stakeholders views on how we should value the service risk factors within our decision support tool (Network Asset Resilience Metric - NARMS):
  - Safety
  - Environment
  - Reliability
- We also asked:
  - What length of time should we be demonstrating benefit to consumers?

Asset Health programme

- Through NARMs we have the ability to present multiple options that deliver an asset health programme that meets stakeholders needs

How have we developed NARMs and how will we use it?

Develop the improved methodology

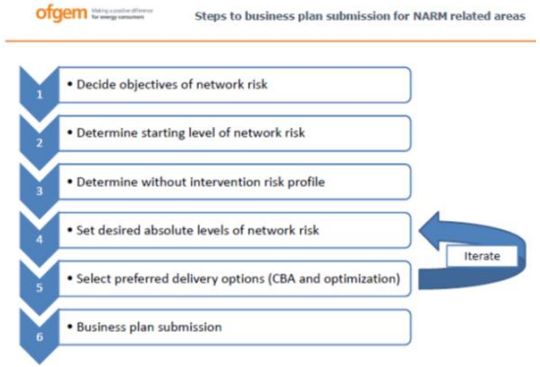
- Building on industry best practice that use monetised risk
  - Water
  - GDNs
- Employed specialist consultancies
- Continual consultation with key stakeholders
  - Ofgem
  - HSE

Consulted with stakeholders

- What value should we assign to each of the service framework areas?
- Consulted targeted stakeholders on specialised areas:
  - Citizens Advice
  - Environmental Agencies
  - HSE
- Conducted an open consultation for all our stakeholders
- Received a number of responses through workshops and online

Validate and implement

- We are now validating and testing the tool to ensure the results we receive are in line with what would be expected
- NARMs will be used to inform our RIIO 2 Asset Health programme
- This aligns with Ofgem's thinking

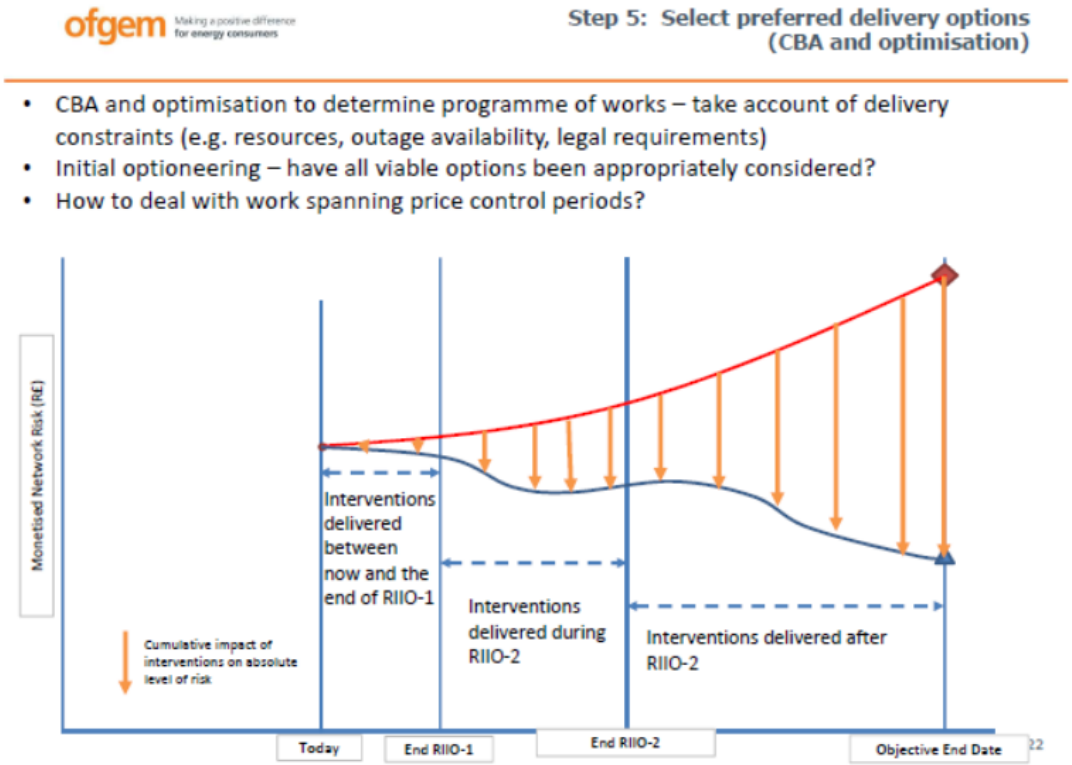


Ofgem and our approach to selecting options

As discussed, we are **exploring options** that meet what our stakeholders have told us and aligns with Ofgem views.

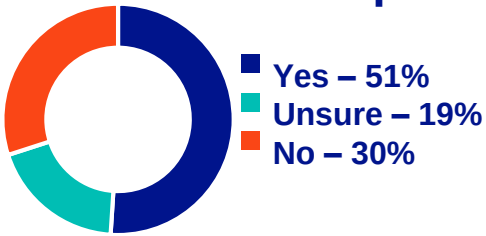
We are currently **in the optioneering phase** and testing our options with stakeholders.

Further work will be undertaken on delivery, legal requirements and cost efficiency once we have narrowed options



What we've heard

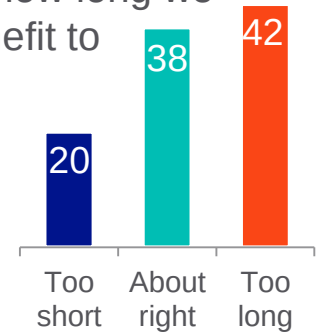
Are the default options correct?



- Consider the impact of these options on our customers
- Do not increase risk to safety
- Consider an option to:
  - Improve reliability by10%
- Consider future proofing the network:
  - Consider flexibility
  - Incorporate hydrogen/green gases
  - Support move to a decarbonised energy system

Is 25 years the right length of time for us to demonstrate value to consumers?

- Difference of opinion on how long we need to demonstrate benefit to consumers
- We are working with Ofgem to understand their cost benefit analysis requirements



- We'll look to show the impact of the different timescales on our investment decisions

What we've done

Costed up two default options

- Keep cost the same as T1
- Keep risk the same as T1

Safety is maintained throughout all options

Technical Challenge - Delivering asset health up to 2045

Started work on what 'future-proofing' looks like within options

How are we doing this?

- Talking to suppliers about the options available and potential costs
- We will share these with you

Developed an 'improve reliability by 10%' option

Results in increased Asset Health investment at exit points

- Additional to planned asset health investment at terminals

Gas
Transmission

02

Asset Health

Costed Options

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All costed options summary

	Option	Ten year T2 spend £m	Indicative £/consumer bill / year	Health and safety	Transport disruption	Availability & Reliability	Environment
Default options	1. Modelled Risk Stable	1,218	0.11	Same (at risk)	Same	Same	Same
	2. Risk Stable Plus	1,623	0.15	Same	Likelihood reduced by 16%	Same	Same
Requested by stakeholders	3. Reduced cost to consumer	731	0.07	Same	Likelihood increased by 23%	Likelihood increased by 38%	Likelihood increased by 5%

*Over 8 year period based on 17/18 figures

Numbers correct as at 14/06/19

Option 1 – Modelled Risk Stable

- This option looks at the impact of keeping the Safety, Environment and Reliability service risk areas the same over the T2 period. This ensures risk at 2030 is the same as 2018.

£1,218 (m)

Ten year T2 spend*

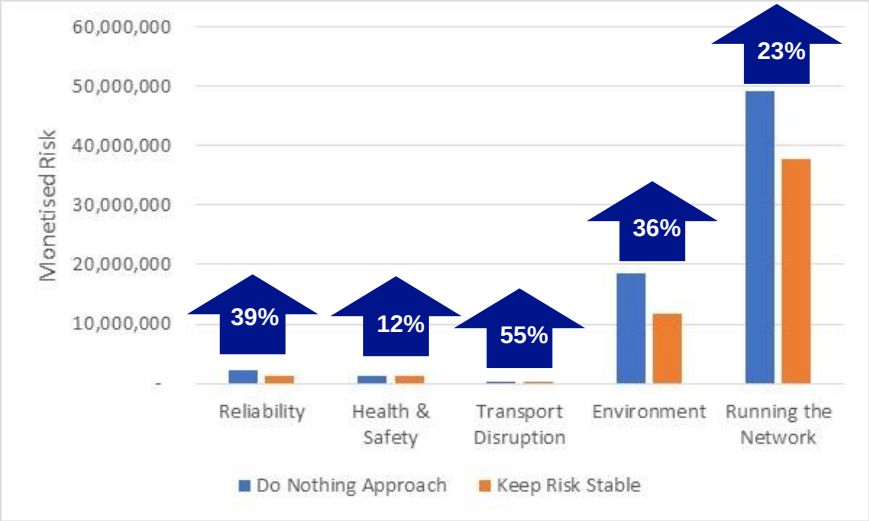
£2,856 (m)

Monetised risk removed by 2040

Annual Consumer bill impact

£0.11 /bill

- In this option:
  - ~~This is more expensive than spending the same as T1~~
  - Safety and environmental performance will be unchanged compared to present
  - Reliability levels are maintained at current levels



Graph shows monetised risk values at end of 2030 for option (blue) against if we were to do no investment at all (orange) over same period. **The higher the number, the higher the risk**

*Over 10 year period based on 17/18 figures

Numbers correct as at 14/06/19

Option 2 – Keep Risk Stable Plus

- This option looks at the impact to the service risk areas by improving levels of service risk to align to spend recommended by Engineering Subject Matter Experts

£1,623 (m)

Ten year T2 spend*

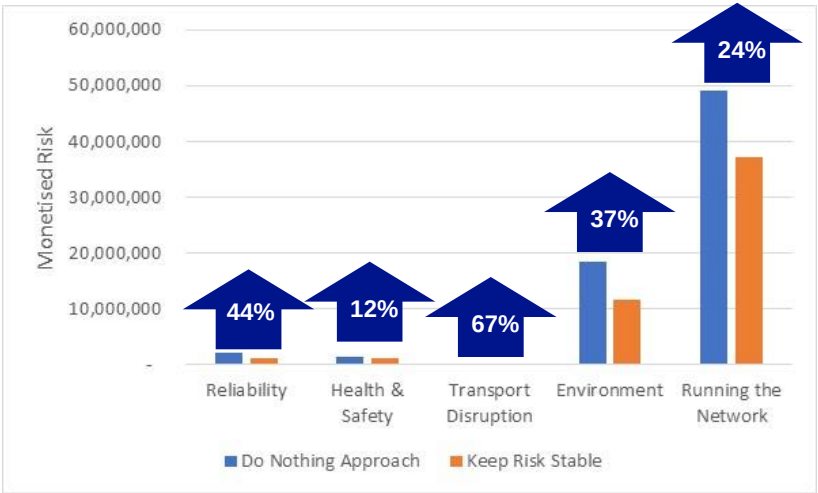
£2,862 (m)

Monetised risk removed by 2040

Annual Consumer bill impact

£0.15 /bill

- In this option:
  - This requires increase in spend to deliver the benefits
  - Numbers of transport disruptions likely to reduce from current levels



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Numbers correct as at 14/06/19

Option 3 – Reduced cost to Consumers

- This option looks at the impact of spending 10% less than T1 whilst maintaining levels of health and safety risk

731 (m)

Ten year T2 spend*

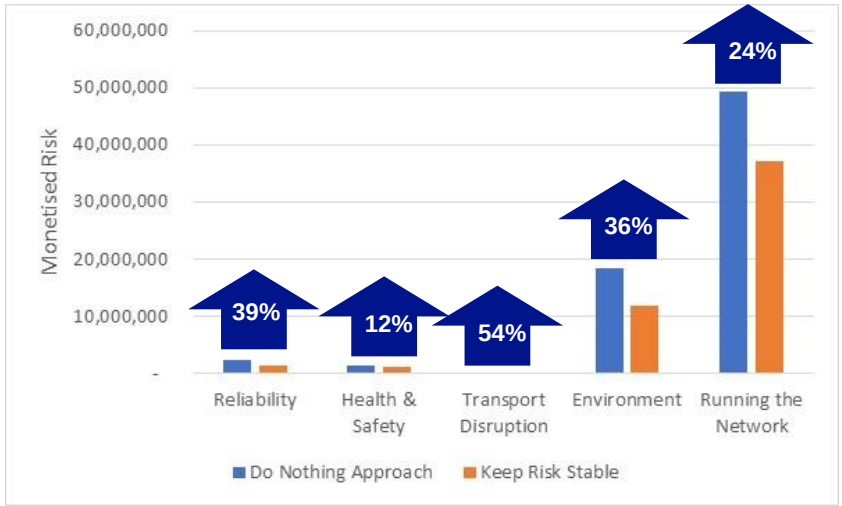
£2,853 (m)

Monetised risk removed by 2040

Annual Consumer bill impact

£0.07 /bill

- In this option:
  - Health and Safety Risk maintained as per HSE guidelines
  - Likelihood of outages, environmental incidents and transport disruptions increased



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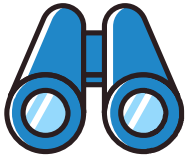
We’re continuing to develop these options



Maintain risk until 2045

- Due to the level of uncertainty, we are unable to develop this option at this time

Lower cost for consumer

- Stakeholders have asked us to develop this option
- This aligns with learning from the water industry
- We will understand stakeholder views further and develop a suitable option

Future proofing within options

- Stakeholders have asked us to investigate the impact of future proofing the Gas National Transmission System e.g. hydrogen
- We have started looking at what this might look like

Quick Poll…Having heard about each of these options…

1. Should we pursue the reduced cost to consumer option further?

A. Yes

B. Unsure – more information needed

C. No

If unsure, please state what additional information you'd need to inform your view

2. Should we pursue future proofing within these options further?

A. Yes

B. Unsure – more information needed

C. No

If unsure, please state what more information you'd need to inform your view

Quick Poll…

1. How would you like to receive the output of this work?

A. Report of all the findings
B. Webinar
C. Workshop or event
D. Other

If other, please specify

Gas
Transmission

3

Asset Health

How it all fits together

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Where does Asset Health fit in with the wider plan

What is the right Gas Transmission System for our customers and stakeholders now and in the future

Agree outputs to deliver these

Example outputs:
- Environment
- Safety
- Reliability

Create integrated programmes of work to deliver these outputs

Example programmes of work:
- Emissions
- Asset Health
- Cyber
- ISS
- Decommissioning
- Operating and maintaining the network

What's next…

Future proofing	This has not been taken in to account to date, however we'll continue to look at what this looks like and come back to you in the new year
Ofgem Engagement	Ofgem are engaging on asset health via targeted workshops and working groups.
Industrial Emissions Directive	We will look at becoming compliant as part of this work
Planned deliverability	We will continue to engage to ensure we have a robust stakeholder view on which approach to take. We will then look at the deliverability of this plan.
Reporting the outputs	We will report back all the findings of our work over the last 12 months. This will be Q1 2019

Any questions?

Bridget Hartley

RIIO 2 Submission Manager

Jenny Pemberton

Stakeholder Engagement Manager

Neil Tansley

Asset Performance Manager

Adam Baker

Asset Management Analyst

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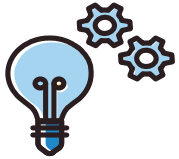

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  - Deep dive on key topics
  - Upcoming events and activities
  - Signpost relevant events

Contact us directly

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Ofgem working group update

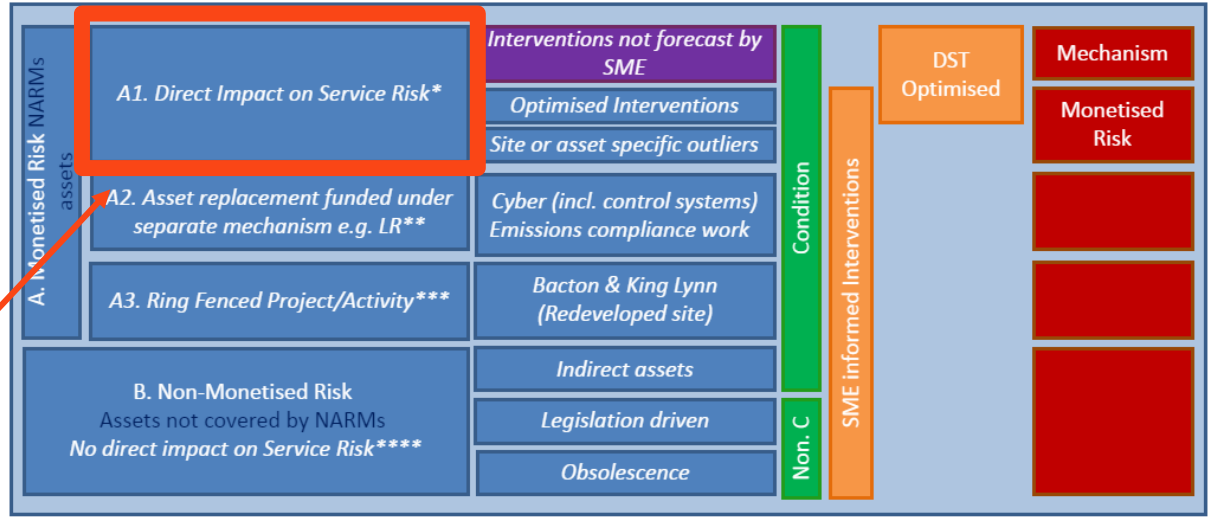
We've been engaging with Ofgem

Major projects will improve risk of local network but some areas will be very high

Therefore created approach to deliver against stakeholders needs and wants

A1 – Keep risk the same as current levels

Asset Health Investment Plan – Ofgem structure



*Network Risk reduced with investment (e.g. Gas Generator) – Has Monetised Risk deliverables
**Funding under separate mechanism e.g. asset replacement funded under LR mechanism.
***Separate funding mechanism & PCDs, MR benefit delivered to be discounted from any output delivery
**** Network Risk is not reduced with investment e.g. Indirect assets: Assets which do not directly impact Service Risk (e.g. Security Fence)
NB. Site or asset specific outliers: are not considered by DST (uses population averages) e.g. Kings Lynn Bi-directional / AGI below ground pipe and coating.