Annex

A16.06 Environment Engagement Log

December 2019

As a part of the NGGT Business Plan Submission

nationalgrid

ANNEX A16.06 – ENVIRONMENTAL ENGAGEMENT LOG

Stakeholder Priority: 'I want you to care for communities and the environment'

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Document Number: 3

Executive Summary

The environmental topics covered in this engagement log are aligned to two of our stakeholder priorities 'I want you to care for communities and the environment' and 'I want to take gas on and off the transmission system when and where I want'. Engagement on these environmental topics is an essential part of developing our RIIO 2 business plan.

All the topics with environmental aspects have been grouped for the purposes of our engagement and interaction with all the relevant stakeholder segments. Within this engagement log, topics associated with our network emissions management and compliance are assigned to the 'I want you to care for communities and the environment' priority. Topics which are aligned to mitigating the environmental impacts to the NTS, i.e. ensuring network resilience, are aligned to the 'I want to take gas on and off the transmission system when and where I want' priority.

Our engagement with stakeholders has been designed to understand how we continue to deliver value for our stakeholders whilst adapting to reduce the environmental and societal impact of our operational activities and protecting our assets in the face of a changing climate. The engagement has been focused around emissions to air, adaptation to climate change and our approach to environmental stewardship. As well as gathering insight from our regular engagement with the environmental regulators and information from the current RIIO 1 environmental outputs and incentives, we held several workshops, including two specifically targeted at environmental topics. These workshops provided useful insight into stakeholders' expectations of National Grid and key messages included the need for a standardised approach to carbon measurement and a more holistic approach to emissions to air including leakage as well as operational emissions.

Version 2 of the engagement log was updated to include new insight generated since November 2018 and to address challenges raised through discussion at the Stakeholder Group meeting, SG4. Any new text was coloured purple and the layout was amended so all the engagement on a sub topic is brought together more clearly.

This is version 3 of the engagement log, updated to include new insight generated since July 2019 including the outcomes of our consumer engagement including willingness to pay, interactive slider tool and cultural analysis. Any new text is coloured blue.

Contents

Questions for stakeholder group

Pre Engagement

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

Post Engagement

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

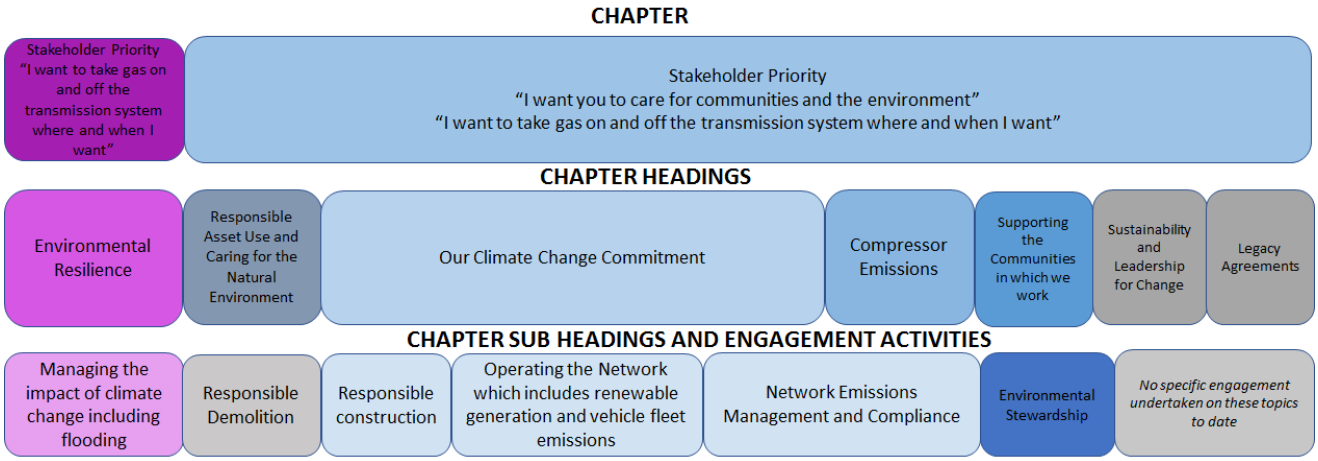
Part 1: Environmental Engagement

What do we mean by 'Environment'?

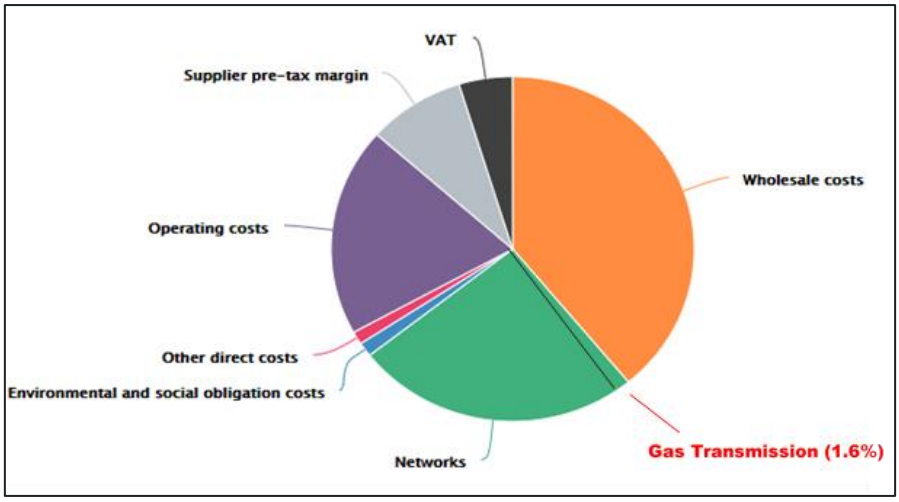
The UN use the Organisation for Economic Co-operation and Development (OECD) definition for environment as being, "the totality of all the external conditions affecting the life, development and survival of an organism." In relation to National Grid Gas, this is considered to be the living element of the planet, for which our activities can have an impact.

Why are we engaging on this?

Our engagement on this topic has been designed to enable us to build a business plan that reflects stakeholder expectations of how we reduce the environmental impact of our business operations and how we effectively manage our assets to adjust to a changing climate. All the engagement on environmental activities has been grouped to minimise the impact on stakeholders. However, the associated investment is divided between two stakeholder priorities; "*I want you to care for communities and the environment" and "I want to take gas on and off the transmission system when and where I want" as per below*



The required investments will impact gas consumers as the costs will form part of our TOTEX allowance which flow through shipper charges to the end-consumer bill. These environmental topics are likely to impact on the gas transmission element only, however the non-financial benefits to consumers of the environmental activities we undertake are equally important.



Over the five years of RIIO 1 to date our activities ranged across a number of topics linked to reducing our carbon footprint, environmental stewardship and managing the impact of climate change. This work also delivers significant societal benefits for consumers both at a global level from reducing our carbon footprint and at a national and local level, improving air quality, sustainable construction and environmental approaches to land use and management. The insight from our stakeholder engagement activities is essential in ensuring we propose an approach that is supported by our stakeholders in our business plan submission.

Context and Drivers

National Grid plays an important role in the sustainable development of Great Britain's energy sector, building affordable, reliable and sustainable energy systems to meet the needs of our current and future stakeholders. By embedding sustainability in our business strategy, we are future-proofing our organisation within a changing environmental and social landscape, ensuring we continue to operate as a responsible business.

Our environmental sustainability strategy, Our Contribution, focuses on the areas where we can make the greatest contribution to a more sustainable future. These are:

- Our climate commitment – As an infrastructure business, our day-to-day activities result in greenhouse gas (GHG) emissions and by reducing our emissions we can reduce costs and our impact on the environment. Target: 45% reduction in GHG emissions by 2020, 70% reduction in GHG emissions by 2030 and 80% reduction in GHG emissions by 2050 (against a 1990 baseline).

- Responsible resource use – Making the most of our assets through reuse and recycling of recovered assets. Target: Reuse or recycle 100% of recovered assets by 2020 and send zero office waste to landfill at major office sites by 2020.

- The natural environment – Working closely with local and national stakeholders to manage our natural assets, enhance ecosystems and improve the quality of nature across our UK

landholdings. Target: Recognise and enhance the value of our natural assets on at least 50 sites by 2020 and drive net gain in environmental value (including biodiversity) on major construction projects by 2020

These targets are held at a National Grid corporate level so within this engagement log we focus primarily on the specific gas transmission business topics for engagement as part of the RIIO 2 price control period. However, there are some elements of our activities which are coordinated across the various National Grid business functions. These gas transmission specific requirements would contribute to our overall corporate targets as well as a those at a business level. These cover four main categories and further detail on the associated topics is presented in the diagram below:

- Network emissions management and compliance
- Operating the network
- Managing the impact of Climate Change
- Environmental Stewardship
- Construction

The topic of responsible demolition is presented in a separate engagement log.

Business As Usual and Existing Insight

We've gained significant insight on this topic via BAU and previous engagement channels. An overview is presented in the table below, with more detail in appendix 2

What	How	Who	Outcome
Do consumers value environment improvements	Populus consumer research	Domestic and business consumers	Environment is ranked 7 out of 17 priorities
Strategic view of environment interest groups	BAU via Safety Health and Sustainability team	Interest groups NGOs Investors	We should embed environment into our decision making There is a greater focus on the environment in the financial community
How to incorporate environmental considerations in to major projects	Peterborough/ Huntington compressor replacement projects Humber pipeline project	Environmental regulators Local community Local government	Approach must be tailorable to the area Critical to engage local community throughout Develop local partnerships to embed local learning and best practices
Environmental compliance management	Regular BAU with Environmental regulators	Environmental regulators	Network review is effective Continued compliance with legislation
Identifying and delivering environmental innovation	NIA and NIC projects Annual publication LCNI conference	Other networks Academics /innovators	17 environmental innovation projects each will deliver different environmental outcomes

RIIO 2 Engagement

What are we focusing on?

Beyond the requirements of the regulators and the existing insight from our extensive business as usual engagement on environmental topics, at the start of our RIIO 2 engagement it was unclear whether our focus on reducing emissions was the right course of action for our stakeholders. We wanted to understand whether current focus is at the right level or should include a holistic approach to emissions, including a more formalised approach to carbon pricing. The topic of environmental stewardship has been of increasing focus within RIIO 1 and so our RIIO 2 engagement would look to establish if this should be an ongoing activity into the next price control period.

In addition, having done some work around understanding risks from climate change, ahead of planning and investment, it is helpful to understand the stakeholders' views on climate change adaptation and how this should be approached and funded. Furthermore, engaging with a wider stakeholder base to get a broader view of environmental priorities helps to provide a more holistic approach in our environmental endeavours.

We therefore proceeded to combine our engagement interactions across both the topics of Network emissions management and compliance, operating the network, mitigating the impact of climate change, environmental stewardship and construction.

We engaged over three phases as described in the table below:

Phase	What	Purpose	Comments
1	Initial engagement: Joint workshop with National Grid Electricity Transmission	Gain stakeholders views (as per outcomes) Collaborate to reduce stakeholder burden	Well received Location wasn't ideal Six stakeholders
2a	Close the gaps: Additional workshop in Scotland Bilaterals with Environmental regulators	Gain stakeholders views (as per outcomes) Broader range of stakeholders targeted Enable quantitative and qualitative insights to be gathered	Refreshed material based on feedback from User Group and Frontier Economics Well received
2b	Consumer engagement	Gain qualitative and quantitative consumers insight on environmental topics	Includes: • Consumer listening • Willingness to pay • Interactive slider tool • Cultural Analysis
3	BAU engagement	Continued check in with key stakeholders on specific topics	Detailed in appendix 2

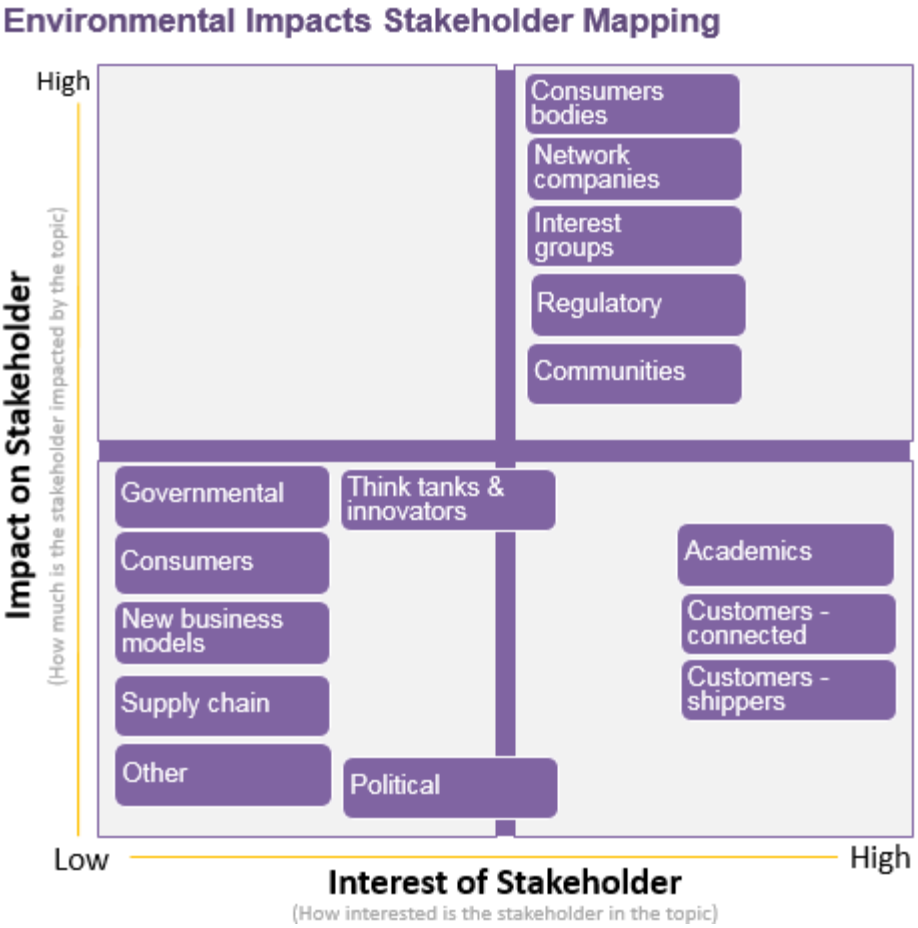
Outcomes across all our engagement

The desired outcomes from this stakeholder engagement include gathering insight from stakeholders on our approach to the issue of environmental impacts of the NTS. Having engaged

with the right selection of stakeholders, we would look to have an evidence base of support for our options and costs.

Stakeholder mapping

We undertook an extensive stakeholder mapping exercise to help us target our engagement effectively and the map below shows how we mapped our stakeholders. As part of engagement, we asked our stakeholders to map themselves on interest and impact on specific topics. Updated maps are therefore included in the following topic sections.



Network emissions management and compliance

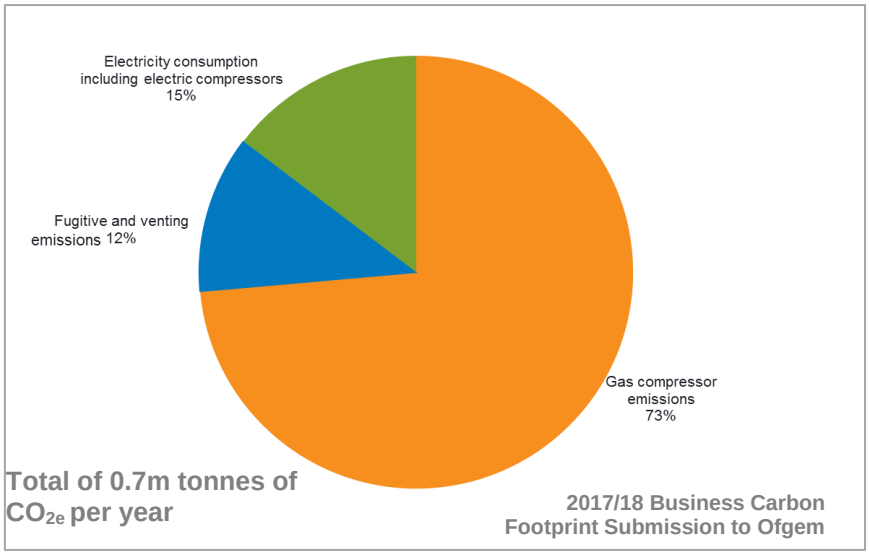
Background:

The activities we undertake in operating and maintaining the National Transmission System can have a negative impact on the environment.

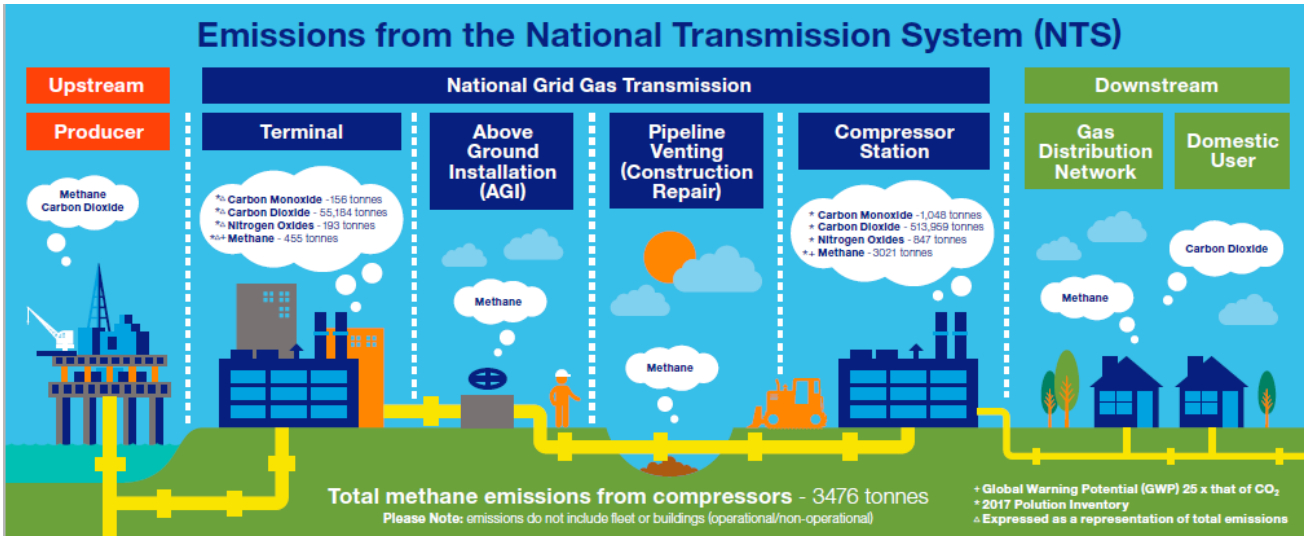
The legislative framework controlling this aspect of our activities is large and complex, with various European and domestic legislative controls to consider to ensure compliance. The legislative framework, the must-do, seek to control every aspect of the lifecycle for emissions to air (and other environmental impacts) from our gas turbines and include:

- Large Combustion Plant Directive (LCPD)
    - Sets specific emission limits for NOx and CO (amongst others) for combustion plant >50Mw; references Best Available Techniques (BAT) for new and existing plant for member states to adopt, and timescales for delivery
- Medium Combustion Plant Directive (MCPD)
    - Sets specific emission limits for NOx and CO (amongst others) for combustion plant >1Mw to <50Mw; references Best Available Techniques (BAT) for new and existing plant for member states to adopt, and timescales for delivery
- Environmental Permitting Regulations (England & Wales) (as amended)
    - Enacts in England and Wales the requirements of the LCP and MCP directives, further outlining the emission limits, the process for applying for environmental permits, compliance regimes and details of enforcement action for non-compliance.
- Pollution Prevention and Control Regulations (Scotland) (as amended)
    - Enacts in Scotland the requirements of the LCP and MCP directives, further outlining the emission limits, the process for applying for environmental permits, compliance regimes and details of enforcement action for non-compliance.
- The Greenhouse Gas Emissions Trading Scheme Regulations 2012 (EUETS)
    - Sets the framework to meet the requirements of the European Union Emissions Trading Scheme for the UK. Establishes a cap and trade context with reducing carbon credits used to cover carbon dioxide emissions. A financial price is applied to credits which can be traded and drive investment to reduce carbon emissions.

The most significant of the environmental impacts come from emissions to air, either through combustion by burning gas in gas driven compressors to keep the gas flowing through the system, or from methane emissions from compressors venting or electricity generation from the use of electrically driven compressors. This is a primary focus for our RIIO 2 engagement, which accounts for approximately 0.7 million tonnes of CO_2 per year.



An overview of the emissions to air from the network is presented on the diagram, with an associated explanation below:



As well as CO_2, the compressor units also emit NOx (totalling 800 tonnes for 2017/18) and these emissions are directly linked to the running hours of the units as a function of network flow patterns and profiles. This means National Grid has relatively little control over these emissions from operating the network on a daily basis although this is influenced when replacement compressor units are specified and built and in some operational decision (e.g. the use of electric drive units). Investment in compressor units to reduce their associated emissions is not directly covered in this paper.

Methane emissions from venting are process safety related. When required by an operational process, methane is vented from our compressor cabs and pipework to return the equipment to a safe state and remove safety risk. Last year the amount vented to the atmosphere was just under 4000 tonnes of methane.

There are also emissions from leakage. Leakage from network sites (including terminal and above ground installations) is approximately 300 tonnes of methane a year. These are so called 'uncontrollable emissions' caused usually by deterioration or failure of the asset.

We use a range of recognised methods and techniques to identify, assess and mitigate these impacts. For example, Best Available Techniques (BAT) is an agreed standard with the environmental agencies for assessing the environmental benefit of a proposed solution against cost of delivery. Within the BAT tool there are weighted categories to ensure that the necessary costs and benefits are considered for each technology and the BAT assessments are used to make the best selections of equipment to meet all internal and stakeholder requirements (cost, emissions, noise, amenity, delivery and usability).

However, our approach to carbon pricing is not consistent. Carbon is incorporated into investment decisions in different ways for example, carbon weighting in the BAT tool assigns a percentage weighting to carbon emissions whilst carbon pricing assigns a monetary value to each tonne of carbon emitted.

We have different methods for other emissions from our operations e.g. methane venting, NOx, CO, CO_2, fugitive emissions, and we use traded and non-traded prices for carbon, EUETS (EU Emission Trading Scheme) measurements and the National Grid price of carbon.

All of this can be confusing and makes it difficult to determine the right investment decision when considering the different drivers and potential benefits. Our stakeholders have indicated a simple system using carbon dioxide equivalent (CO_2e) of a single price, would mean that whatever the emission source, it would be clear and transparent to compare the cost, outputs and benefits to the environment.

We currently have outputs and incentives in a number of these areas to reduce the environmental impact of operating the NTS (please see appendix 6.2). However, in developing our RIIO 2 business plan we need to understand what our stakeholders expect from us and value. Their insight will help us determine the right level of investment and activities in the face of a changing energy landscape (with potentially unpredictable flow patterns), more stringent environmental legislation and aging assets.

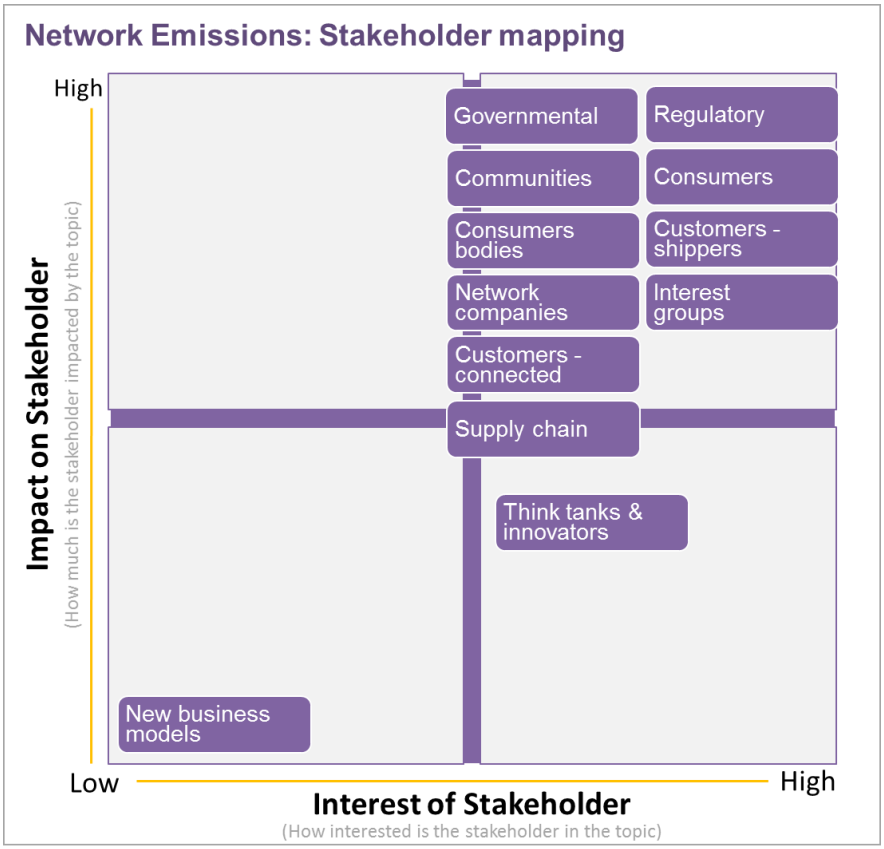
Outcomes

Gain a clear understanding of:

- Stakeholders' ambition to embed the cost of carbon in to decision making including major projects and refurbishment of assets
- Stakeholders' views on how we should manage emissions including methane (fugitive and vented) and carbon dioxide

Stakeholder mapping

We asked our stakeholders to indicate how impacted and interested they are in Network emissions management and compliance:



We asked:

Phase 1

Discussion question: Should we have a consistent approach to managing our carbon footprint across all activities? The answer was 'Yes' and supported by all attendees.

> *"Yes we should have one consistent carbon price, in order to make analysis of these figures easier. This should be a balance between the cost to consumers and highest price for the business, yet be ambitious in terms of reducing the impact on the environment. This should allow for benchmarking within the industry."* - [redacted] *Regulator*

Voting questions: (please note the percentages are used to show the difference in opinion but the sample size is based on a small number of attendees at the event)

Should we be focusing on all our emissions e.g. vented and fugitive?

Yes: 100%

How should we consider carbon in our decision making?

Apply a consistent cost of carbon – Government central case carbon evaluation (mid - case): 100%

Following consultation with Frontier, we redesigned our engagement (see appendix 3 for details) and so the questions we asked during our second phase of engagement differ slightly:

Phase 2:

Discussion questions:

1. What further information would you like about emissions management?
2. How important is it that we manage emissions?
3. Should with be a focus of innovation going forward?

Voting question: Should National Grid Gas Transmission do more, continue as is or do less to manage emissions?

100% of respondents selected "Do more to manage emissions"

When asked "what further information do you need to help inform your view?" replies focussed on three elements:

- Scope 3 emissions
- Views on CSS schemes
- Where are the losses?

What we've heard:

The quotes below reflect some of the common themes during our stakeholder discussions on this topic:

"Would like to see more focus on methane emissions such as there are in Europe" - [redacted], Interest Group

"You would need funding to be able to deliver low carbon emissions e.g. through the price control." – [redacted], Interest Groups

"Nox and CO2 reduction systems very high priority and seems NG are taking it seriously." – [redacted] Supply Chain

"You need to prioritise what you spend your money on." – [redacted], Supply Chain

"To what extent are we taking account on upstream emissions? Where on the diagram are the bulk of our emissions? Is there any SF6? How do we manage consumer behaviour and are we developing CCS at St Fergus?" – [redacted] Network Company,

"Focus on reducing emission from compressors rather than from a construction project where savings are less." – [redacted], Supply Chain

Conclusions from engagement

Stakeholders value us reducing emissions to improve local air quality as well as focusing on reducing CO2 and methane leakage. There was also discussion on reducing our impact by increasing the efficiency of compressor units.

Engagement with environmental regulators has previously been around permit compliance for our compressor units, however, more recently discussions have been broader around focusing on all emissions rather than just the ones presently permitted or incentivised for.

Adoption of a wider, public carbon policy was endorsed as the way forward to managing emissions, however, this is currently in contrast to the current permitting system which focuses more on air quality. There is appetite amongst stakeholders to look for a consistent approach and for National Grid to communicate this to stakeholders to make the process clearer.

Update October & December 2019

Additional insight on the 'network emissions' topic was collected from a number of other stakeholders since the July submission. This is summarised in the table below:

Carbon Emission- other stakeholders	Evidence 1	Evidence 2	Evidence 3	Evidence 4	Evidence 5	Evidence 6
New information	There is a social obligation to reduce methane emissions. Even though there isn't much legislation on this, the industry needs to demonstrate that we are working to reduce these emissions.	Stakeholders were asked to rank a number of areas based on priority. On average "fighting climate change" was ranked as the most important area valued by stakeholders, with 30% of respondents choosing this area as their highest priority, approx. 20% ranking as 2, approx. 30% as 3 and 4 together, approx. 12% as 5, and less than 10% as 6 (least important).	One stakeholder asked why the Business Plan does not consider the effect of climate change on assets, e.g. long periods of hot weather when compressors need to run.	Consumers consider air quality to be very important. Most respondents are willing to pay 50p more on an estimated bill of £9 (estimated amount of the bill that covers NGGT) annually towards improving air quality. This is considerably above the stated likely bill impact (£0.07 per annum) and hence suggests strong support for the quantum of activity proposed by NGGT.	Limited comment on this topic. One stakeholder advised keeping options open on compressors, as NG is doing. But it was not clear that this topic is a priority for industry.	66% of respondents agree with the proposed investment (as per the BP) and its impact on their bills (£0.07) in relation to improving local air quality around NG sites. 26% of respondents agree with the proposed investment but not with its bill impact and 2% do not agree with the investment. In addition, 44% of respondents would like to see more investment in this area, 19% less investment, 9% would like to remove investment and 28% would like to see no change in the investment in this area
Stakeholder source	Industry / trade body (O&GUK)	Non-domestic consumers	Customer (shipper / supplier)	Domestic consumers	Industry / trade body (Major energy users)	Trade-offs between environment and affordability
Trade-offs between priorities (affordability, reliability, environment)	No trade-offs	Consumers have made trade-offs between environment, affordability and reliability. "Minimising disruption to gas supply" and "Minimising the gas bill" have a higher average rank (less important for consumers), compared to "fighting climate change", which was ranked as the most important.	Trade-off between environment and reliability	Trade-offs between environment and affordability	No trade offs	Acceptability survey

Source document	Overall BP engagement	NERA/Explain WTP Study	Overall BP engagement	Consumer immersion workshop - July 2019	Overall BP engagement	The findings are relevant and representative for domestic customers. However, there are some issues with validity as consumers may find it difficult to comment on very small bill increases.
Robustness	The findings are relevant and valid. However, representativeness might be limited as this is the stated view of a single, albeit important, respondent and should be viewed in this context.	The findings are generally relevant and representative. However, the specific monetary values should be treated with caution, given the issues associated with Faced with complex choices, people are likely to simplify any problem they are presented with that they don't know about. People often exhibit loss aversion and do not want to lose the service they have now, so they tend to weight small probabilities very highly.	The findings are relevant and valid. Representativeness might be limited as this is the stated view of a single, albeit important, respondent and should be viewed in this context.	The findings are relevant but less likely to be representative or valid given the risk of bias. Focus group research is very difficult to carry out without bias – for example, answers may be driven by participants seeking social affirmation.	The findings are relevant and valid. However, representativeness might be limited as this is the stated view of a single, albeit important, respondent and should be viewed in this context.	Given the sizeable proportion that signalled a desire for NGGT to go further, plus the findings from the WTP study, NGGT could consider options for going further in this area.
Changes to the BP conclusions and proposed actions	No changes required.	No changes required	NGGT actions in relation to compressors and hot weather could be noted.	No changes recommended	Limited stakeholder input has been received from these entities, but a lack of response does not in our view provide a signal that change is needed, given the wider feedback received.	Given the sizeable proportion that signalled a desire for NGGT to go further, plus the findings from the WTP study, NGGT could consider options for going further in this area.

Operating the network

Background

In addition to emissions from our network (covered above), we have a few opportunities to reduce our environmental impact. We asked stakeholders for their views on what we should do in these areas. This area covers two sub-topics:

Vehicle Fleet Emissions

With over 200 vehicles in the gas transmission fleet, a key area for reducing our business carbon footprint is through our commitment to low carbon vehicles. Our annual emissions from these vehicles are over 1100 tonnes CO_2e, and we have a commitment to transform our fleet into low carbon vehicles by 2030.

Renewable Generation on site

National Grid Gas has historically not generated power on site due to limitations in licence conditions which prevent us from exporting electricity back to the grid and potentially distorting the electricity market. The assets on site could be used for generation of electricity via solar panels, or wind turbines for example, to offset our own onsite consumption. However, we have not previously undertaken projects of this type to generate own use electricity (purely for use on site) due to operational complexities.
However, looking to the future it may be possible to gain a derogation from the licence for small scale generation, which is unlikely to interfere with market dynamics but may be able to provide benefits to local communities. Similarly, to vehicle emissions, engagement on this topic will form part of our next phase of stakeholder engagement work.

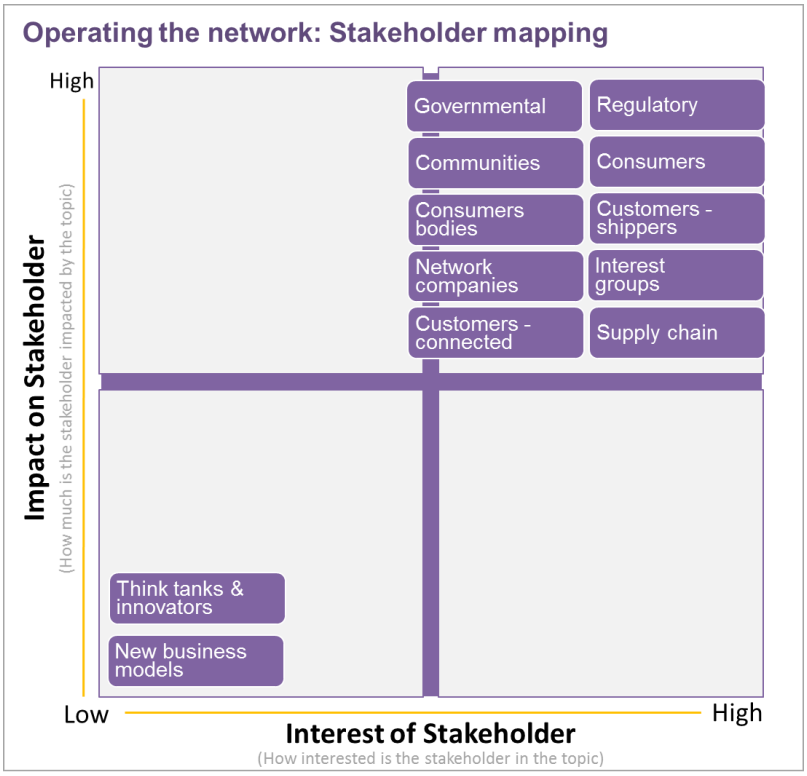
Outcomes

To understand stakeholder views and ambition on:

- reducing emissions from fleet vehicle
- installing renewable generation on sites

Stakeholder mapping

We asked our stakeholders to indicate how impacted and interested they are in Operating the network:



We asked:

This topic was not included in the first phase of engagement

Phase 2 Discussion questions:

1. Of the options shown on the table, pick one or two areas and discuss:
    a. What could we do to reduce their impact
    b. Add these to the opportunities board
    c. Are there any other areas we should be looking at?

Phase 2 Poll question:

1. For non- legislative compliance related activities, National Grid Gas Transmission should…
    a. Do more
    b. Continue as is
    c. Do less
2. Please explain your answer

Vehicle Fleet Emissions

What we've heard:

"Electric fleet vehicles as current ones come to end of life." –[redacted], Supply Chain

"set commitment to decarbonise your fleet by 2030." –[redacted], Supply Chain

"an easy one would be fleet vehicles – commute if people are in the same office etc – one of the easier ones to deal with" –[redacted] Supply Chain

"what distance to NG fleet vehicles go? Charging vehicles – will every location have a charging point? Is that one piece of kit in a certain location? I would say yes – it's a social responsibility." – [redacted], Supply Chain

Renewable Generation on site

What we've heard:

"Does having renewables on site put you in a conflict of interest? If you export, can money go to a community fund " – [redacted], Regulator

"It is ridiculous that you are not able to generate energy - even in renewable energy production to reduce carbon on ops sites." –[redacted], Supply Chain

Conclusions from engagement

There is appetite from stakeholders for us to explore these aspects to reduce our impact on the environment. We are undertaking consumer engagement on these topics and will update this section when we have these results. We are currently considering proposals to undertake a trial of alternative fuels including electric vehicles and the developments of the charging infrastructure and its maintenance costs. In order to reduce carbon emissions from energy use in office buildings through purchasing renewable energy where available and replacing other fuel sources such as diesel generators with low carbon fuels. With regards to our commitment to deploy renewable technologies we are developing proposals to install solar panels on our compressor sites for the generation of own use electricity.

Update October 2019

Additional insight on the 'operating the network' topic was collected from a range of consumer engagement interactions, and is summarised in the table below:

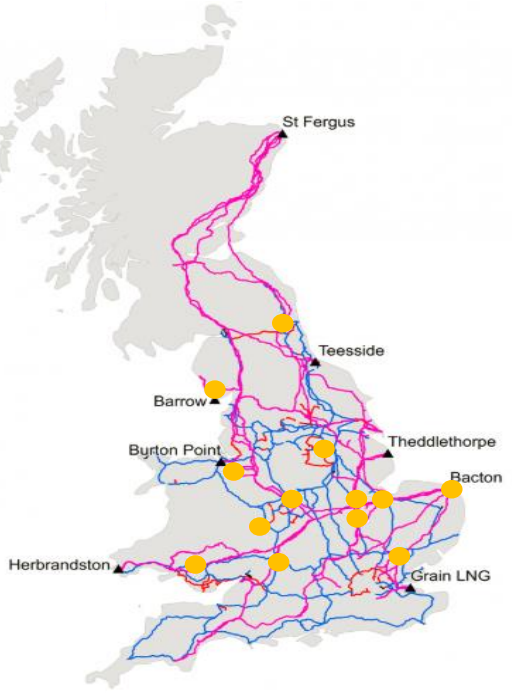
	Evidence 1	Evidence 2	Evidence 3	Evidence 4	Evidence 5	Evidence 6 and 7	Evidence 8
New stakeholder information and insight	Consumers rank "helping the move towards low carbon economy" as the second highest priority behind "reliable supply of gas". In addition, on average 54% of respondents voted yes, 21% voted no and 25% were unsure on being asked to pay slightly more on their annual bill (less than £1).	Consumers consider reducing carbon emissions to be very important. Most respondents are willing to pay 50p more on an estimated bill of £9 (estimated amount of the bill that covers NGGT) for NGGT to reduce its carbon emissions. Almost all in the study were willing to pay more to allow NGGT to reduce its carbon emissions (27 respondents). 4 consumers were unwilling to pay more while 1 was unsure.	When asked what NGGT should do about GHG emissions, fewer than 10% of respondents answered "do nothing" or "I don't know". 75% voted investing in renewable technology, 64% in carbon neutral construction, 62% in green power and 50% in fleet vehicles. There were some variations by gender, region and socio-economic groups.	Consumers gave "fighting climate change" the second highest average rank. While consumers consider climate change important, not all consumers considered "fighting climate change" of the utmost priority. 20% of respondents gave it a ranking of 1 (most important), a little more than 30% of 2, approx. 13% of 3, approx. 12% of 4, approx. 11% of 5 and approx. 11% of 6 (least important).	76% of respondents agree with the proposed investment (as in BP) and its impact on their bills (£0.01) in relation to reducing carbon emissions from NGGT operations. 17% of respondents agree with the proposed investment but not with its bill impact and 2% do not agree with the investment. In addition, 48% of respondents would like to see more investment in this area, 17% less investment, 11% would like to remove investment and 24% would like to see no change in the investment in this area.	UKERC research finds that consumers would be willing to pay more for 'increasing low carbon energy'. BEIS found that in March 2019, 86% of consumers agreed with the statement that "if everyone does their bit, we can reduce the effects of climate change".	NGGT has set a target of changing 30% of its fleet to low carbon-fuelled vehicles by the end of RIIO2. [redacted] would like to know how this figure has been chosen, if a higher target is achievable and what would be the cost to consumers of both a 100% target and the current proposals.
Stakeholders	Domestic consumers	Domestic consumers	Domestic consumers	Domestic consumers	Domestic consumers	Domestic consumers	Consumer interest group ([redacted])
Trade-offs between priorities	The exercise asked respondents to rank between reliability, environment, affordability and helping the community (vulnerable consumers). Respondents gave reliability the highest importance, followed by environment, affordability and helping the vulnerable, in that order.	There was a higher consensus among consumers to pay 50p more towards carbon emissions than towards reliability (at least 8 respondents said no and 3 were unsure).	No trade-offs, as stakeholders were asked to comment on the different investments NGGT can undertake.	"Minimising gas bill" has the highest average rank (least important), followed by "minimising disruption to gas reply" (second least important), while "fighting climate change" has the second lowest average rank.	Consumers are happy to trade off affordability for investment in this area.	Consumers are happy to trade off affordability for investment in this area.	[redacted] is pushing NGGT to provide more detail on a specific trade-off between affordability and ambition in abatement through fleet management.

Source document	Consumer immersion workshop - February 2019	Consumer immersion workshop - July 2019	Interviews with bespoke tool	NERA/Explain WTP Study	Acceptability Phase 2 - survey	BEIS PAT and UKERC	[redacted] response to NGGT draft RIIO2 Business Plan
Robustness	The findings are relevant but less likely to be representative or valid given the risk of bias - focus group research is very difficult to carry out without bias – for example, answers may be driven by participants seeking social affirmation		The findings are relevant and representative. There are some issues with validity, respondents' ability to answer meaningfully may be limited by the experiences that they have had, and making choices based on very small sums of money.	The findings are generally relevant and representative. However, the specific monetary values should be treated with caution, given the issues associated with validity WTP analysis should be treated with some caution. Faced with complex choices, people are likely to simplify any problem they are presented with that they don't know about. People often exhibit loss aversion and do not want to lose the service they have now, so they tend to weight small probabilities very highly.	The findings are relevant and representative for domestic customers. However, there are some issues with validity as consumers may find it difficult to comment on very small bill increases.	The findings are relevant and representative. There are some issues with validity.	The findings are relevant and valid. Representativeness might be limited as this is the stated view of a single, albeit important, respondent and should be viewed in this context.
Relation to evidence in business plan	Reinforces the existing Business Plan conclusions						
Changes to the business plan conclusions and proposed actions	No change required.	No change required.	No change required in BP proposals, although NGGT could do more to explain how it arrived at the specific actions it has chosen to undertake.	No change required.	No change required.	No change required.	NGGT could provide more evidence on how the EV target was set. This would require an appraisal of the incremental cost.

Managing the impact of climate change

Background:
As an owner operator of Critical National Infrastructure (CNI), National Grid is required to take part in the triennial climate change adaptation report, required by the government's Committee on Climate Change (CCC), thereby complying with our obligations under the Climate Change Act 2008. Our obligations include understanding the risks of climate change on the NTS, producing plans to mitigate the impacts and report on triennial basis on progress to deliver those plans.

Climate change is resulting in more uncertainty and more extreme weather in the UK. We are seeing more severe storms and weather events, such as flooding. For example, the winter of 2013-2014 was the wettest winter on record for the UK and between November 2015 and January 2016 we had the most ever rain for that period, causing some of the most extreme and severe floods in 100 years. The nature of our business means the majority of our sites are located in remote, rural areas. During periods of inclement weather, access to these sites can become very challenging and sometimes dangerous. We need to ensure that we are running the NTS as effectively as possible, whilst keeping our people safe. Whilst flooding doesn't always present an immediate risk to the way our assets function, any sustained period of inclement weather will prevent us from gaining access and maintaining the equipment, at a time when they are likely to be running at an increased demand due to the inclement weather. A large proportion of our sites sit within a high to medium flood risk zone, this means that these sites are more at risk of future flooding. Hence the approach to the future risk to the network assets associated with climate change needs to be carefully considered with stakeholders and also consider our legislative drivers.

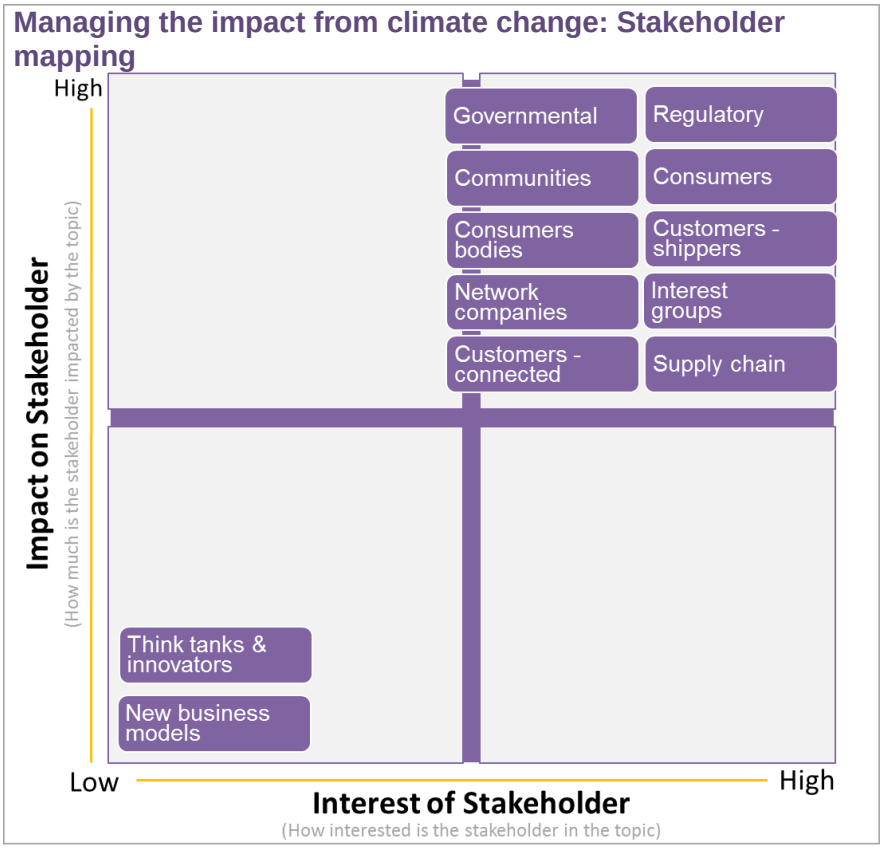


Outcomes

To gain stakeholder views on whether we should take a proactive or reactive approach to dealing with climate change impacts

Stakeholder mapping

We asked our stakeholders to indicate how impacted and interested they are in managing the impact from climate change:



We asked:

Polls:

Should we be proactive or reactive in managing these impacts?

1. Proactive: mitigate against flooding by investing in flood defences etc. – 42%
2. Risk based: mitigate high risk sites and manage remaining as appropriate – 53%
3. Reactive: insure against these impacts and manage the clean-up – 5%

What we've heard:

"asset replacement programme should absorb the cost of having assets that are less likely to be affected by climate change." – [redacted], Supply Chain

"The only downside of a reactive approach may be public perception. Climate change needs to be taken into account in the short, medium and long term." – [redacted], Regulator

"As long as National Grid justify what their decision is based on in terms of which principle is best, then the outcome should be okay." –[redacted], Consumer Body

"National Grid need to have good risk management, so that they can maintain assets to deliver a reliable network for the customers." – [redacted], Network Company

"Adaptation can be seen as partly negative as that's reactive. Are we covering logistics and supply chain issues? Wellbeing of employees working in these conditions?" – [redacted]

"NG could do is nature-based solution. I.e. flooding, one programme dairy companies are doing is connecting with farms upstream. Look at assets that are at risk of flooding, planting woodland upstream etc to protect out downstream assets – opportunity." –[redacted], Customer Connected

Conclusions from engagement

The key outputs from this engagement are within the Gas on and Off the NTS chapter. We are currently still developing proposals which will be presented at a later date through the 'Golden Thread' approach.

Environmental stewardship

Background:

Environmental stewardship is driven by our commitment to being a responsible business. No formal legislation requires companies to take a holistic approach to social sustainability where its actions interact with the environment however, there is a strong public interest and public perception consideration to the work we undertake. Our activities in this area are company-wide, rather than specific to gas transmission.

Environmental education centres

National Grid currently funds four environmental education community centres to share knowledge and learning with the communities in which we conduct business. These centres fund access to nature for socially and/or economically disadvantaged communities. Funding by National Grid is supplemented by additional external funding and the centres received over 40,000 visitors last year, including 25,000 educational visits and over 10,000 attendees at community events. Visitor satisfaction at the centres scores 9.6 / 10.

Natural Grid approach

The Natural Grid approach is a scheme which looks to implement more sustainable approaches to land use and management in collaboration and partnership with third parties. This includes identification of areas of shared interest and value including educational services e.g. green gyms, horticultural therapy and courses for children and adults. This model looks to manage our land proactively which is different from our historical, reactive approach and helps us to better understand the benefits services and values associated with our land. We have rolled out this approach at a number of gas transmission sites including Aylesbury, Warrington and Wormington compressor sites, and hope to have 50 sites by the end of RIIO-T1 (2021). As part of our RIIO 2 business plan we are looking to engage on how our land can deliver wider benefits to our stakeholders whilst being mindful of the process safety risks associated with our assets and the need to minimise populations around them.

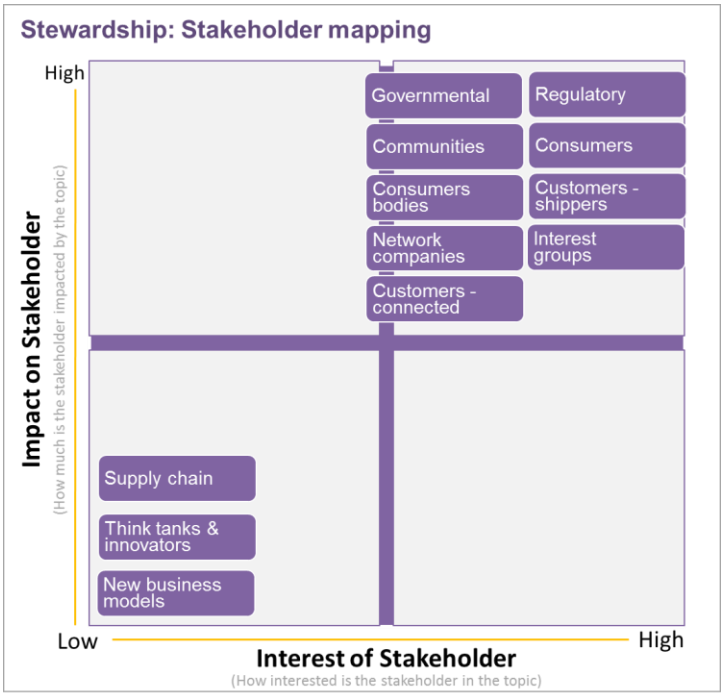
Outcomes

To gain a clear understanding of stakeholder' views on our approach to environmental stewardship, particularly around:

- Our environmental education centres
- Natural Grid approach (how we use the land around our assets) including Sustainability action plans

Stakeholder mapping

We asked our stakeholders to indicate how impacted and interested they are in stewardship:



We asked:

Discussion questions:

- What do you think about our current approach to environmental stewardship?
- What should we do in the future in relation to the environment as part of our wider corporate social responsibility work?
- Who should pay for these types of activities?

Polls: We asked:

Are our environmental stewardship activities relevant and appropriate?

- Yes - 80%
- Mostly - 20%
- No – 0%

Relating to environmental stewardship, National Grid Gas Transmission should:

- Do more – 80%
- Continue as is – 20%
- Do less – 0%

What we heard:

"Social aspects are important but cannot put a financial value on. How many sites do we have? 4. Would be happy for the additional cost of 0.5p on the consumer bill. Could we do more sites in Urban areas? More industrial skills?" - [redacted] Network Company

"Should be done but shouldn't be paid for by customers. Investments in the related buildings etc should be self-sufficient, reducing reliance on carbon – Notice we had none in Scotland. Every one of our sites should be considered" - [redacted], Supply Chain

'Provides education and raises profile of the environment which is critical' – [redacted]

"Do you ask the local community before you do anything? some othes in sector have a charity of the year – what ever they give comes off profits and not off peoples bills. Eg cancer uk but money from that goes to support England and not Scotland. Need to chose ore local charities. NG should pay for this!' – [redacted]

"Should be done but shouldn't be paid for by customers. Investments in the related buildings etc should be self-sufficient, reducing reliance on carbon – Notice we had none in Scotland. Every one of our sites should be considered" – [redacted]

Conclusions from engagement

Stakeholders see the value in this approach and encourage us to continue. There are questions asked as to whether this should be funded by consumers or by us. We are undertaking consumer engagement on these topics and will update this section when we have these results.

Update October 2019

The additional insight captured through our consumer engagement channels on this topic is summarised in the table below. This includes the online slider tool, the consumer immersion workshop and willingness to pay survey.

Supporting the local community – domestic consumers	Evidence 1	Evidence 2	Evidence 3	Evidence 4	Evidence 5	Evidence 6
New stakeholder insight and information	Domestic consumers are willing to pay £4.79 per consumer per year to support current level of community schemes compared to no support and are willing to pay £6.85 per consumer per year to support current level of community schemes and additional funding to charities and other organisations compared to no support. "Supporting local communities" has the fourth (of six) highest average rank (fourth most important), when ranking priorities, followed by minimising disruption to gas supply and minimising gas bill. Approx. 15% consumers rank supporting local communities as the highest priority.	Participants were asked to come up with suggestions of ways NGGT can help members of the public. Of the suggestions proposed, "encourage STEM subjects" ranked 2nd, followed by "work with others to help communities" which ranked 3rd and "employees to dedicate volunteer hours" came 5th (last). Other ideas that were proposed by the respondents included charity work, apprenticeships, education (e.g. on low carbon) and effective restoration of sites.	Consumers were presented with a number of options to vote on what type of community and charity work NGGT should focus on, on a scale of 1-5. Support was highest for work with vulnerable members of society, followed by tackling fuel poverty, promoting education (STEM), helping communities, with the generic goal of supporting charities falling last. Views differed across respondents with 36% respondents giving the highest rank to supporting vulnerable people, 38% supporting fuel poverty, 32% promoting education, 24% helping communities and 21% supporting charities.	Consumers were asked how NGGT's community and charity work should be funded and 45% of respondents felt costs should be shared between NG and consumers, 37% believed NG should pay and 7% thought costs should be paid by consumers. Results varied by age groups. 45-54 year olds were significantly more likely than average to expect NG to cover all costs (48%).	Consumers were asked what NG should do with any money made from selling excess electricity generated through renewable technologies. Consumers were asked to vote on 4 investments on a scale of 1-5. Of these, local projects focussed on energy efficiency or the environment were most selected, followed by donations to charities dealing with vulnerable or fuel poor households. Donating to a selected, but unspecified charity partner was the least favoured option.	To improve the environment around transmission sites, for an additional 3 large sites and 10 small sites, non-domestic consumers would be willing to pay £9.91 per consumer per year or 0.31% of the change in the bill and for an additional 11 large sites and 30 small sites non-domestic consumers would be willing to pay £36.35 per consumer per year or 1.13% of the change in the bill. "Protecting the local environment" has the second highest average rank (ranked as the second least important) with less than 10% stakeholders stating it as the highest priority.
Stakeholder source	Domestic consumers	Domestic consumers	Domestic consumers	Domestic consumers	Domestic consumers	Non-domestic consumers
Trade-offs between priorities (affordability, reliability,	"Minimising the gas bill" and "minimising disruption to gas supply" have a higher	No trade-offs across topics, consumers are simply stating preferences from a set of options provided.				Trade-offs between environment and affordability

environment)	rank (less important for consumers) compared to "supporting local communities".					
Source document	NERA/Explain WTP Study	Consumer immersion workshop - February 2019	Interviews with bespoke tool ('slider tool')	Interviews with bespoke tool	Interviews with bespoke tool	Acceptability Survey
Robustness	The findings are generally relevant and representative. However, the specific monetary values should be treated with caution, given the issues associated with validity.	The findings are relevant but less likely to be representative or valid given the risk of bias.	The findings are relevant and representative. There are some issues with validity.	The findings are relevant and representative. There are some issues with validity.	The findings are relevant and representative. There are some issues with validity.	The findings are relevant and representative for domestic customers. However, there are some issues with validity as consumers may find it difficult to comment on very small bill increases
Relation to existing stakeholder evidence in BP	The high WTP for supporting the local community reinforces the existing Business Plan conclusions.			New area	New area	
Changes to the BP conclusions and proposed actions	None required					No changes are recommended, but we propose that NGGT reflects on the weak support for more investment so as to place their proposed actions in context.

Responsible Construction

Background

As we develop and maintain the network, through compressor replacement or new connections we want to make sure the environmental impacts of our construction projects are minimised. This includes sourcing from environmentally sustainable suppliers using low carbon materials and ensuring that permanent habitat loss and associated value is understood, compensated for and mitigated against in better ways that provide a net positive contribution.
We have the following targets across our construction portfolio for both gas and electricity transmission:

- Reduce capital carbon of our major construction projects by 50% by 2020.
- 100% of waste is diverted from landfill (excluding industry restrictions) by 2020.
- Have 30% of aggregate from secondary or recycled sources by 2020.
- Drive net gain in environmental value (including biodiversity) on major construction projects by 2020

We have a contractor resource forum where we work with our contractors to deliver a collaborative action plan ensuring we achieve our resource targets and share good practice. Within RIIO we have taken key steps to ensure we are driving towards these targets on our gas transmission construction projects and will look to engage with stakeholders as part of our next phase of engagement on how we can embed further improvements as part of our RIIO 2 business plan.

Outcomes

To gain a clear understanding of:

- Stakeholders' ambition to embed the cost of carbon in to decision making
- Stakeholders' ambition to deliver environmental net gain projects

We asked:

Discussion question: How far should we go to protect our environment through our construction activities?

- Should we go as far as carbon neutral?
- Should we ensure we deliver net gain or is 'putting back' enough?

Poll: "Should we look to have carbon neutral construction projects?"

- Yes, you should reduce emissions and offset all construction activity – 73%
- Yes, you should reduce emissions and offset on major projects – 13%
- You should focus on reducing emissions but not pay to offset – 7%
- No, deliver the project at minimal cost – 7%

What we heard:

"Carbon negative. Can we use aspects of infrastructure to facilitate carbon capture? More stuff we can do on carbon sinks. Is offsetting purely focused on carbon reduction or bio diversity?" - [redacted], Network Company

"Carbon neutral, Drax using biofuel to be carbon negative" - Natural Gas Solutions (UK) Ltd
"Carbon negative, cautious of companies that do carbon offsetting. Must influence locally. Can we make our land accessible for protected species? Reptiles? Badgers." - [redacted], Supply Chain

"Other ways around offsetting that avoid paying someone external to do it i.e. have wind turbines etc on our own land. Is paying to offset the right way? Or are there ways of offsetting within your own control that can be more effective." - [redacted], Network Company

"We need to put more in than we take out – reality is with construction – in long term, need to get back. Rather than go for a neutral approach, go for a net gain approach." [redacted] Supply Chain

Conclusions from engagement

From the stakeholders we engaged with, there is a clear message that we should reduce and offset the carbon emissions from our major projects. There was also ambition to explore biodiversity net gain where possible.
Our RIIO 2 proposals for our construction work are to achieve carbon neutral construction by 2026 by implementing the PAS2060 standard and implement an offsetting policy. We will continue to work collaboratively to ensure carbon neutral construction is a priority within the supply chain where relevant.

Update October 2019

The additional insight captured through our consumer engagement channels on this topic is summarised in the table below. This includes the online slider tool, the consumer immersion workshop and willingness to pay survey.

Responsible asset use and caring for the natural environment – domestic consumers	Evidence 1	Evidence 3	Evidence 4	Evidence 5
New information	To improve the environment around transmission sites, for an additional 3 large sites and 10 small sites, domestic consumers would be willing to pay £3.61 per consumer per year and for an additional 11 large sites and 30 small sites domestic consumers would be willing to pay £5.37 per consumer per year. Almost 50% respondents chose "protecting the local environment" as their highest priority and it received the highest average rank (in comparison to fighting climate change, supporting innovation, supporting local communities, minimising disruption to gas supply and minimising gas bill, in order of priority.)	Consumers were asked what NGGT's approach should be in adapting sites from 2021 to 2026. Just over half of the respondents answered obtaining the greatest overall environmental value from each site (53%), with 25% voting for creating important habitats for wildlife identified by local partners, 10% voting to give local communities more access and 12% advising NG to stop undertaking such projects or unsure of their response.	Participants were asked to come up with suggestions of ways NGGT can help members of the public. Of the suggestions proposed, "make land available for others" ranked 4th (out of 5). There was also a good degree of consistency between social groups as to the relative priority of “making land available to others”.	To improve the environment around transmission sites, for an additional 3 large sites and 10 small sites, non-domestic consumers would be willing to pay £9.91 per consumer per year or 0.31% of the change in the bill and for an additional 11 large sites and 30 small sites non-domestic consumers would be willing to pay £36.35 per consumer per year or 1.13% of the change in the bill "Protecting the local environment" has the second highest average rank (ranked as the second least important) with less than 10% stakeholders stating it as the highest priority.
Stakeholder source	Domestic consumers	Domestic consumers	Domestic consumers	Non-domestic consumers
Trade-offs between priorities	"Minimising gas bill" has the highest average rank (least important), followed by "minimising disruption to gas reply" (second least important), while "protecting the local environment" has the lowest average rank (most important for consumers).	Does not inform on trade-offs with respect to affordability but gives views on stakeholder preferences around preferred final use for land after improvement works.	No trade-offs, with respect to affordability or reliability as stakeholders were choosing between different ways NGGT can help the public.	Consumers have made trade-offs between environment, affordability and reliability. "Minimising disruption to gas supply" and "Minimising the gas bill" have a lower average rank (more important for consumers), with "minimising the gas bill" considered the most important of the three and "protecting the local community" the least important.
Source document	NERA/Explain WTP Study	Interviews with bespoke tool	Consumer immersion workshop - February 2019	NERA/Explain WTP Study

Robustness	The findings are generally relevant and representative. However, the specific monetary values should be treated with caution, given the issues associated with validity Faced with complex choices, people are likely to simplify any problem they are presented with that they don't know about. People often exhibit loss aversion and do not want to lose the service they have now, so they tend to weight small probabilities very highly.	The findings are relevant and representative. There are some issues with validity, respondents' ability to answer meaningfully may be limited by the experiences that they have had, and making choices based on very small sums of money.	The findings are relevant but less likely to be representative or valid given the risk of bias - focus group research is very difficult to carry out without bias – for example, answers may be driven by participants seeking social affirmation.	The findings are generally relevant and representative. However, the specific monetary values should be treated with caution, given the issues associated with validity.
Relation to existing stakeholder evidence in business plan	Reinforces the existing Business Plan conclusions.	Reinforces the existing Business Plan conclusions.	Reinforces the existing Business Plan conclusions.	The WTP estimates do indicated that non-domestic stakeholders support the quantum of activity NGGT is proposing – but the low priority given to this by non-domestic customers may require a specific mention in the plan.
Changes to the business plan conclusions and proposed actions	No further actions are required on the basis of this feedback.	None required.	None required	We recommend that NGGT sets out the diversity of views between domestic and non-domestic consumers and explains how despite this it considers its proposed actions justified.

Responsible Demolition

This is covered in a separate engagement log

Other consumer insight

There is some final consumer insight which is not aligned to any particular sub topic, presented in the table below:

	Evidence 1	Evidence 2	Evidence 3
New information	Respondents were asked to rate five investment areas on the importance they would place on a scale of 1 to 5 for investment in innovation. Based on average rank, "environmental impact" ranked third, with 45% respondents giving a ranking of 5 (extremely important) on a scale of 1 to 5. A majority of consumers (almost 70%) ranked "environmental impact" as highly important or "important". 45% of respondents ranked it as 5 (extremely important), 24% as 4, 18% as 3, 8% as 2 and only 6% as 1 (not at all important).	Respondents were asked to rate the importance of four investment areas on a scale of 1 to 5, where NGGT should replace equipment and increase maintenance work. The average rank of "environment" was third (behind "health and safety" and "reliability" and ahead of "transport"). At the same time, 41% of respondents identified "environment" to be a very high priority for NGGT (similar figures for "health and safety" and "reliability" were 48% and 43% respectively), 25% as 4, 20% as 3, 6% as 2 and 7% as 1 (very low priority).	As part of the consumer immersion workshop, participants were asked to come up with suggestions of ways NGGT can help members of the public. Of the suggestions proposed, "improve environment" ranked the highest (among other suggestions - encouraging STEM subjects, working with others to help communities, make land available for others, dedicate volunteer hours to employees).
Stakeholder source	Domestic consumers	Domestic consumers	Domestic consumers
Trade-offs between priorities	Looking at the average rank, "Environmental impact" was placed third, behind "reliability and maintenance" and "safety and engineering", and ahead of "security" and "decarbonisation of energy", which was a much lower priority for stakeholders.	Environment was ranked third, behind "health and safety" and "reliability" but substantially ahead of "transport" based on average ranks.	No trade-offs, as other options presented / suggested were also on improving the environment in some way.
Source document	Interviews with bespoke tool	Interviews with bespoke tool	Consumer immersion workshop - February 2019
Robustness	The findings are relevant and representative. There are some issues with validity -respondents' ability to answer meaningfully may be limited by the experiences that they have had, and making choices based on very small sums of money.		The findings are relevant but less likely to be representative or valid given the risk of bias. Focus group research is very difficult to carry out without bias – for example, answers may be driven by participants seeking social affirmation.
Relation to stakeholder evidence in business plan	Reinforces the existing Business Plan conclusions		
Changes to the business plan conclusions and proposed actions	No change is needed.		

Triangulation of stakeholder engagement outputs

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

What new evidence is there on stakeholder views?

The majority of domestic consumers find the July Business Plan proposals relating to environment and communities, and the associated bill increases acceptable. A significant proportion (around a fifth to a quarter) accept the proposals but not the bill increases. This is backed up by the general finding that improving the environment (air quality, carbon emissions, local community and the environment) is very important for domestic consumers.

Non-domestic consumers see action on climate change as particularly important and major energy users noted that there was a societal obligation for action on methane.

Supporting the local community is of importance to stakeholders. However, views are not consistent across all stakeholder groups and evidence collected. Domestic consumers tender to support it, while other stakeholders offer less support. Community schemes are considered generally considered less important by stakeholders (including domestic consumers) than initiatives to improve the environment. However domestic and non-domestic consumers are willing to pay more in this area.

Ideas supported by domestic consumers on ways National Grid Gas Transmission (NGGT) can help the public resulted in suggestions similar to those currently employed / proposed by NGGT in the Business Plan. The majority of domestic consumers believe that costs for NGGT's charity and community work should be shared between NGGT and customers. However, a small proportion of consumers also believe that costs should be borne entirely by NGGT.

Are there particularly diverse views or a consensus?

There is a consensus that action on environment and communities are important priorities. There are mixed views among consumers on the acceptability of bill increases. Domestic and non-domestic consumers make different trade-offs between protecting the local environment and reliability and affordability. While domestic consumers gave protecting the local environment the highest priority, non-domestic consumers considered it as relatively less important. There is a consensus that action in the area of air quality is important. There are mixed views among consumers on the acceptability of bill increases.

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

This is in line with the stakeholder findings reported in the July Business Plan.

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

No major changes. More evidence on the approach NGGT has taken to secure cost efficiencies in this area could be included. It may also be useful to set out where there are differences in views between domestic and non-domestic consumers.

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

Stakeholders care about protecting the environment and the majority accept the trade-offs NGGT is making between cost and action in this area. Since a significant proportion of domestic consumers do not accept the associated bill increases, any further actions stakeholders take in this area would need to be carefully justified as cost-effective.

For air quality, given the strong emphasis received on cost-effectiveness from stakeholders for the July Business Plan, National Grid should only go beyond the measures set out in the July Business Plan where further cost-effective options are available.

Part 2: Stakeholder Group Challenge

Stakeholder Pre-Meeting Feedback

National Grid circulated version 1 of this engagement log in advance of the Stakeholder Group meeting on the 29th of November 2018. Pre-meeting calls were held to collect feedback on the log and any points of clarification. The details are presented in the table below:

Topic specific feedback and points of clarification		
Pre-meeting calls	**Feedback**	**National Grid Response**
[redacted]	1. Is UAG £70m? Seems high – is that all shrinkage? 2. Really liked the Frontier insight; although some of the questions may not meet that advice: 3. 'Should we have a consistent approach' - may be a no-brainer 4. Should wider corporate social responsibility work be treated differently? Should this be a shareholder expense (and so not funded) and so of less interest in terms of business planning (compare with core activity such as shrinkage) 5. Could all responses be included in appendix (within reason).	1. This is the total cost as per RRP (2017/18). 2. We acknowledge we may not have fully implemented the Frontier advice for the first workshop. We learnt from this for the second workshop and used to improve this session (this is explained further in the appendix) 3. Asking about a consistent approach can feel like a no brainer, however we wanted to qualify what we thought we knew by asking and explaining this during the workshops. This removed doubt and demonstrated that we weren't assuming what stakeholders wanted. 4. Shareholder expense – We believe that as the assets are managed through stakeholder investment, then the environmental compliance of the asset should be too. Where we are asking for the "beyond compliance" investment, we were testing this during the workshops to establish whether there is an appetite for stakeholders to pay for this, or expect National Grid to include it within the business plan. We continue to explore this with stakeholder, e.g. through WTP work. 5. Our' insight' document is still live so as part of the July business plan submission we will look to provide a full download of all responses.
[redacted]	1. Are we subject to EUETS – should be discussed in the engagement log e.g. what happens after BREXIT or a move to a carbon tax. If NG has a large financial incentive through EU ETS then stakeholder engagement is less impactful. Engagement might need to evolve accordingly.	1. The UK government has proposed a carbon tax in replacement of EUETS post Brexit. Details are still being developed as the Brexit process unfolds, but it is expected to be similar to the arrangements we have in place currently. The carbon element is a pass-through cost to the shippers, so by focusing on reducing carbon emissions, National Grid can improve efficiencies within the system.
[redacted]	1. What is the performance against target and are the targets challenging enough? 2. Renewable generation onsite – common elsewhere. 3. Environment as an add on rather than integral to business; Top down rather than bottom up 4. Innovation – how many different third parties? 5. [redacted]...so what ?	1. Please see incentives paper for SG7. 2. Renewables – National Grid has been unable to utilise renewables onsite due to a licence condition which prevents it. Inclusion within other elements of the Business Plan will promote the needs case for using renewables onsite. 3. We have developed the gas transmission environment framework to map our strategy aspirations, tactics and measurements for all aspects of the environment topic. The draft Environment chapter also seeks to articulate some of these bigger issues, articulating them in a way that draws this far-reaching subject together.

		4. We have added additional detail on the innovation projects undertaken within RIIO 1 in the appendix. 5. [redacted] – National Grid collaborates with a number of European groups ([redacted] being one of them) which has provided sound routes for lobbying the EU; a good example of this is the extension to the MCP deadline from 2025 to 2030. This is cost effective for stakeholders as it enables a shallower gradient of investment, with constant corrections based on rebased scenarios for compressor utilisation.
[redacted]	1. It's more difficult to understand from this log how initial engagement was done – the description is vaguer than others on the methods used and the feedback received. 2. I understand the concerns re very technical questions etc. raised by Frontier but the questions ultimately arrived at seem still either quite technical or slightly artificial either/or choices – e.g. votes on fugitive and vented emissions or whether to be proactive or reactive in managing the impact of climate change. It would also have been useful to understand how the differences in opinion, where they exist, reflected different stakeholder groups. 3. It wasn't very transparent to me how the conclusions, particularly around mitigating climate change impacts, were arrived at from the engagement – particularly, for example, re only reactive response. Agree with conclusions that this is still at a relatively early consultation stage. "	Comments noted. We looked to improve on the early engagement events in the planning for the workshop in Edinburgh. We have also restructured the Engagement Log to allow a clear flow on each topic from desired outcomes through to conclusions. Finally we have engaged Frontier to review the material and they will provide independent assessment of conclusions.
[redacted]	1. Peterborough – we have had the discussion about gas units being replaced with other gas units 2. Vehicles – target to move to low carbon vehicles by 2030 – why not sooner? typical lifecycles would be every 4 years so 3 replacements by then. CNG, H2 or electric vehicles. 3. Environment education and communities – should this be shareholder not stakeholder funded. 4. Suggestion to look at onsite generation is a good one. Many companies going this way in light of government taxes	1. The decision on gas versus electric drives is determined through the BAT (Best Available Technique) process. The cost of an electric drive unit is higher than a gas unit, hence typically gas drives are the preferred solution where a high voltage connection is difficult and/or costly to install or where the predicted run hours of the unit are low. 2. There were two drivers for the 2030 target date for swapping out the fleet of low-carbon vehicles; the first being that during consultation with the business we understood that the fleet replacement is slowing due to cost challenges, bearing in mind that this target only covers the commercial fleet (vans etc) not company cars. The second driver is that there just aren't the options in the market to change all of the commercial vehicles yet, particular for the larger vehicles or commercial vehicles covering greater distances, the anticipation is that by 2030 the market and technology will have caught up. 3. Shareholder expense – We believe that as the assets are managed through stakeholder investment, then the environmental compliance of the asset should be too. Where we are asking for the "beyond compliance" investment, we were testing this during the workshops to establish whether there is an appetite for stakeholders to pay for this, or expect National Grid to include it within the business plan. We continue to explore this with stakeholder, e.g. through WTP work.
[redacted]	1. Keen that we pull out the main focus under environmental legislation is MCP – where are we at after the reopener decision, what's been done to move forward	1. This is now covered in more detail in the emissions compliance deep dive paper. Our current proposals are presented however Ofgem has requested a compressor emissions compliance strategy (CECS) document to complement the business plan submission and the Network capability studies are still ongoing.

What was the outcome of the Stakeholder Group challenge and review?

At the Stakeholder Group meeting held on 27th November National Grid gave an overview on the topic of Environment and the insight gathered from the engagement undertaken to date. The Stakeholder Group questioned why the engagement activities had been low in number to date and then went on to participate in an interactive session within their constituency groups identifying the positive aspects and the limitations of the engagement log. Key topics emerging from the interactive session included:

- The environment perceived as an 'add on' rather than integral to the business, and clarity required on differences between corporate responsibilities and those of the gas transmission business only.
- Clarity required on stakeholder segmentation between customers, consumers and communities.
- Differentiation needs to be made between compliance requirements and those which are business choices.

The Stakeholder Group identified positive points such as the Open questions - "what should we do on the environment?" and recognition of gaps and challenges of engagement. Eight formal challenges were agreed and incorporated in the challenge log. There were two actions which were closed at the next Stakeholder Group meeting.

Topic specific challenges from Stakeholder Group discussion. **Meeting SG-04 27/11/2018**		
ID	**Challenge**	**National Grid Response**
77	Framing of engagement needs clarity - consequences of options and context given in the questions. Questions felt forced and did not follow Frontier advice	This feedback was noted and alongside the Frontier guidance, we looked to improve on the framing of the question in the planning for the Edinburgh event held in December 2018. The questions were developed further and are included in the appendix.
78	More needed on societal impacts including third party comparators/sources and the different impact on customers, consumers and society	We have seen a diversity of views between the three stakeholder segments mentioned and our consumer engagement will provide additional direct insight. We have seen for example, differences in views between customers and consumers with regards to environmental stewardship activities. Whilst for decommissioning and emissions management predominantly costs are incurred by customers and consumers and the environmental impacts are predominantly felt by local society. We have mapped the impact felt by the various groups onto the table below:

		<table><tr><th>*Topic*</th><th>*Customers*</th><th>*Consumers*</th><th>*Society*</th></tr><tr><td>**Climate Change commitment**</td><td>*Medium*</td><td>*Medium*</td><td>*High*</td></tr><tr><td>**Supporting Communities in which we work**</td><td>*Low*</td><td>*Low*</td><td>*Medium*</td></tr><tr><td>**Compressor Emissions**</td><td>*Low*</td><td>*Medium*</td><td>*Medium*</td></tr></table> We have asked Frontier to validate this mapping in their assessment of our engagement outcomes and 3rd party sources.
79 83 84	Environment felt like an add on - need to articulate 'the journey' with the stakeholder support and input. Why are we at an early stage? What is the compliance burden i.e. what we need to do and what we choose to do. Bigger issue of sustainability needs to be articulated. Overlapping and conflicting - EUETS and the difference between compliance and other expenditure Wider CSR doesn't link to business plan- difference in views and integral part of reflecting societal views	Additional detail has been provided on page 7 detailing the legal frameworks and regulations National Grid must comply with. Whilst we have certain legislative drivers, there is often a number of ways in which we can achieve compliance with the legislation and stakeholder engagement on these options is a key element of the 'journey'. We have also developed the gas transmission environment framework to map our strategy aspirations, tactics and measurements for all aspects of the environment topic (see appendix). The draft chapter seeks to articulate some of these bigger issues, articulating them in a way that draws this far-reaching subject together. We are also exploring further with stakeholders what our role should be with regards to activities that go beyond legislative requirements; whether there is an appetite for stakeholders to pay for this, or expect National Grid to include it within the business plan.
80	Not enough detail on innovation and options to manage the environmental impacts	We have added additional detail on the innovation projects undertaken within RIIO 1 in the appendix. Output from these projects will be included in our future options analysis for managing environmental impacts. For example; within RIIO 2 Selective Catalytic Reduction will be an option for compressor investment as a potential alternative to new units.
81	Define ' environment'	The UN use the Organisation for Economic Co-operation and Development (OECD) definition for environment as being, "the totality of all the external conditions affecting the life, development and survival of an organism." In relation to National Grid Gas, this is considered to be living element of the planet, for which our activities can have an impact on.
82	Define key stakeholders and ensure these are the full range - where are the green gas, bio methane stakeholders?	We have attempted to engage with these groups, however, have been unable to get insight relevant to this topic from green gas and bio methane stakeholders. We have primarily engaged with these organisations on the topic of connections, through our innovation Project CLoCC and through operational forums.

Actions from Stakeholder Group discussion			
ID	**Date**	**Action**	**National Grid Action**
SG04-G03	27/11/2018	TK to provide additional detail on RIIO 1 context e.g. current underperformance against the on GHG emissions target.	See incentives paper for SG7 in April
SG04-G04	27/11/2018	TK to provide information on all sources of carbon emissions.	Briefing note in the SG 5 pre-read pack and on Huddle under the Actions folder. Added as an appendix to this Engagement Log

Conclusions:

We have made a number of business plan commitments on this topic, including but not limited:

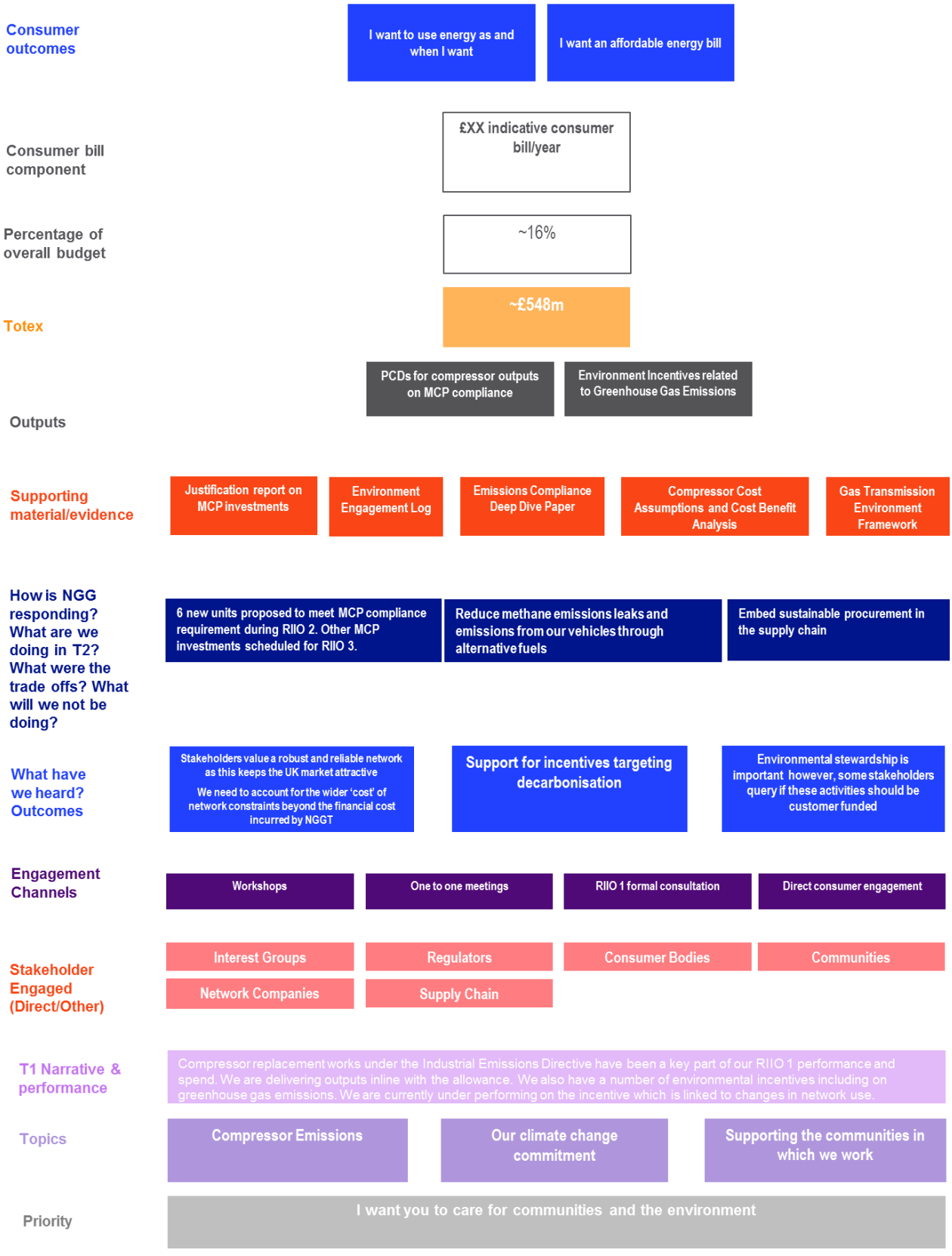
- Compressor emissions compliance
- Replace 100% of our operational vehicle fleet with alternative fuel vehicles where there is a market alternative today (in 2019). Currently, this results in 30% of our operational fleet that will be delivered through purchasing 80 vehicles and install charging points at 45 sites with aim to reduce carbon emissions from operational transport by 22% on RIIO-1 averages to end of RIIO-2.
- Install renewable generation on our operational sites for our own use during RIIO-2, starting with compressor sites.
- Achieve carbon neutral construction for major projects by 2025/26 by further implementing PAS20260 and PAS2080, supported by an offsetting policy and based on current business assumptions that 26,000tCO2e can be offset with up to £310k.
- 75% of National Grid's top 250 suppliers (by category/spend) will have carbon reduction targets The direct influence of feedback from the stakeholder group is presented in the table below:

How feedback from the stakeholder group impacted National Grid and the RIIO-T2 business plan?	
Stakeholder Group feedback	**Impact on RIIO-T2 Business Plan (Outputs)**
N/A	
Stakeholder Group feedback	**Impact on National Grid Business / Processes**
Wider CSR doesn't link to business plan Environment felt like an add on	The feedback prompted the development of the gas transmission environment framework to map our strategy aspirations, tactics and measurements for all aspects of this topic included in the RIIO 2 business plan. Further work is ongoing to develop the strategy to underpin this framework.
Wider CSR doesn't link to business plan	Further work eg through WTP, to explore stakeholder views with regards to us undertaking activities that go beyond legislative requirements; whether there is an appetite for stakeholders to pay for this, or expect National Grid to include it within the business plan.
Framing of engagement needs clarity - consequences of options and context given in the questions	Further work with Frontier ahead of second Environment Workshop to ensure appropriate framing of questions.

The golden thread diagram was used for our october plan to illustrate how the business plan outputs aligned to stakeholder engagement outcomes:

Environment

Draft position, subject to further work

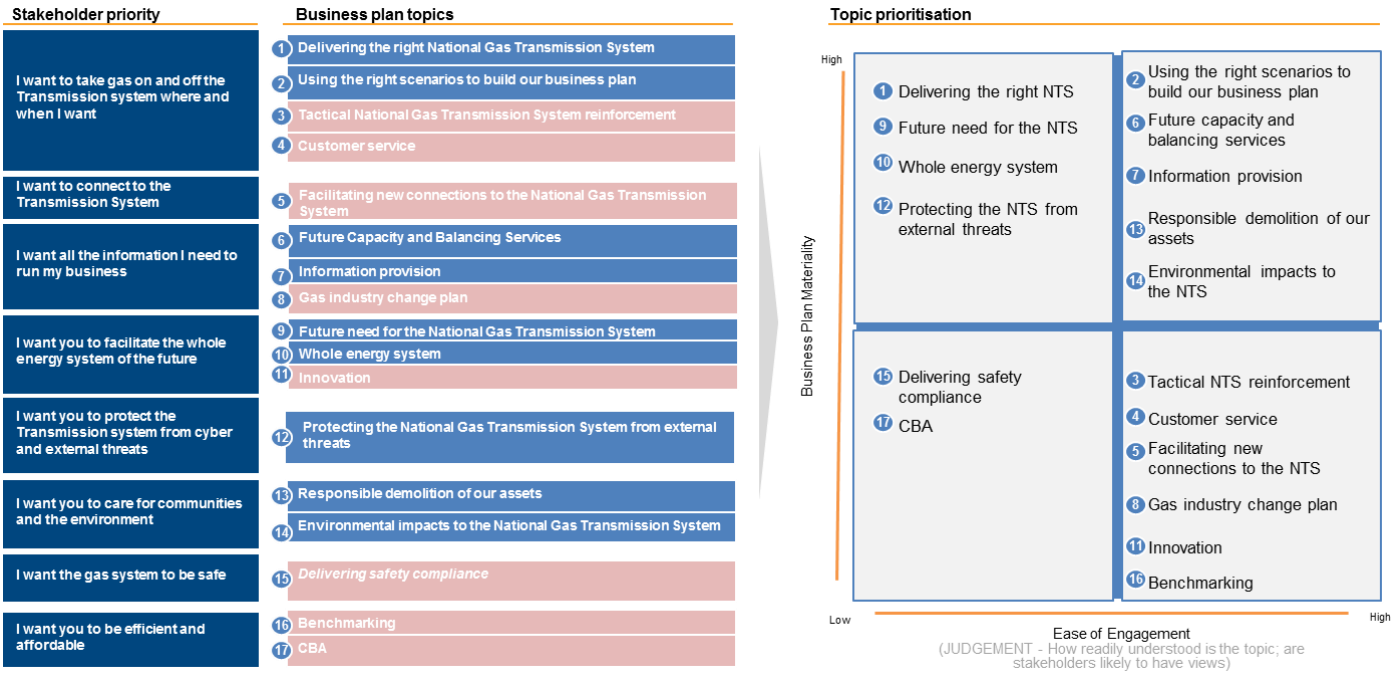


nationalgrid

Appendices

Appendix 1 - The link to the stakeholder priorities and the scale/materiality of the topics

The environmental topics discussed with our stakeholders are pertinent to the core priority of "I want you to care for the environment and communities". The importance of these topics to our stakeholders, and the materiality within our business plan, mean that these are key areas of relevance for engagement with our stakeholders. Emissions and climate change adaptation are gas transmission's most significant environmental risks as recorded in the ISO 14001 accredited Environmental Management System (Risks and Opportunities Register). At the Stakeholder Group meeting 2 the topic was classified as having a high materiality and therefore deemed relevant for discussion at the Stakeholder Group, as demonstrated by the following matrix:



There are multiple interactions with other elements of our business plan when considering environmental outcomes. Specifically, the other areas of focus included security of supply – ensuring that we fully understand our environmental risks, as well as others to ensure supply is maintained during times of difficulty, and innovation and the utilisation of new technology to reduce environmental impact e.g. should methane recompression be considered in order for National Grid to meet its stakeholder expectations. There are also a number of topics within the reducing the business carbon footprint area, which have not been part of our engagement activities to date, but will be developed further as we move into the next phase of work.

Within the overarching topic emissions has the highest materiality level, followed by climate change and environmental stewardship. Climate change however has a low level of ease of engagement

(our activities cannot be easily impacted by stakeholders and there is a relatively low level of spend) whilst environmental impacts and environmental stewardship are moderate.

Regional variations are a more prevalent consideration on this topic than some of the gas transmission activities. Engagement from the regional events we held to explore any differences, feedback and insight did not bring out any key regional insights. However, our business as usual insights, for example from construction activities, do highlight the continued need to tailor our approach to the specific location. The nature of the climate change risk is also site specific, however we would look to develop a common strategy and methodology for application at a regional level.

Appendix 2 – Business as Usual and Existing Insight

We have a range of existing insight which we have used to develop our RIIO 2 engagement activities and which will help inform our RIIO 2 business plan. An overview of the following areas given below:

- Direct Consumer Engagement Project
- Safety, Health & Sustainability (SHS) Strategic Stakeholder Engagement
- Compressor Construction Engagement
- River Humber gas pipeline replacement project
- Incentives
- Liaison with Environmental Regulators
- Innovation
- Marcogaz

Direct Consumer Engagement Project
In 2017, we commissioned a report through Populus ('National Grid's reputation and influence') which gave some useful insight into the views of consumer priorities. The need to deliver a more sustainable energy network ranks second out of seventeen priorities. 'Going beyond obligations to reduce carbon emissions' is a lower priority (tenth out of seventeen).

Safety, Health & Sustainability (SHS) Strategic Stakeholder Engagement
Our SHS department represent National Grid at a corpate level on all aspects of safety, health and sustainabililty. The team regularly engage with a number of stakeholders such as interest groups, our supply chain and investors who provide valuable insight into our approach and commitments to reducing our businss carbon footprint and our approach to environmental stewardship.
SHS engage with environmental non governmental organisations, including the Wildlife Trust, Field Study Council, Groundworks, The community volunteering charity (TCV) and the RSPB, who have said they would like to see us ensuring that environmental value is incorporated into decision making and that the way we shape our sustainable approach to land management is stakeholder-led. They would also like to see us work in partnership to utilise opportunities we have with our land.
In general, feedback is positive from the business as usual interactions that we have. When engaging with contractors in our supply chain, we have had the following insight:

- Positive feedback on us incentivising sustainability in tenders

- They like the good practice work and sharing ideas with each other through contractor resource forum

SHS also engage with investors who have stated that there is a greater focus from the financial community on ensuring climate change risk and opportunities are embedded into business plans and they expect us to align with major sustainability events and trends, e.g. the Paris agreement and Sustainable Development Goals (SDGs). SHS have also had some recent engagment with the Scottish Environment Protection Agency discussing the roll-out of their "One planet prosperity strategy" confirming the principles of their approach align to ours.
This provides valuable strategic insight for further consideration and assessment in our RIIO 2 business plan.

Compressor Construction Engagement
National Grid has two strategically important compressor stations at Peterborough and Huntingdon where major upgrades are now being implemented to meet stringent new environmental requirements. Through the course of the project design stage, stakeholder engagement was central to National Grid's consenting strategy, involving a wide range of stakeholders including neighbouring residents, local government and statutory bodies. Key engagement points included:

- Discussions with environmental regulators on the proposed selection of compressor machinery deemed to meet the requirements of Best Available Techniques (BAT) prior to purchase. This reduced the risk of potential non-compliance.
- Detailed discussions with technical officers in the local planning authority and environmental regulator to ensure that local environmental and amenity considerations were adequately addressed in preparing technical assessments and drafting submissions.
- Engagement on key design matters with the local parish councils, including attending a series of meetings to canvass opinions on key issues. This assisted us in addressing local concerns and still delivering our design objectives and customer requirements.
- Delivery of an information session for elected Council members at Peterborough, to provide a forum to discuss the project and answer questions.
- Engagement meetings with residents, where project specialists from National Grid were present to answer questions raised by our neighbours and local communities.

Our key learning from the process to take forward into our RIIO 2 business plan engagement is the extent to which local issues and concerns are of significance, necessitating that we adopt a flexible process capable of adapting to meet the differing needs of differing sites. This was emphasised in respect of Peterborough, where extended local stakeholder discussions were required in respect of certain key design issues, whereas at Huntingdon potentially sensitive local ecological receptors required detailed consideration. All necessary consents for both projects were secured, and conditions discharged, enabling the project to successfully progress to the build stage.

River Humber gas pipeline replacement project
National Grid are delivering a replacement gas pipeline beneath the Humber Estuary. The existing pipeline (Feeder 9) carries up to 20% of the UK's gas supply from Easington on the East Yorkshire coast through the NTS. The existing river crossing is approximately 5km long and was laid in a conventional open cut trench on the river bed. Over time, tidal patterns have eroded the river bed

that covers the pipeline leading to parts of it becoming exposed. The project was considered a "National Infrastructure Project", therefore a "Development Consent Order (DCO)" was required. There have been stringent environmental requirements for ecology, water, waste and flood risk requiring a number of plans and management strategies:

Water Management Plan: The DCO required hydrogeological studies and pump tests to ascertain potential impacts on aquifer with a bespoke dewatering design included a re-charge system to ensure no net loss of groundwater. The DCO also required flood risk assessments and response procedures involving close liaison with The Environment Agency throughout this process and an online dewatering dashboard was procured that was made available to The Environment Agency providing real-time data on progress of the dewatering operation.

Ecology Survey Plan
Liaison with ecologists and landowners has been essential and led to us making provision for water voles, marsh harriers and other wintering birds and wildlife. This included undertaking mitigation works such as installation of close board fencing around entire site to reduce visual and audible impact and fields set aside as foraging land to mitigate area taken up by construction site. Other plans included

- Removal of Trees & Hedgerows
- Flood Risk Management
- Landscaping & Drainage
- Archaeological Management Plan
- Traffic Management Plan

Learnings from these engagement activities are reflected in our RIIO 2 business plan thinking.

Liaison with Environmental Regulators (Natural Resources Wales (NRW), Scottish Environmental Protection Agency (SEPA) and Environment Agency (EA))
Regular engagement with the environmental regulators has provided Gas Transmission with insight in its approach to reducing and managing emissions across the gas turbine fleet. Positive feedback has been received from the biannual Network Review, which is supported by the exemplary record of compliance through the Operational Risk Appraisal (OPRA) appraisal system utilised by the environmental regulators. The Network Review is an opportunity to refer performance with the environmental regulators and commit to further investment in the NTS to further reduce its impact on the environment.

Regular engagement (weekly) occurs with our environmental regulators on compliance performance related topics. Gas Transmission currently has an excellent rating with all three environmental regulators according to Operator Risk Assessment (OPRA) scores, formally and publicly recorded in our compliance scheme's public registers. As our environmental regulators are responsible for permitting our combustion equipment, we engage with them at the design stage when investment is required. This is conducted through both formal, strategic meetings in the biannual Network Review meetings with all three regulators and on a local level with the individual inspectors of the respective installation.

Marcogaz

Marcogaz is the Technical Association of the European Natural Gas Industry and represents the European Natural Gas Industry on all technical issues. National Grid has been a member of Marcogaz for a number of years and it is a key forum for interaction and sharing learning with other European gas network operator, representing twenty other European countries. The focus of the group is on European technical regulation, standardisation and certification for pipeline systems including sharing learning on the application of the European emissions legislation.

Appendix 3 - RIIO Environmental Innovation

Environment has been one of the main areas within our innovation portfolio over the RIIO 1 period. Delivery of environmental benefits was one of the key principles behind the framework developed by Ofgem for the RIIO 1 innovation incentives and forms a core part of the eligibility for Network Innovation Allowance (NIA) and Network Innovation Competition (NIC) funding.

National Grid Gas Transmission now has 17 NIA projects aligned to the Environment theme of our portfolio and have worked with 13 different third parties to deliver this work. We have also collected insight from a range of stakeholders through our existing Network Innovation Allowance (NIA) and Network Innovation Competition (NIC) programmes. We typically spend £4m - £5m per annum on a range of NIA projects. A number of projects aligned to the topic of Environment are presented below.

Title	Status	Supplier	TRL Start	TRL End	Total Sanctioned (£)
Alternatives to Venting	Completed	DNV GL	TRL 3	TRL 6	1,553,000
Development of a new design vent silencer	Completed	Industrial Noise and Vibration Centre (INVC) & Health Safety Laboratory (HSL)	TRL 3	TRL 7	61,000
Heat in the Soil Form	Completed	Macaulay Scientific Consulting Ltd (Member of the James Hutton Institute)	TRL 3	TRL 4	170,000
Architectural Design of Compressor Site	Completed	AECOM	TRL 3	TRL 4	200,000
Compressor Balance of Plant Environmental Study	Completed	PESL	TRL 4	TRL 6	175,000
Renewable Power on Remote Installations	Completed	Premtech	TRL 4	TRL 5	40,000
Renewable Power Trial and Demonstration (Kiosk)	Completed	Premtech & Orbital Gas Systems	TRL 5	TRL 7	299,000
Resource and asset reuse toolkit	Completed	Sinclair Knight Merz (Europe) *collaborative with* Cadent Gas Limited & National Grid Electricity Transmission	TRL 4	TRL 5	189,000
Pipeline Noise Mitigation	Completed	DNV GL	TRL 3	TRL 7	40,000
PEMS emissions monitoring	Completed	Siemens Industrial Turbomachinery	TRL 5	TRL 7	151,000
SCR Selective Catalytic Reduction	Completed	Costain & AAF	TRL 3	TRL 5	647,500
NMT Noise Mitigation Tool	Delivery	PESL	TRL 3	TRL 7	333,296
Valve Pits Insulation	Delivery	Husht Acoustics & Centrotherm	TRL 5	TRL 8	221,250
CO2LOC Feasibility Study	Delivery	Cambridge Carbon Capture	TRL 2	TRL 3	44,313
2% Hydrogen in the NTS	Delivery	Pale Blue Dot	TRL 2	TRL 4	143,375

Monitoring of real-time fugitive emissions (MorFE)	Initiation	National Physical Laboratory	TRL 3	TRL 7	621,875
Captivate - Proof of Concept	Initiation	Cambridge Carbon Capture & Premtech	TRL 3	TRL 5	1,249,221

Across the portfolio, we have actively participated in a range of projects looking into reducing our carbon footprint, noise reduction and more recently projects investigating options for transportation of 'green' gas. A number of these have started to generate benefits as they become embedded into business as usual. For example:

Compressor Balance of Plant Environmental Study The aim of this project was to develop a software decision support tool which allows a comparison across a range of technology options on equipment such as valve actuators and fuel gas systems. The tool allows the user to perform qualitative or quantitative assessments against 21 environmental criteria such as air emissions, waste and noise, and six operational criteria such as constructability and maintainability. This helps in determining which offers the best environmental cost benefit balance for NGGT and its customers. Whole life savings based on alternative technology options for instrument air compressors at four sites, have been estimated as £2.4m over a 20-year asset life and 24,640 tonnes of CO2.

The NIC criteria has a strong emphasis on low carbon benefits. Our 2019 bid 'Captivate' looks to explore technology for a carbon capture and storage technology to mineralise CO2 exhaust gases from a NTS compressor.

Outside of the NIA and NIC, we have undertaken an innovation project to explore a new system for reducing the volume of gas released to atmosphere in the operation of the NTS. The project was undertaken in partnership with the National Physical Laboratory (NPL) and looked to identify the source of any fugitive emissions and quantify these emissions. The system had a number of novel features including methane sensors located around a site and the produce daily emission maps using weather data and a gas dispersion model. We tested the emissions monitoring system at two NTS sites. During testing, an 82% reduction achieved in total fugitive emissions at test site 1. Due to the limited operating period and topography challenges, significant reductions in fugitive emissions were not achieved at test site 2. However, the emissions monitoring system did locate the source of fugitive emissions at test site 2. The analysis suggested that around 265 tonnes of fugitive emissions could be avoided per year across all NTS compressor sites (maximum possible). This provides a benefit to consumers of £54,251 per year based on a wholesale price of 38.7p. The value of the avoided emissions also equates to a non-traded carbon benefit to consumers of around £424,000 per year. We have gone to follow up our work under the GHGIM with Project Morph listed in the table above. MorPH builds improvements to the system

Other annual engagement activities across the portfolio are listed below:

- We issue an annual call for ideas via the National Grid website and the Energy Networks Association (ENA) for bids into the Network Innovation Competition (NIC), receiving 24 bids from third parties last year.
- We are a key player in the ENA gas transmission and distribution innovation – the Gas Innovation Governance Group (GIGG) – which ensures we continually share learning and ideas with the other gas networks on a range of technical and governance issues. Our work with GIGG resulted in a joint Gas Innovation Strategy published in 2018 of which 'Environment' is one of the key themes.
- The annual Low Carbon Networks and Innovation (LCNI) conference is an innovation focussed conference attended by all networks, gas, electricity, transmission and distribution. Typically attracting up to 1000 attendees we use this event, not only to get feedback from stakeholders on projects we are undertaking but also as an opportunity to gather new ideas from potential suppliers and other networks and third parties.

Looking to the future we are looking to develop a number of other innovation projects within the RIIO 1 timeframe, specifically considering several looking at hydrogen.

Appendix 4: How we've engaged

Events

What	Who	Location	Outcome	Engagement completed
Environment Stakeholder Workshop and Edinburgh Stakeholder Workshop	Network Companies Regulators Interest Groups Consumer Bodies Supply Chain	Surrey and Edinburgh	Understand environmental impacts and considerations by stakeholder segment	Yes
Workshops at our Terminals	Terminal operators Offshore producers Government (Local Authorities)	Bacton St Fergus	Understand environmental impacts and considerations by stakeholder segment and geographical location	Yes
Regional engagement	Network Companies (Gas Distribution Networks) Other connected customers Storage operators Government (Local Authorities)	Chester London		Yes
One to ones	Regulators	N/A	Share outcome of engagement Comfortable with options and impact on Safety, Environment and Security of supply	Ongoing
Direct Consumer Engagement	Consumers	National	Gain qualitative and quantitative consumers insight on environmental topics. Includes: Willingness to pay Interactive slider tool and Cultural Analysis	Ongoing

Attendees

Event	Date	Customer-connected and Customer-shipper	Regulatory and Government	Network Company	Academics and Think Tanks and Innovators	Supply Chain	Consumer Bodies, Interest Groups and Other
Future needs of the Network St. Fergus	03/07/2018	4	1	0	1	0	0
Future needs of the network London	09/07/2018	6	1	1	2	0	1
Future needs of the network Bacton	12/07/2018	5	0	3	1	3	1
Future needs of the network Chester	17/07/2018	5	1	1	2	10	1
Environment Workshop	26/06/2018	1	1	2	0	2*	1
Edinburgh Environment workshop	05/12/2018	0	0	3	0	6	3
Bilateral with Scottish Environment Protection Agency	06/12/18 & 10/01/19	0	2	0	0	0	0

Bilateral with Environment Agency	11/01/19	0	1	0	0	0	0

Event Structure and Questions

Environmental Workshops

The Environment Stakeholder Workshops were focussed events with presentations and facilitated discussions on several areas within the Environmental topic. The questions presented to the attendees on the day are presented below. The room were structured to allow a good mix of stakeholder groups on each table. This lead to some really great discussions which were facilitated and captured by our table facilitators and scribes. Participants were given the opportunity to discuss and share their opinions with the group but also capture their thoughts on cards independently to give every opportunity for open and honest feedback.

Each topic was structured in a similar way:

Introduced by the subject matter expert - allowing all stakeholders to gain a high level understanding of the topic and ask any questions they have.

Impact and interest poll via SLIDO (interactive voting tool) - We did this voting prior to the facilitated discussions to reduce the risk of others influencing their views on this.

Facilitated discussion – Questions were posed for the table to discuss. Each question had supporting questions to help explore thoughts further and were designed to both assist stakeholders in their understanding of the topic and also to gain insight on specific topic areas. All insight was captured by the scribe. Some sessions were supported by table mats and post-it notes to further structure the conversation.

Voting via SLIDO – stakeholders were asked to take part in quantitative polls to get their views on what they'd just discussed.

Overall the events were very well received with a net promoter score of 71. The average impact score of all stakeholders was 4 out of 5 recorded by the attendees, suggesting that most people in the room were able to contribute to matters that impacted their business.

Regional and Terminal Events – Future needs of the network

These were one-day events held around the country to make them more accessible to our stakeholders. We engaged on a number of topics throughout the day that were of interest to delegates. Structured in the same way as the environment events, they included welcome and introductions from National Grid Gas leadership team followed by a series of overview presentations facilitated discussions (some using table mats and post its) and voting using SLIDO. Whilst we did not ask the specific environmental questions, there was some useful insight from stakeholders on a number of environmental related issues. This insight is therefore captured in this engagement log.

One to one meetings and other engagement

Due to the dispersed nature of the identified stakeholders, a multitude of methods is needed to ensure a good response to the engagement. The initial approach through the main environmental event was expected to capture a large cross-section of the stakeholder base. Additional events were then planned around the UK to engage directly with other stakeholders. Business as usual activities are being utilised to have richer conversations with stakeholders about the RIIO 2

business plan proposals and so the additional one to one meetings with the regulators were designed to address gaps at the end of our other planned interactions.

We posed a number of qualitative and quantitative questions to stakeholders:

Network Emissions Management and Compliance

Phase 1 Discussion questions:

1. Currently we are incentivised to manage our vented emissions
    a. What outcomes is this incentive looking to deliver?
    b. What changes might need to be made to achieve this?
2. Should we have a consistent approach to managing our carbon footprint across all activities?

Phase 1 Poll questions:

1. Should we have equal focus on all our emissions e.g. vented and fugitive?
    a. Yes
    b. No
2. How should we consider carbon in our decision making?
    a. Disregard carbon considerations other than is required by legislation
    b. Continue as is
    c. Apply a consistent cost of carbon – Legislation / traded market price (low case)
    d. Apply a consistent cost of carbon – Govt. central case carbon evaluation (mid -case)
    e. Always chose the lowest carbon option

Phase 2 Discussion questions:

4. What further information would you like about emissions management?
5. How important is it that we manage emissions?
6. Should with be a focus of innovation going forward?

Phase 2 Poll questions

1. Should National Grid Gas Transmission…
    a. Do more to manage emissions
    b. Continue as is
    c. Do less to manage emissions
2. What further information do you need to help inform your view?

Operating the network

This topic was not included in the first phase of engagement

Phase 2 Discussion questions:

3. Of the options shown on the table, pick one or two areas and discuss:
    a. What could we do to reduce their impact
    b. Add these to the opportunities board
    c. Are there any other areas we should be looking at?

Phase 2 Poll question:

1. For non- legislative compliance related activities, National Grid Gas Transmission should…
    d. Do more
    e. Continue as is
    f. Do less
4. Please explain your answer

Managing the impact of climate change

Phase 1 and 2 Discussion Question

1. Managing climate change impacts
    - Are you seeing similar issues?
    - How should we manage these impacts?
    - What information would help you make a decision?

Phase 1 & 2 Poll question

1. Should we be proactive or reactive in managing these impacts?

Environmental stewardship

Phase 1 and 2 Discussion Question

1. What should we do in relation to the environment as part of our wider corporate social responsibility work?

Phase 1 Poll Question

Should we be…?

Do more to support the environment through our social responsibility framework
Continue as is
Do less to support the environment through our social responsibility framework

For each topic, we asked stakeholders when we should be undertaking the work related to each topic e.g. Now, Within T2, Within T3

Embedding environmental impacts in to our investment decisions

Phase 1 Discussion Question

1. Should we have a consistent approach to managing our carbon footprint across all activities?
2. Currently we are incentivised to manage our vented emissions:
    What outcomes would we be looking for out of this incentive?
    What changes might need to be made to achieve this?

Phase 1 Poll Question

Should we be focusing on all our emissions e.g. vented and fugitive?

Event Feedback

For the stakeholders who attended the environmental workshop, the event feedback indicated that the engagement was effective. The small sample group of stakeholders found the event useful, providing quantitative feedback in the form of an average event score of eight out of ten. The main challenge is that although a number of the priority stakeholder segments were represented, the overall number of attendees was low. The engagement at the regional and terminal events was useful but less effective as the questions were not sufficiently targeted at the environmental topics. However, this insight is combined with the significant amount of business as usual interaction and feedback.

Appendix 5 – Continuously improving our engagement

During phase 1 of our engagement, we developed our materials and had them reviewed by Frontier Economics. Whilst we took on-board some aspects of their feedback, there wasn't sufficient time to embed all of their changes. The second phase of our engagement gave us an opportunity to further improve the materials and questions we used to gain the insight needed to input to our business plan.

Frontier Feedback during Phase 1:
1. There are some risks associated with asking stakeholders for feedback on the direction of your strategy. Because of this, it's probably right to be cautious over how much you can read into the stakeholder responses.

- It may be hard for stakeholders to take meaningful positions on some of the more technical points, without having access to a lot more information on the issues. For example, stakeholders may not have the expertise to make a judgement on whether you are doing enough on fugitive gases and venting. Instead they may rely on gut feeling and their prior views on the subject.
  We rewrote the material using plainer English and simplified the questions asked.
- Participants are unlikely to have a good feel for the consequences of what you do environmentally (is it "big" or "small") and what it costs. So views expressed are unlikely to be well reasoned/argued.
  We gave an indication of the size of the impact of each topic we discussed to allow stakeholders to compare them
- Stakeholders may well come with strongly held priors that you won't shift one way or the other. ("you should be doing this anyway". "any environmental impact is bad".)
  To minimise these opinions influencing others, we briefed each table facilitator, structured interactive sessions using post-its to allow all voices to be heard and moved some voting questions to before discussions were held.
- Unless you manage the attendance list carefully, you end up getting a self-selected crowd that might have stronger views than is typical.
  We targeted our engagement based on our stakeholder map. We talked to our stakeholders to understand who they thought should be included. Each attendee is asked to assign themselves to a stakeholder group and self select their level of impact and interest. These are then attached to their comments to help us weight the views of the feedback received.
- Open discussion with large groups can be hard to manage. A small number of vocal individuals can easily drown out everyone else. It takes a certain kind of personality to be willing to talk openly in a large room. Voting pads can help overcome this, particularly when attendees are asked to vote before as well as after the open discussion.
  To minimise these opinions influencing others, we briefed each table facilitator, structured interactive sessions using post-its to allow all voices to be heard and moved some voting questions to before discussions were held.

2. It might be useful to include questions on this in each discussion session and to bring in a 'car park' session at the end of the day e.g. the current focus on plastic in the environment – could this be something that NG might need to consider? – *included*

Truth Feedback

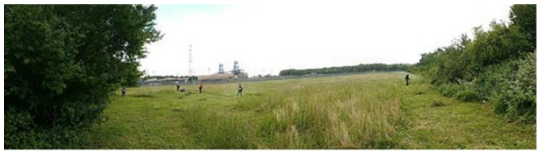
We worked with a third-party behavioural economics company 'Truth' to asses our engagement following phase 1 and to identify and prioritise any gaps. We used this to further target and inform our engagement in phase 2.

Frontier Feedback during Phase 2:

With more time allowed in the planning stages of the phase 2 engagement we worked with Frontier to improve the structure and material of the workshop in a number of areas. We addressed the following comments:

- A principle of good stakeholder engagement is being clear on the objectives of this session, and, how any insights from the session are used to inform the development of your business plan. It is also important to be clear on what stakeholders cannot influence. - *We made it clear up front what type of insight we were looking for. We also had posters around the room to that showed what we would do with stakeholders' feedback as a reminder.*
- It is good practice to explain how you will keep the conversation going – this could include an explanation of how you will feedback to stakeholders the insights from the session, when you will be running more engagement, and how they can find out more about you. *– All stakeholders were asked if they would like to join our distribution list so they could be kept up to date on future engagement. Following the workshop, links were sent out to the slides and the website which is home to all our future engagement as well as materials we've already shared.*
- It would also be worth setting out early on when people will get breaks during the workshop. – *Included in the agenda and referred to throughout the day.*
- We would also suggest shortening the introduction, as there are a number of slides to get through and it feels like some of this material could be trimmed down and whether it's better to get into the meat of the material earlier in the day. – *The introduction slides were simplified to focus on what the Gas Transmission does and the impact using plain English.*
- We would suggest that the voting is focused on the impacted/interested question, and that you remove the technical questions from each sub-section. This is because, as we explained above, the cognitive validity of the results to these more technical questions is likely to be low, and therefore you will not lose much from removing them. If the voting question(s) is included before the open discussion, as then you will get stakeholders' answers after they have heard your information, but before they have been affected by what they have learned in the open discussion. – *Questions were simplified to make them easier to answer based on stakeholders' prior knowledge.*
- We would also suggest amending the design of the wall chart questions. The current questions are again complex and technical, and therefore are likely to result in results with a low cognitive validity. In particular, there is a risk that less well-informed attendees copy where other seemingly more well-informed attendees place their post-it notes. We would suggest that if you want to keep this activity you could simplify the questions and ask people

to write down what else they would like NG to do differently in this area, or what more information you would like NG to publish on its performance. – *The wall chart was redesigned. Each stakeholder completed a card as below and added it to the relevant topic section of the wall chart.*



- *We also included an opportunities board to allow stakeholders to include additional thoughts/suggestions that we hadn't covered throughout the day.*

Appendix 6 Gas Transmission Environmental Framework

Headline Outcome	Strategy (What)	Tactic (How)	Measurement (Metrics)
A. Our Climate Commitment: reduction in carbon emissions by 2026	Reduce carbon emissions from leaks on the network	Invest in better monitoring equipment to identify leaks to create a replacement programme	Tonnes of CO2e
	Reduce carbon emissions from operational transport by 7%	Replace 30% of our fleet with Alternative Fuel Vehicles	Tonnes of CO2e
	Reduce carbon emissions for our business transport	Reduce road mileage by promoting rail and virtual meetings, promote EV's on company car scheme and install Electric car charging points at compressor sites	Tonnes of CO2e
	Reduce carbon emissions from energy use by 100% in office buildings	Purchase 100% renewable energy, and replace other fuels sources (diesel generators) with low-carbon fuels	Tonnes of CO2e
	Achieve carbon neutral construction by 2026	Implement PAS2060 and implement an offsetting policy	Compliance to PAS2060 and PAS2080
	Engage with our supply chain to set carbon reduction targets for suppliers	Continue using CDP supply chain as the mechanism for supplier carbon reporting and engagement	# of suppliers with reduction targets
	Install solar panels at all compressor sites	Install renewable generation, e.g. solar panels, on our sites to generate energy for site use and export excess to the grid for free	# sites with renewable generation OR kWh gener
	Reduce our risk from climate change	Actively manage and reduce risks from climate change	Reduction in risk
B. Responsible Asset Use: Minimise waste and resource us, keep resources in use for as long as possible, recover and regenerate products and materials at the end of each service life	Sustainability and responsible sourcing is embedded within the procurement tender process and a sustainable procurement strategy is in place	100% compliance within tender processes	No. tenders including sustainability Compliance to ISO 20400 standard
	Extend the life of equipment where possible by refurbishment	Refurbishment activities for certain assets e.g. valves	# of refurbished assets
	Reducing the waste intensity of our construction projects year on year	Use new methods that reduce waste in construction; baseline to be defined by end of T1	Tonnes of waste/ £100,000
	On construction projects we will achieve zero waste to landfill with increasing recycling & composting rates year on year	We should be achieving zero waste to landfill by end of T1, and from this data we will bas	% waste recycled
	Increase the amount of recycled materials used on construction projects	Needs to be baselined by end of T1	% recycled content
	Implement circular economy principles for raw materials and goods procured and existing assets	Analysis current reuse projects for their circularity and refine to create circular processes; work with PMC	# of Pilots that implement circular economy principles, circularity metric defined. Process to
		Purchase products that can be recycled / reused	purchase products that can be recycled/reused
	have a consistent and transparent framework for redundant assets	to be defined in the redundant asset theme paper	tbc
	Enhance the value of our natural assets of our non-operational land by 10%	Natural Capital tool is used to assess how land can be developed and used to enhance the value of ecosystem services. Sustainability action plans on how we mange our land are managed and monitored. Land that is farmed should have clauses in it to include biodiversity requirements.	% increase in environmental value
C. Caring for the natural environment: material consideration is given to the value of nature and net gain in environmental value is achieved	Deliver Net Gain in environmental value (including biodiversity) on all construction projects (including those delivered by third parties)	Net Gain target is applied on all schemes that lead to permanent or temporary habitat loss, negative impacts on the habitat condition or provision of ecosystem function e.g. screening, flood management, recreation	Net environmental gain on construction projects (units) / % of projects that deliver net gain
	Educate the public more about environmental issues through outreach linked to major compressor emissions projects	Engage with local community through school visits, local talks, including the environmental impact of our major projects	# of visits and customer satisfaction
	Act as custodians of our redundant sites by ensuring we reinstatement them to a net gain in environmental value	Identify local environmental initiatives e.g. living landscapers to inform our reinstatement plans.	net gain achieved
	Reduce our air quality emissions from the business	Define baseline from Compressor fleet and operational fleet in T1	reduction in Air Pollutants
D. Leadership for Change: we will demonstrate organisational leadership and make the right strategic choices;	Senior Management accountability to environmental performance	Senior management have environment and sustainability objectives, which is linked to performance bonuses	# of managers with objective
	An engaged workforce on environmental issues that lead by example	Implement a comprehensive employee engagement programme on environmental issues including waste, reduction in plastics and employee travel	% of employees engaged with environmental activities - employee engagement survey/ attendance of events
	Be an environmental leader for the energy industry	Contribute to external Working Group i.e. Evs, Aldersgate	# of groups and meetings attended and consultations
	Sustainability is fully embedded in our decision making	Carbon pricing is influencing decisions and whole life costing is assessed in the decision making process. Other sustainability impacts are embedded in decision making	A clear framework for the different decision making points
	Transparency to stakeholders on sustainability performance	Publish Gas Transmission environmental performance annually *and are* shared for feedback with stakeholders. Trust in National Grid GT is as an environmentally responsible company is increased	Annual publication of results and feedback