National Grid
Electricity Transmission

Environment Workshop

Sandown Park, 26th June 2018

Agenda

Welcome and introduction

Our environmental approach

Break – split into separate Gas and Electricity workshops

Electricity

The environmental impact of decision making

Lunch

Visual impact

Break

Construction

Break

Managing assets

Close

Welcome

Hêdd Roberts
Head of Customer and Commercial,
Electricity Transmission

Introduction to National Grid

Bridget Hartley
Gas Transmission RIIO-T2 Manager

National Grid: what we do

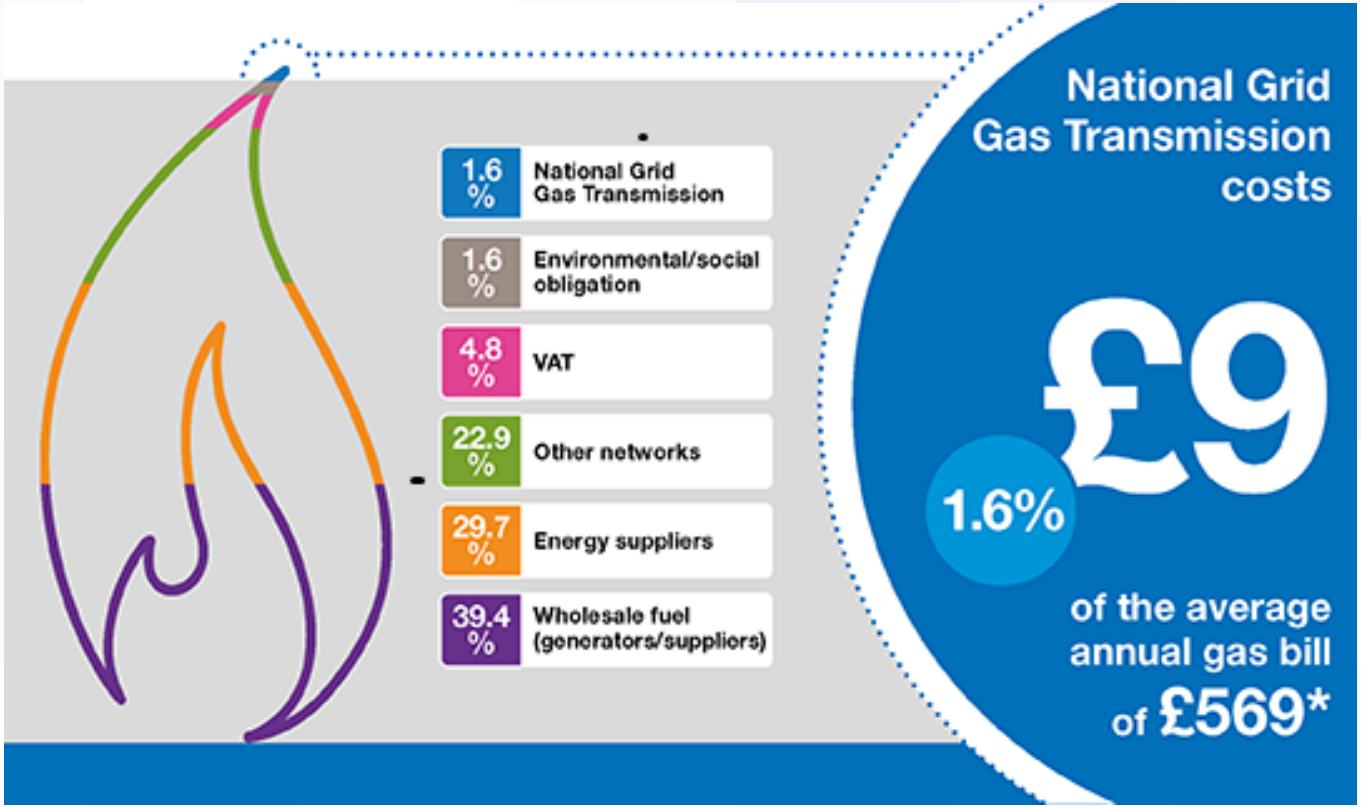
- England & Wales Electricity Transmission Owner (TO)
  - own, build and maintain the network
- GB Electricity System Operator (SO)
  - balance the system and ensure that voltage and frequency are kept within acceptable limits
- GB Gas TO & SO
  - own, maintain and operate the gas National Transmission System (NTS) in Great Britain, with day-to-day responsibility for balancing supply and demand
- US interests
  - generation, electricity Transmission and Distribution, gas Distribution in New York, Massachusetts and Rhode Island
- **Today is about Gas Transmission and Electricity Transmission, not including the SO**

National Grid Gas Transmission

- We own and operate 7,660km of high pressure pipelines, 23 compressor stations and over 600 above ground installations
- **Entry**: 7 gas reception terminals, 3 LNG importation terminals and 3 interconnectors (Ireland, Belgium and Netherlands)
- **Exit**: Eight Distribution networks as well as some large industrial consumers and power stations

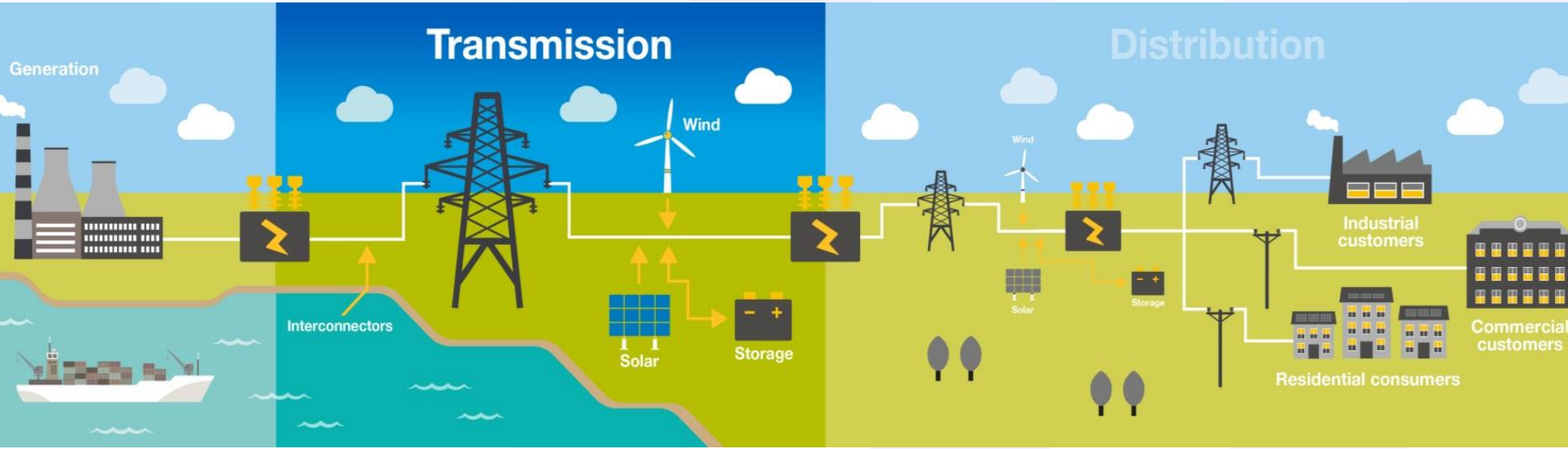
- What we **don't** do:
  - Produce or own the gas
  - Own or operate UK Gas Distribution networks
  - Sell gas to end consumers

Household bill impact: gas



*2016/17 figures

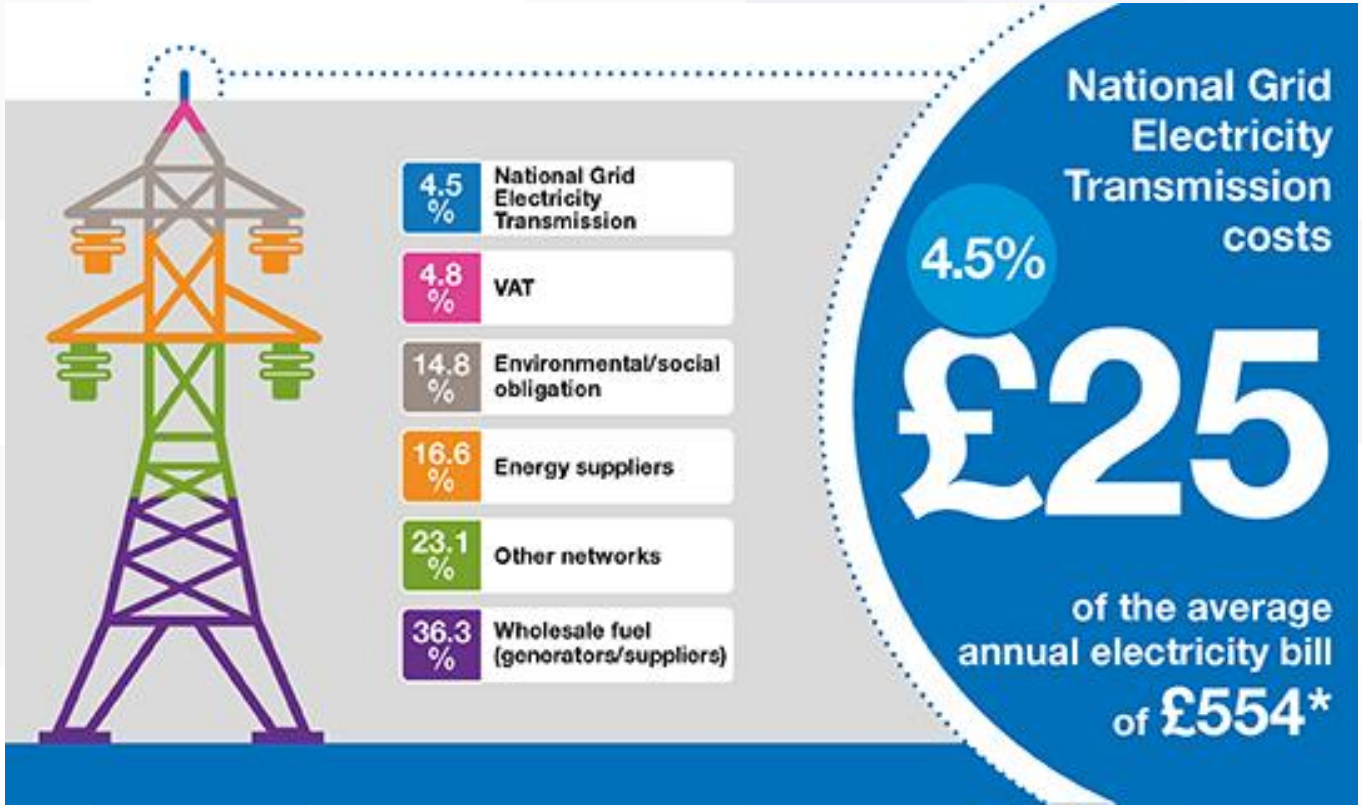
National Grid Electricity Transmission



- Our network operates at 400,000, 275,000 and 132,000 volts
- 45 power stations, 12 Distribution networks and 3 interconnectors are connected to our network, along with a few, large directly connected customers

- What we **don't** do:
  - Generate electricity in the UK
  - Own or operate UK electricity Distribution networks
  - Sell electricity to end consumers in the UK

Household bill impact: electricity



*2016/17 figures

How we're building our business plans with you

Gary Stokes
Stakeholder Engagement Manager,
Electricity Transmission

RIIO: the basics

Current RIIO-T1 outputs

- Safety
- Reliability
- The environment
- Customer connections
- Customer satisfaction

Ofgem's key themes for the RIIO-2 consultation

- Ensuring fair returns
- Responding to changes in how networks are used
- Giving consumers/stakeholders a stronger voice
- Driving innovation and efficiency
- Simplifying the price control

Today we'll focus on…

- Ensuring fair returns
- Responding to changes in how networks are used
- Giving consumers/stakeholders a stronger voice
- Driving innovation and efficiency
- Simplifying the price control

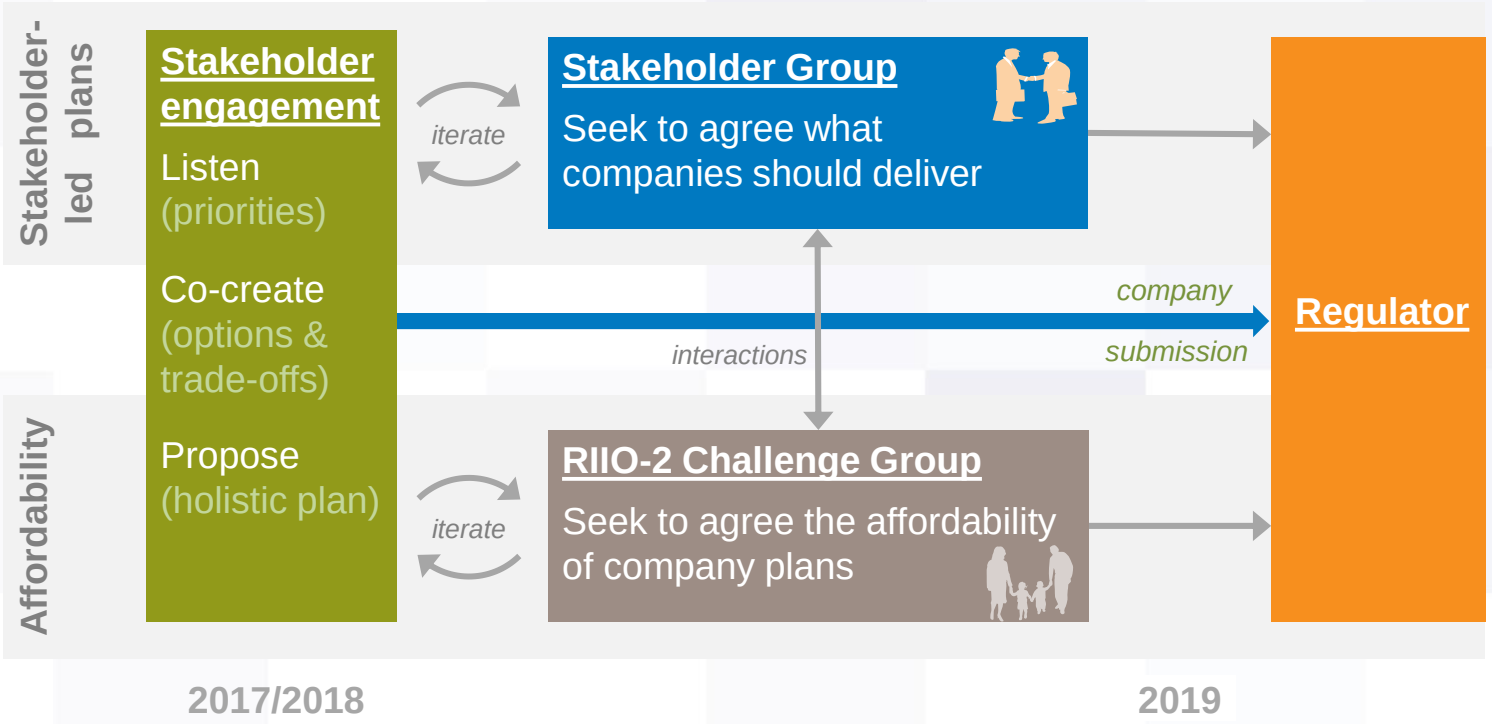
Our approach

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

- We're following a *constructive engagement* approach

- This involves listening to what you need from us, creating our plans with you, then checking that our plans reflect what you've told us

Constructive engagement



What we've heard from our Listen phase

(today's focus in bold)

Gas stakeholder priorities	Electricity stakeholder priorities
I want to take gas on and off the transmission system where and when I want	I want you to provide a reliable network, so that electricity is there whenever I need it
I want all the information I need to run my business, and to understand what you do and why	I want your electricity network to be safe
I want to connect to the transmission system	**I want you to provide value for money**
I want you to care for communities and the environment	**I want you to care for communities and the environment**
I want you to be efficient and affordable	I want you to protect the network from cyber and external threats
I want you to facilitate the whole energy system of the future – innovating to meet the challenges of an uncertain future	I want you to enable the ongoing transition towards the energy system of the future
I want you to protect the transmission system from cyber and external threats	I want you to make it easy for me to connect to and use the electricity network
I want the gas system to be safe	**I want you to be transparent and easy to work with**
	I want you to be innovative

Today's approach

- The principle is that we talk for a bit, then you talk for a lot (and we listen)
- Where we talk about bill impact, it's based on RIIO-T1 parameters
- We won't assume we know everything you're interested in (car park)
- There'll be chances to tell us if there's something else you'd like to talk about
- And please leave your feedback at the end

Collecting your feedback

Jenny Pemberton
Customer and Stakeholder Strategy Manager,
Gas Transmission

First a quick test…

- *What was your main mode of transport this morning?*

1. Train
2. Car
3. Motorbike
4. Bus
5. On foot
6. Bicycle
7. Plane
8. Something else
9. None of your business!

And to help us analyse your answers…

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

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

Knowledge of our environmental impact

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

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

Our environmental approach

Steve Thompson
Environmental Sustainability Manager

Decarbonisation

The big picture

Impact of climate change
Extreme weather

Paris Agreement COP 21

Clean Growth Strategy
Clean Air Act

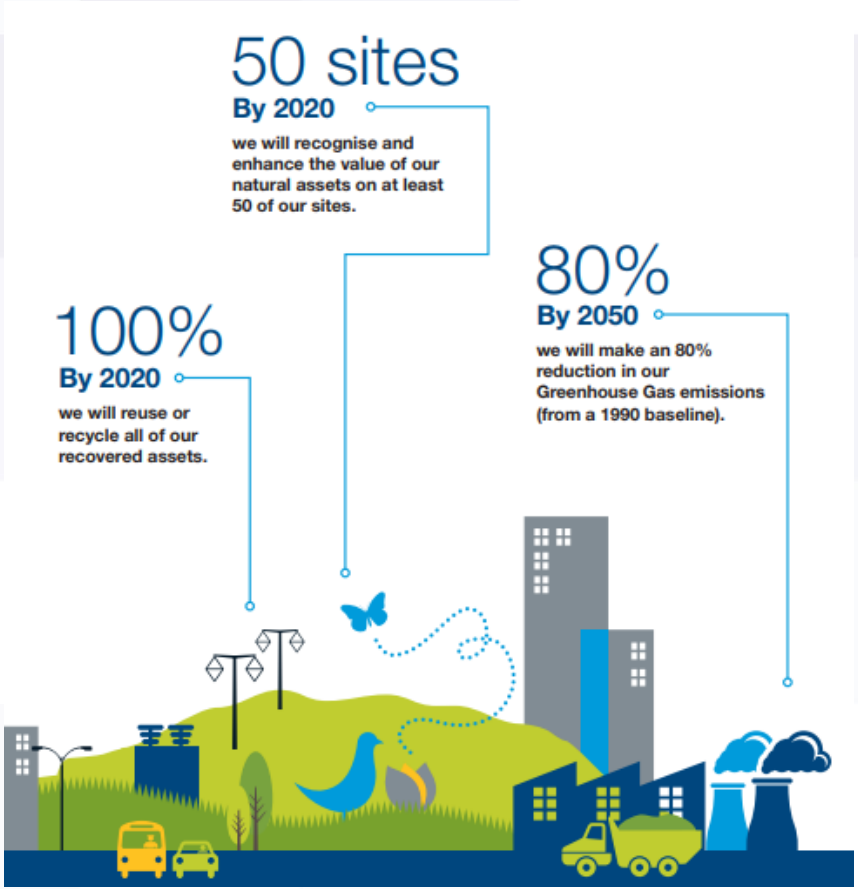
Companies reporting to the UN Sustainable Development Goals

25 Year Environment Plan

What are we doing?

Environmental Sustainability Strategy – Our Contribution

- Our climate commitment
- Responsible resource use
- Caring for the natural environment



Our Contribution – the targets

Our Climate Commitment:

- 80% reduction in GHG emissions by 2050.
- 45% reduction in GHG emissions by 2020.
- Implement carbon pricing on all major investment decisions by 2020.
- Reduce capital carbon of our major construction projects by 50% by 2020.
- Increase energy efficiency of our property portfolio by 10% by 2020.

Responsible Resource Use:

- Reuse or recycle 100% of recovered assets by 2020.
- Send zero office waste to landfill by 2020.

Caring for the Natural Environment:

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

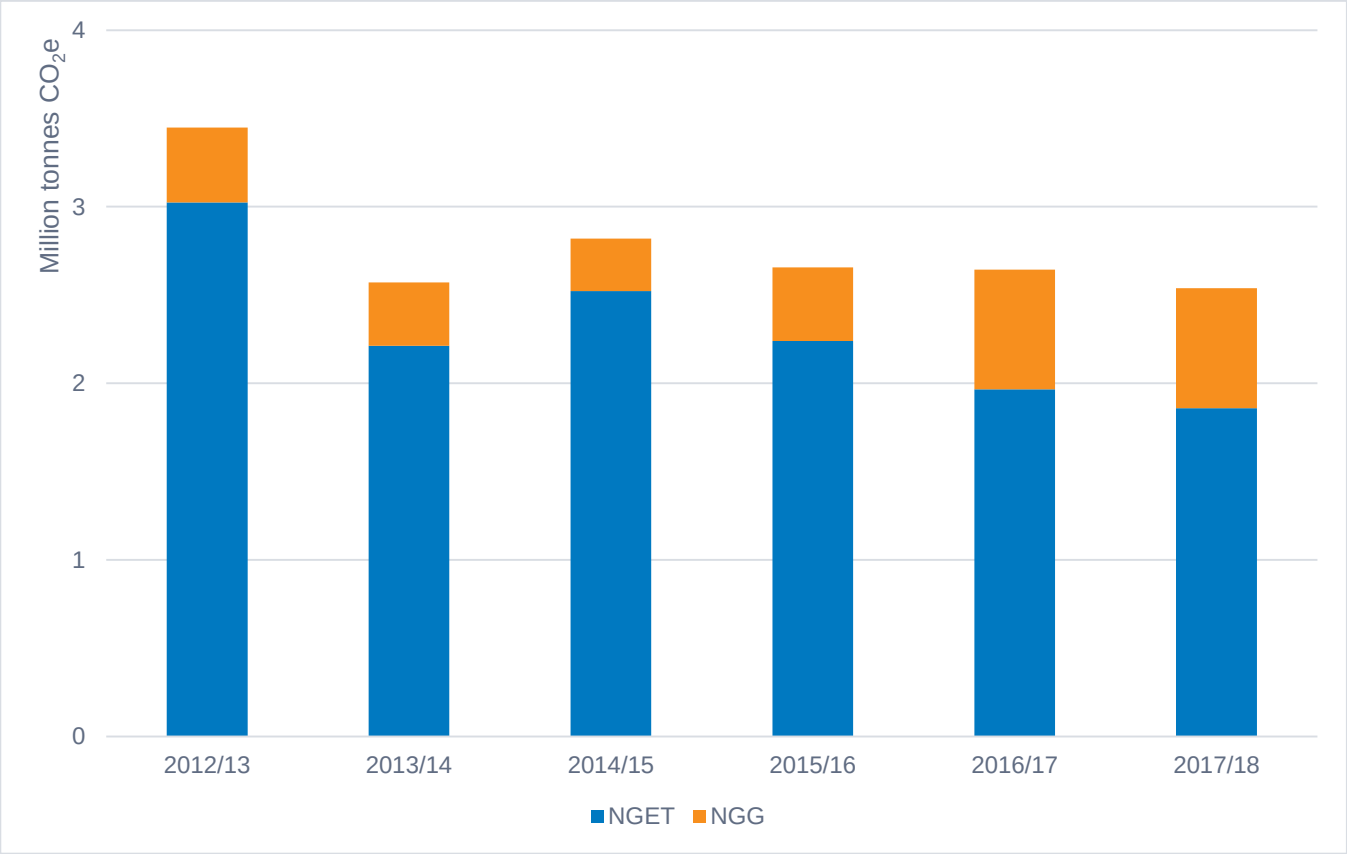
Discussion questions

- What would you like to know more about?
- What are the areas you would like us to focus on?
- What else should we be thinking about?
- Is there any more information you would like us to publish?

Carbon pricing

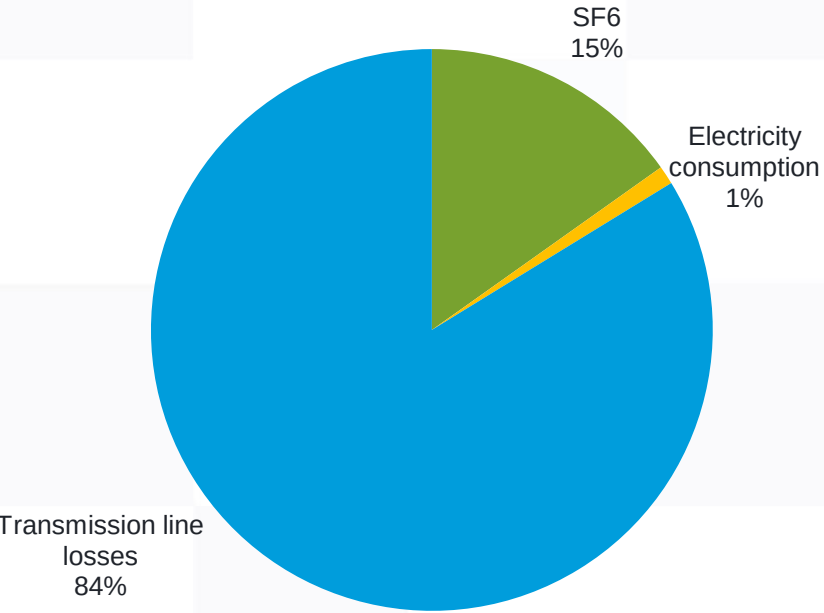
- We have a National Grid Group internal carbon pricing policy
- RIIO-T1 regulatory incentives underpinned by carbon price
- EU Emissions Trading Scheme

Our climate commitment: UK



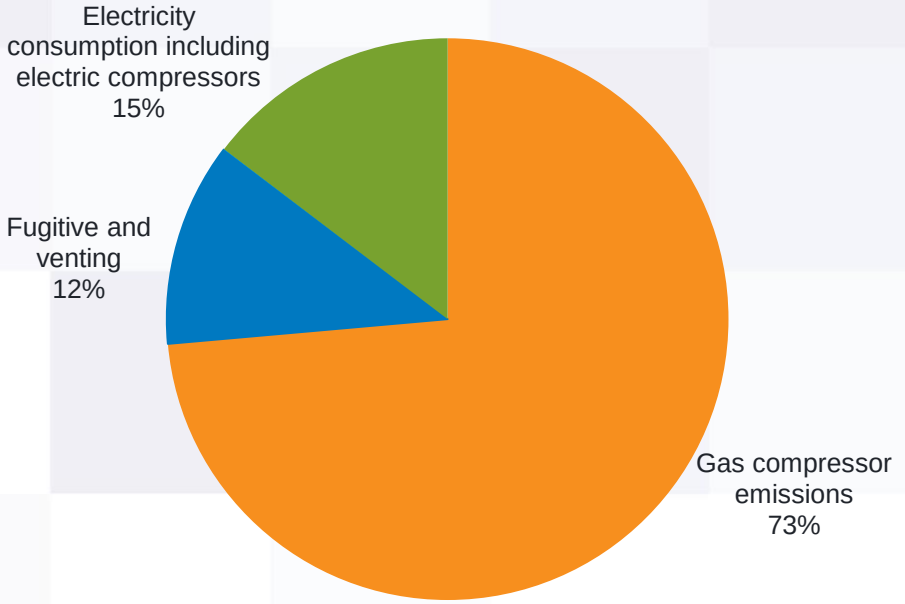
GHG emissions from our UK businesses

Electricity Transmission



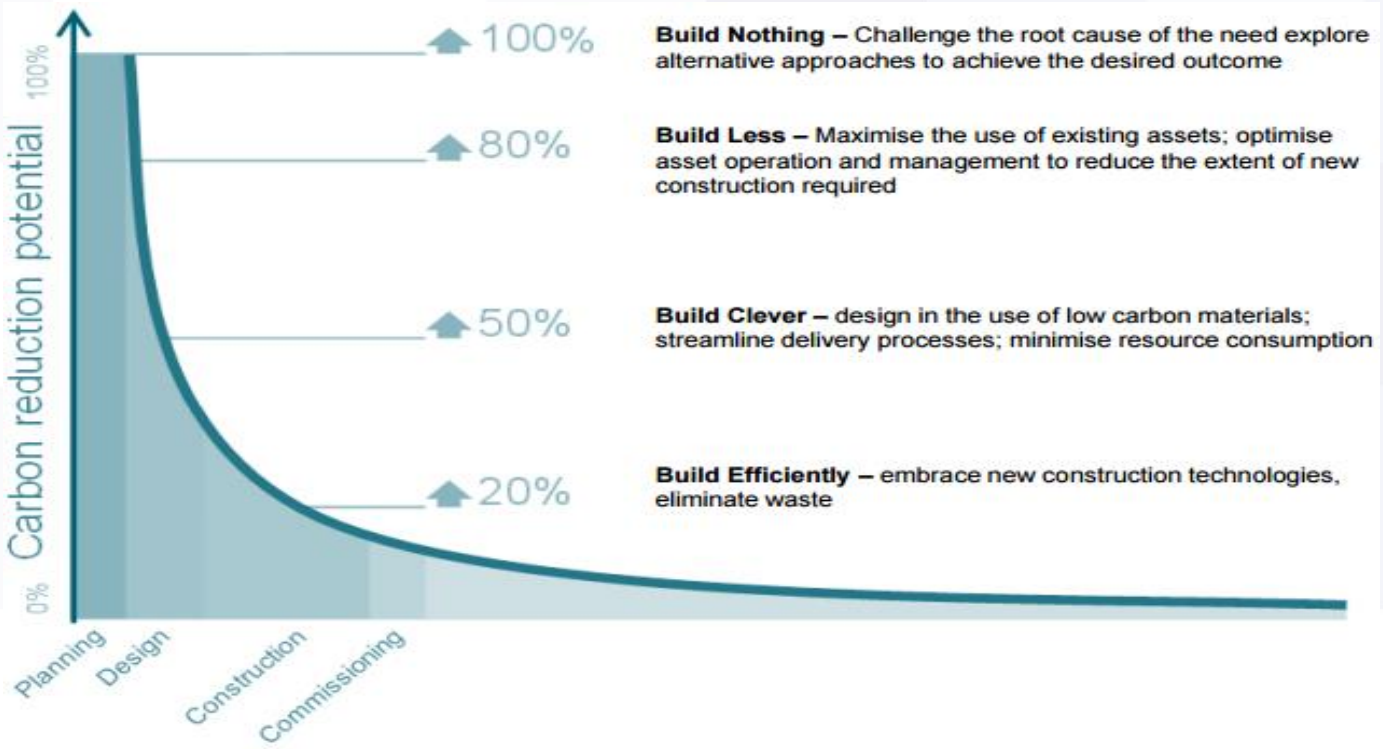
1.9 m tonnes

Gas Transmission



0.7 m tonnes

Our climate commitment: construction



37% reduction in capital carbon intensity from 2015

Resources

- Majority of metallic assets are re-used / re-cycled
- In 2017/2018, 96% of waste was diverted from landfill
- New pledge to ban single use plastics from our offices by 2020

Environmental Value

Biodiversity Net Gain

- New way of assessing biodiversity impacts and opportunities
- Development that enhances biodiversity and contributes towards wider strategic priorities
- Builds on the mitigation hierarchy:

- Considers wider values and services provided by the natural environment

Environmental Value

Natural Capital

- Defined as the world's stores of natural assets
- Includes geology, soil, air, water and all living things

- Natural Capital Value is a financial representation of the benefits and services that Nature provides to society and businesses
- Includes visual screening, flood control, improved air quality, raw materials, recreation, clean water, etc

Caring for the natural environment

- We own over 7,000 hectares of land (that's 7,000 football pitches!)
- Managing this effectively is important for the environment, local communities and our business
- The UK is one of the most nature-depleted countries in the world
- Target of 50 sustainability action plans by 2020
  - Increase potential Natural Capital Value by 30%
  - Reduced health and safety risks by 22%
  - Improved local community relationships

Local environmental impact

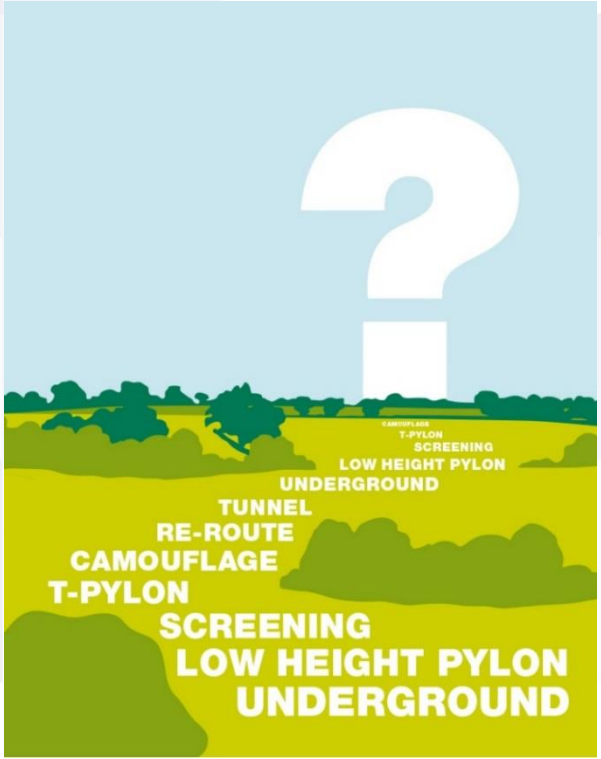
- Noise
- Local air quality
- Waste
- Ecological
- Visual impact

Air quality case study

- Gas Transmission has significantly lowered NOx emissions per run hour
- Achieved by optimising the system to choose the best available compressor
- NOx decomposes to Ozone and is harmful to human health

Visual impact

- Current Visual Impact Provision scheme (VIP) focuses on AONBs and National Parks
- £500m available across all TOs in RIIO-T1
- Different solutions:
  - Undergrounding (cables)
  - Non-engineered solutions – Landscape Enhancement Initiative e.g. High Weald *Beautiful Boundaries* scheme



Discussion questions

- What would you like to know more about?
- What are the areas you would like us to focus on?
- What else should we be thinking about?
- Is there any more information you would like us to publish?

Break

(the following slides relate only to electricity)

The environmental impact of decision making

Phil Clements, Project Development Manager
Christopher Hartley, Development Engineer

Investment considerations

Location: Coastal, industrial, residential, available space?

Land: Already owned, available to buy, cost?

Planning: Permission available/required, surveys, conditions?

Environmental: Carbon, ecology, visual impact, contamination, noise?

Construction: Carbon, groundworks, transport, timeframe, cost ?

Maintenance: Resources, frequency, accessibility?

Technology: Air insulated, gas insulated, cable, overhead line?

Investment considerations

(with an environmental impact)

Location: Coastal, industrial, residential, available space

Land: Already owned, available to buy, cost

Planning: Permission available/required, surveys, conditions

Environmental: Carbon, ecology, visual impact, contamination, noise

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Maintenance: Resources, frequency, accessibility

Technology: Air insulated, gas insulated, cable, overhead line

Air Insulated vs Gas Insulated

Carbon in our decision-making process

- Insulating gases: SF_6
  - Allows us to install high voltage equipment in smaller spaces
  - Very high Global Warming Potential, c.23,000 times that of CO_2
  - Equipment leaks (c.1.14 % across network)
  - We minimise leaks by replacements
  - Our current target is to minimise total percentage leak rate (more detail can be found on page 16 of Ofgem's Annual Report)

Carbon in our decision-making process

- Insulating gases: alternatives
  - Some alternatives are on the market
  - Trialled g^3 in our assets
  - Trials of g^3 for 132kv – successful
  - g^3 has a GWP of 345, 98% better than $SF_{6,}$ but is that still too high?
  - Other companies are working on alternatives with lower GWP – but not market ready

The future for insulating gas

What should our approach be in the future?

1. No change, continue with our current approach
2. We could put g^3 in all new 132kv assets (+5% on cost of gas vs SF_6 – c.£4k/site)
3. We could develop 400kv g^3 solutions (estimated innovation costs of £6m over 5 years – around 2p per year on household bills – then +5% on cost of gas)
4. We could work to develop additional solutions to g^3

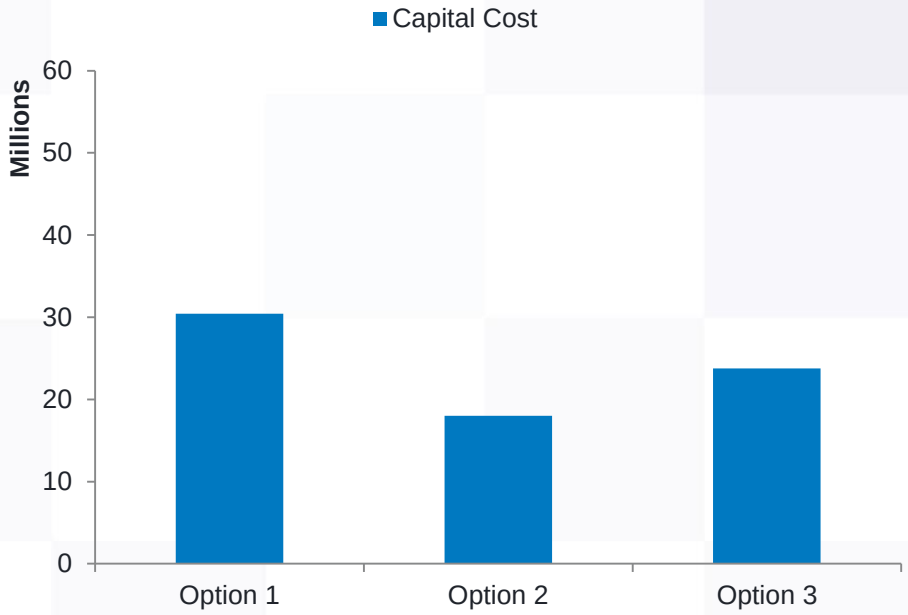
Carbon in our decision-making process

- Losses are the difference between energy generated and energy supplied
- These are largely outside of our control
- But we can impact losses by choosing different equipment

Case study: Low loss conductor

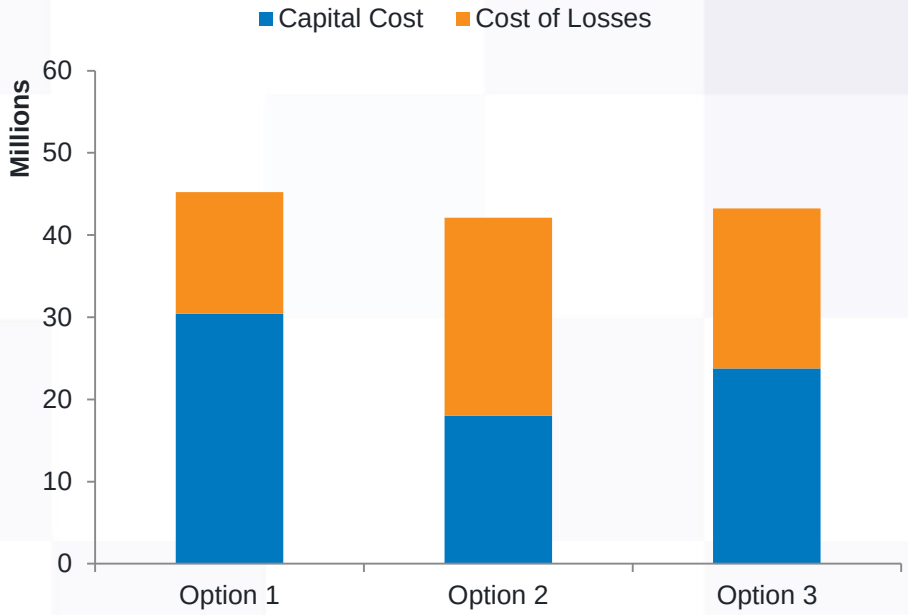
- 3 conductor options
- Option 2 has been taken as the baseline as it's one of the most common conductor types

Capital cost



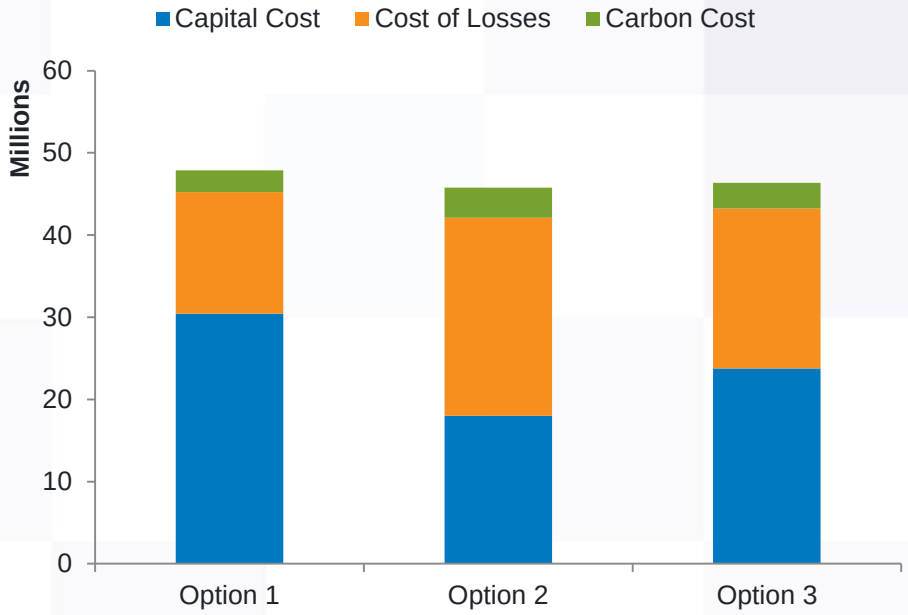
	Option 1	Option 3
Saving in losses	48%	32%
Saving in carbon	9%-28%	5%-15%
Cost increase	+69%	+32%

Capital and operational cost



	Option 1	Option 3
Saving in losses	48%	32%
Saving in carbon	9%-28%	5%-15%
Cost increase	+3%	+7%

Capital, operational and carbon cost



	Option 1	Option 3
Saving in losses	48%	32%
Saving in carbon	9%-28%	5%-15%
Cost increase	+1%	+5%

Substation scenario

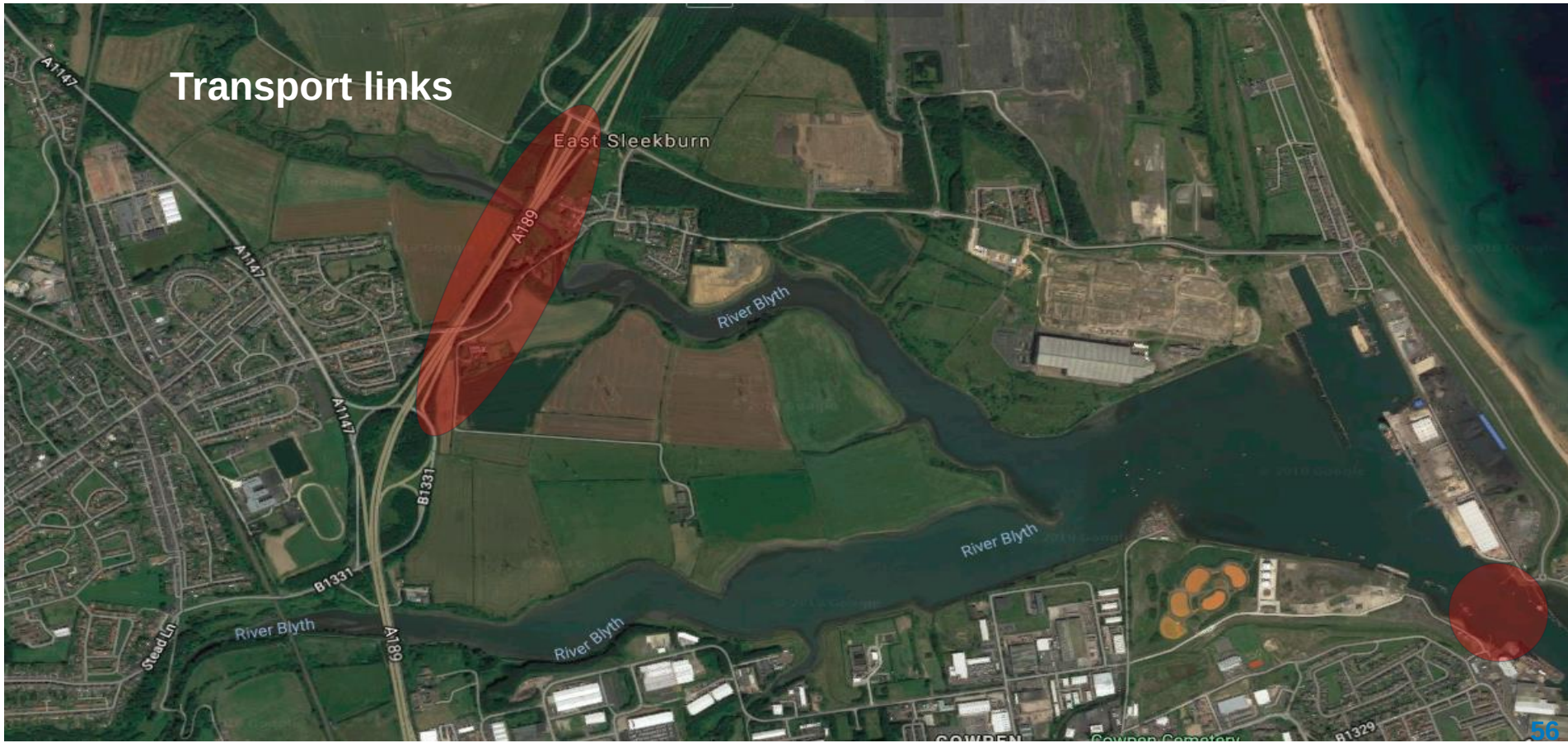
Substation scenario

Substation scenario

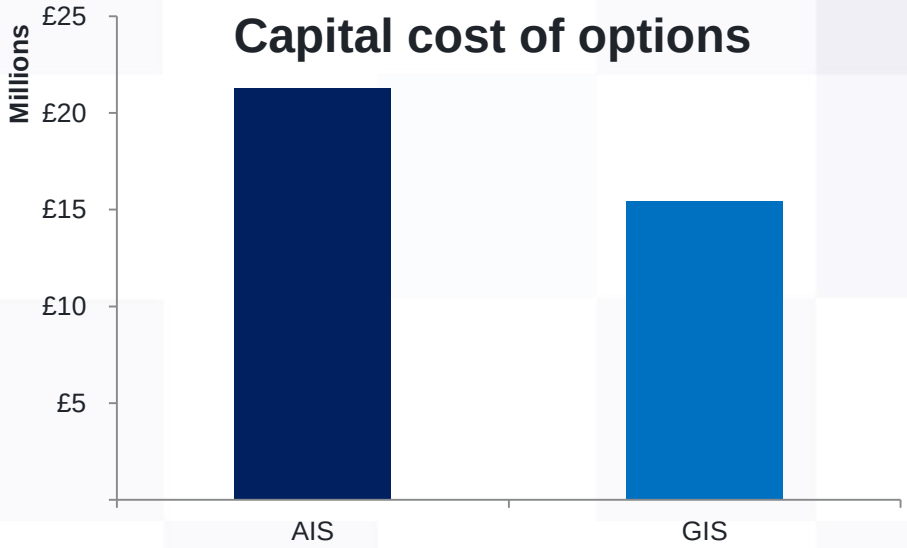
Substation scenario

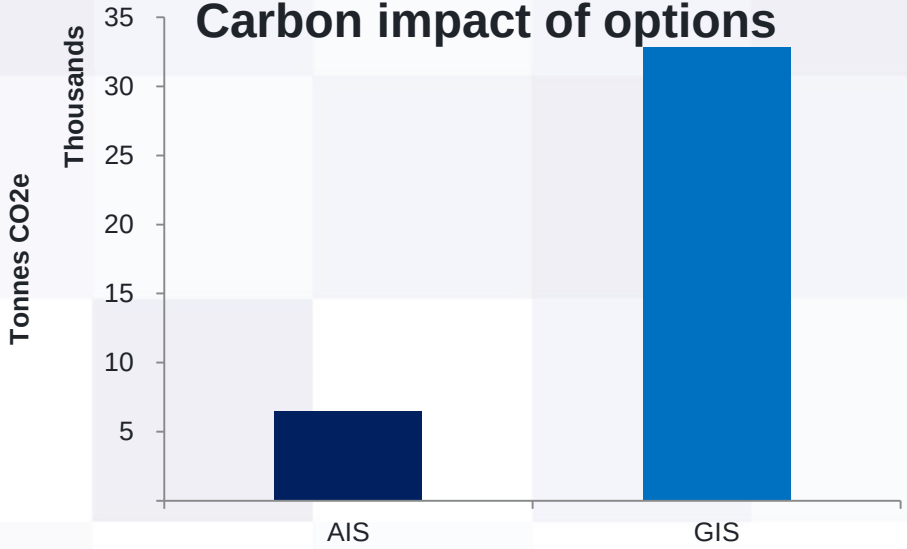
Substation scenario

Substation scenario

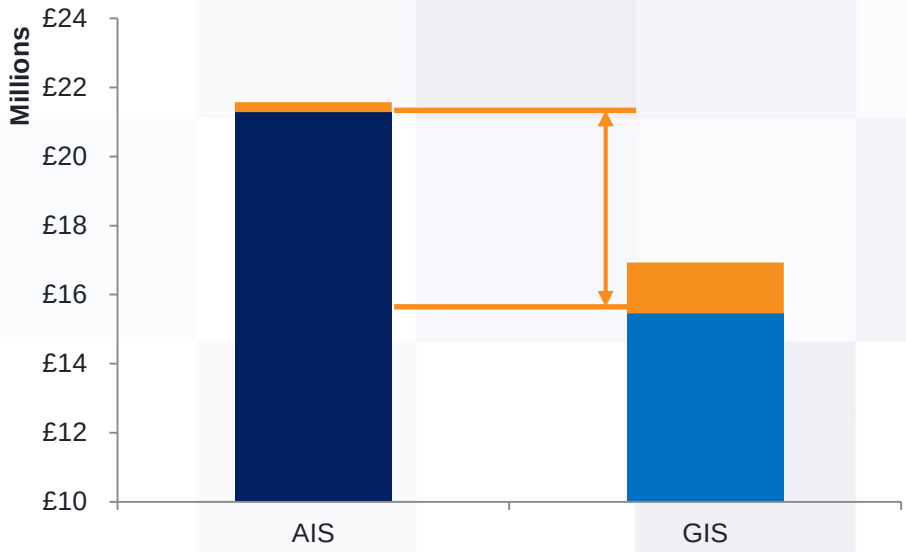


Substation example: cost vs carbon

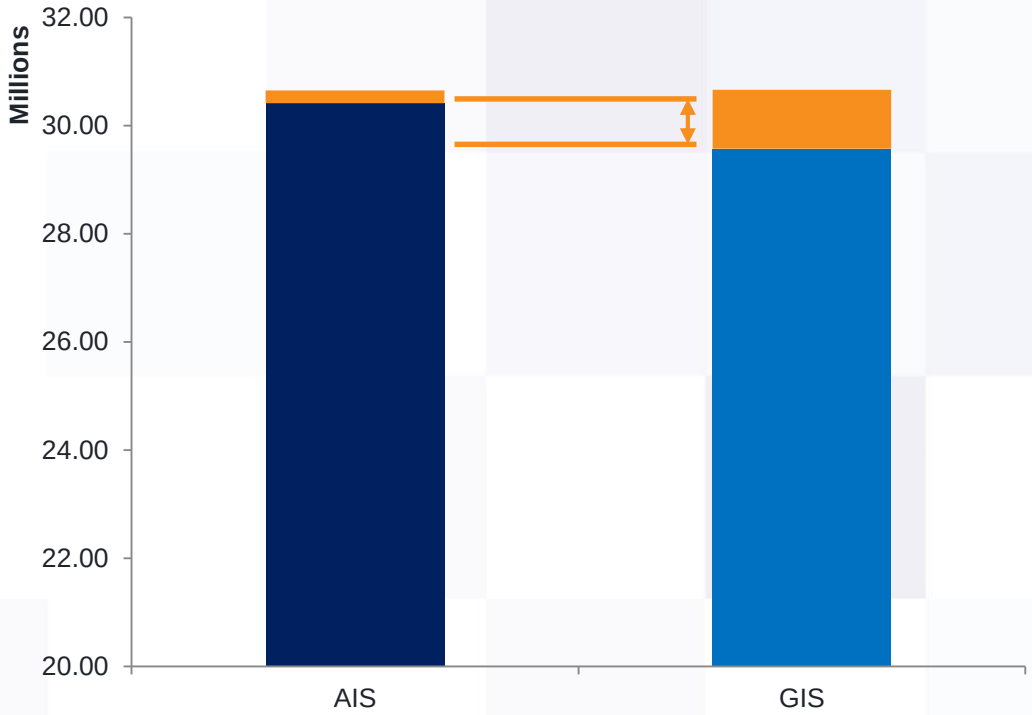




Substation example: cost vs carbon



A different substation example…



Discussion questions

- What should we focus on to reduce our carbon footprint?
- How far / how quickly should we go?
- For SF_6, should we focus on leakage percentage, overall volume of leaks, and/or finding alternatives to SF_6?
- What should we consider when making investment decisions?
  - Whole life approach
  - Capital costs

Voting

Our impact on you

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

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

Question 1

- *How should we make our future investment decisions?*

1. Based on whole life costing and whole life carbon impact
2. Based on whole life total cost
3. Based on the lowest possible capital cost

Question 2

- *Should we invest in lower loss equipment?*

1. Yes, regardless of cost
2. Yes, if it's the best solution through a whole life approach
3. No

Question 3

- *Should we continue to focus on SF_6 leakage?*

1. No
2. Yes, focusing on leakage percentage
3. Yes, focusing on total leakage volume

Lunch

Visual impact

Jeremy Lee
Lead Project Manager

Choosing between overhead lines and underground cables

nationalgrid

New transmission circuits

Undergrounding policy: Approach to new connections

National Grid considers every case for using underground cables for amenity reasons instead of overhead lines on its merits, but in view of the extremely high additional costs the company reserves detailed considerations for those places where the benefits of maintenance of visual amenity can be demonstrated to:

- outweigh the adverse effects upon other environmental factors;
- justify the high additional cost; and
- where it is technically possible and will not conflict with our statutory duties.

In identifying such places, National Grid takes account of the views of professional authoritative advisors, statutory environmental bodies and other organisations as it feels appropriate.

Guidelines for consideration of undergrounding of new high voltage transmission connections

The excessive cost of high voltage underground transmission coupled with the environmental and operational disadvantages are important reasons for the limited use of underground cables at 400 kV. National Grid's approach is to seek overhead connections wherever possible.

The following guidelines set out the categories of area which National Grid believes are the highest priority and where consideration may be given to undergrounding. They indicate those exceptional circumstances where National Grid believes undergrounding might be justified.

Exceptionally constrained areas

The term "exceptionally constrained areas" has been adopted to refer to situations where physical or amenity factors related to landscape, land use and development weigh most heavily against the use of overhead lines and therefore where consideration of underground cables is warranted. In such areas, judgement on the merits of each case will be required to justify the use of underground cables.

The nature of the "exceptionally constrained areas" varies in urban, rural and estuary crossing areas and the key factors are outlined as a basis for the consideration of the potential use of underground cable.

- **Exceptionally constrained urban areas:** Urban areas where there may be exceptional constraints on siting of overhead transmission lines comprise those locations where the density of residential, community and associated development and public open space is such that a reasonable direct overhead route is impracticable.
- **Exceptionally constrained rural areas:** Of special concern in the siting of overhead transmission lines in the countryside is the protection of important landscape features in nationally or internationally designated areas of amenity value. These designated areas comprise National Parks, Areas of Outstanding Natural Beauty, Heritage Coasts and World Heritage Sites. "Exceptionally Constrained Rural Areas" comprise those locations within or immediately alongside those designated areas where the scale of new high voltage transmission towers and conductors would dominate unspoilt landscape and cause serious damage to major open views of spectacular panoramas, crests of prominent rides and skylines or attractive small scale valleys seen from important locations within or immediately alongside the designated areas.
- **Exceptionally constrained estuary and major river crossings:** These occur where the exceptional difficulty and cost of an overhead line would be comparable with or exceed those of an underground cable.

Existing transmission circuits

Undergrounding policy: Approach to existing overhead lines

Our approach is always to seek to retain our existing overhead lines in situ. To promote the successful development of sites crossed by existing overhead lines, and the creation of well-designed places, National Grid has developed "a sense of place, design guidelines for development near high voltage overhead lines".*

There are significant technical, cost and environmental challenges associated with relocation or undergrounding of high voltage overhead lines. Any proposals to alter existing overhead lines crossing or on the edge of development sites will therefore require special justification. It will be for the promoter of the site to demonstrate to National Grid why the development cannot take place with the existing overhead line in situ. National Grid strongly believes in the need to run its transmission operations in a way that is as supportive as possible of the broader needs of society. Therefore, National Grid will support proposals for the relocation or undergrounding of existing high voltage overhead lines across sites where the developer can demonstrate that the development could not take place with the overhead line in situ and where such proposals satisfy both the two following sets of criteria:

1. Where it can be clearly demonstrated by the promoter that such proposals will

- directly facilitate a major development or infrastructure project of national importance which has been identified as such by central government; and
- provide a beneficial step change in the environmental character and quality of the associated area; whilst at the same time not resulting in any unreasonable detriment to the environmental character and quality of the area to which the overhead line is relocated or undergrounded;

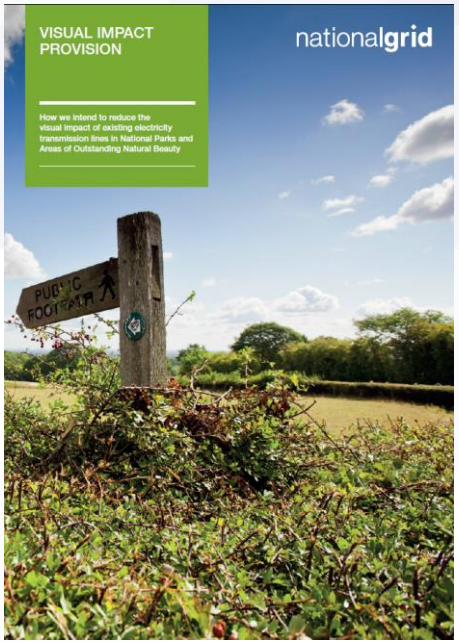
and

2. Where National Grid is satisfied that such proposals for relocation or undergrounding will

- not compromise the security of supply, the reliability and the maximum capability of the high voltage transmission system now or in the foreseeable future; and
- be technically feasible, fully compliant with National Grid's current design specifications and achievable in terms of system outages and resources within a timescale that does not adversely affect National Grid's wider investment programme; and
- be fully funded by the promoter, who will also be responsible for securing all agreements in principle to allow National Grid to site its equipment on land and acquire any necessary land without the need to resort to compulsory powers.

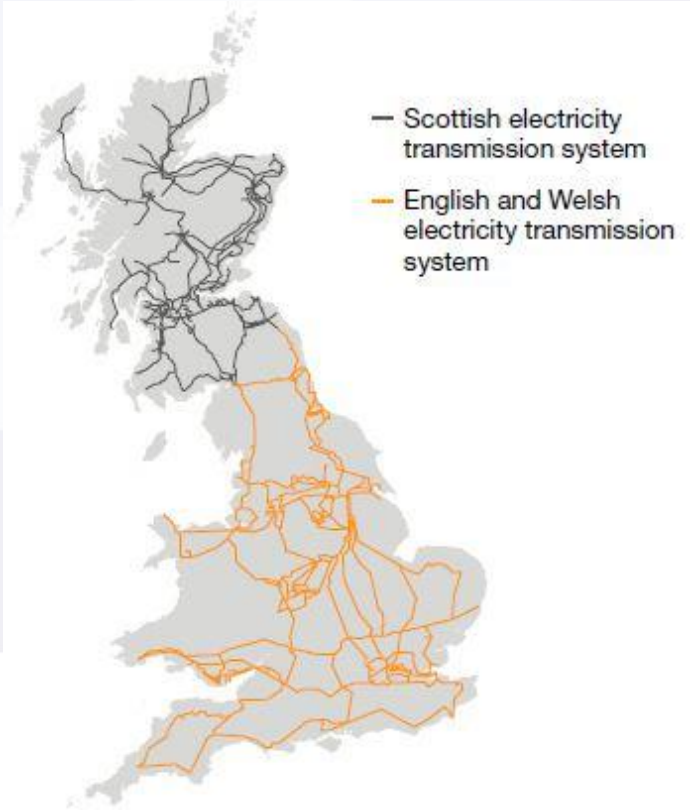
* These comprehensive site layout, design and landscaping guidelines provide advice and pragmatic solutions to demonstrate how a creative design approach can minimise the impact of overhead lines. They promote design initiatives which help to retain land values; ensure that new good quality environments are built; that residential densities can be retained; and that the environmental impacts of overhead lines are minimised. They demonstrate that for many developments, overhead lines can be retained in situ without adversely affecting sites' development potential. For further information visit the Sense of Place website at: http://www.nationalgrid.com/uk/senseofplace

nationalgrid
The power of action.



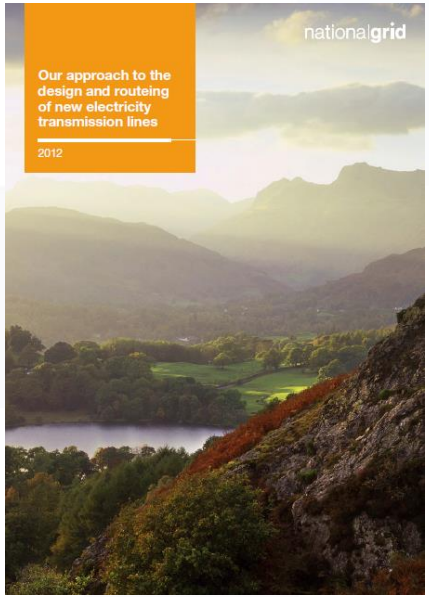
The electricity transmission system

- 7,200 km of overhead lines
- 1,560 km of underground cables
- 346 substations
- Historically, underground cables were installed in urban areas and under large river estuaries
- 571 km of overhead lines are within National Parks and Areas of Outstanding Natural Beauty (AONBs)



New transmission lines

We have no inherent preference for either overhead or underground approaches and we will always seek to deliver the best balance



We have to balance our Licence duties

- "…develop and maintain an efficient, co-ordinated and economical system of electricity transmission…"
- "…have regard to … preserving [and reasonably mitigating the impact on] natural beauty, flora, fauna and features of special interest…"

Planning for transmission lines

- In principle…
  - Government does not believe that development of overhead lines is generally incompatible with our statutory duty

- In practice…
  - New above ground electricity lines can create adverse landscape and/or visual impacts
  - This is dependent upon their scale, location, degree of screening and the nature of the landscape and local environment
  - These impacts can often, but not always, be mitigated

How we evaluate options

nationalgrid

Technical	Environmental	Socio-economic	Cost
Technical complexity	Landscape and Visual	Local economic impact	Capital cost
Construction/project delivery issues (incl resource and waste issues)	Ecology	Aviation and Defence	Lifetime cost
Suitability of technology	Historic environment	Traffic and Transport	
Network capacity	Water		
Network efficiencies/ benefits (incl energy efficiency)	Local air quality		
	Noise and Vibration		
	Soils and Geology		

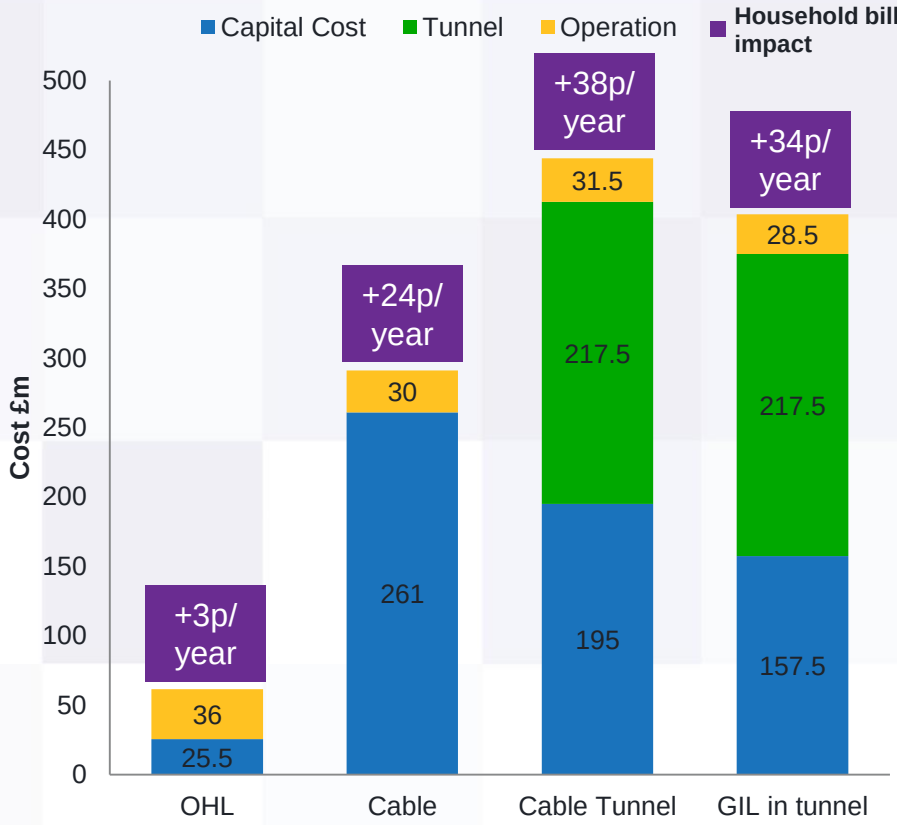
Overhead versus underground

	Overhead	Underground
Technology options	▪ Conventional steel lattice towers ▪ Low height steel lattice towers ▪ ‘T’ pylon	▪ Conventional underground cables, shallow bury ▪ Use of deep bore tunnel ▪ Gas Insulated Lines
Construction	▪ Less intrusive, quicker to complete than underground	▪ Long length of trench excavated ▪ Longer duration and more disruptive installation than overhead. ▪ Stranded land with landowner access required across working area
Permanent impact	▪ Visibility of pylons and conductors, difficult to screen	▪ Sealing end compound at each end of cable sections ▪ Link boxes at joint positions ▪ Restriction on planting and development above cables

Low height pylon designs

Case study: new 15km 400kV route

- As well as differences in cost, the environmental impacts of the options are different:
  - Overhead lines are quicker to build than underground installations, but result in a permanent visual impact
  - Underground options result in short-term environmental impacts in construction, but very small permanent visual impact
- Operational costs over 40 years include electrical losses and maintenance



Examples of recent outcomes

Richborough connection (Kent)

- 20km route avoided any nationally designated areas
- All overhead line – permission granted and in construction

Hinkley Point connection (Somerset)

- 65km route mostly follows an existing 132kV overhead line (which will be dismantled)
- Passes through the Mendip Hills AONB
- Permission received for OHL (mostly T-pylon) with an 8km underground section through the Mendip Hills
- Construction anticipated to start 2019

Mid Wales connection (Powys and Shropshire)

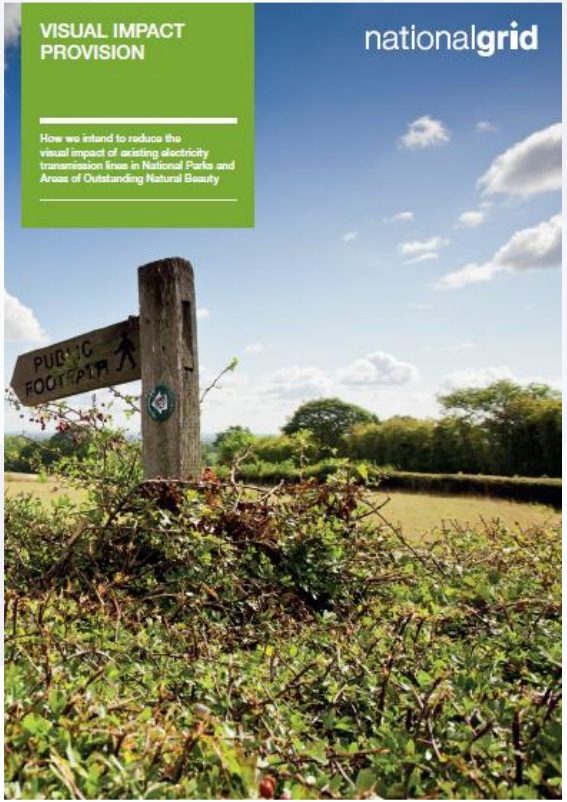
- Proposed 55km route avoided any nationally designated areas
- Proposal for two sections of overhead line, one section with low height pylons, separated by an 13km underground section
- Project on hold

Bramford to Twinstead (Suffolk)

- Proposed 20km route replaces an existing 132kV overhead line runs and largely in parallel with an existing 400kV overhead line
- Proposal for majority overhead line with underground sections in Dedham Vale AONB and across the Stour Valley (no national designation)
- Project on hold

Existing overhead lines

- £500m provision in RIIO-T1 for electricity Transmission Owners to mitigate the visual impact of existing electricity infrastructure in nationally protected landscapes
- c.42p/year on the average household bill
- Covers National Parks and AONBs (more details are available on our website)
- National Grid: VIP
- SSE: VISTA
- Scottish Power: VIEW



VIP policy and guiding principles

- Working with stakeholders, we will prioritise proposals which:
  - result in **greatest landscape** enhancement benefits
  - result in greatest opportunities to conserve and enhance **natural beauty, wildlife and cultural heritage** whilst avoiding unacceptable impacts on the natural and historic environment
  - result in greatest opportunities to encourage **public understanding and enjoyment of the protected landscapes**, including positive socio-economic impacts
  - are **technically feasible** in context of the wider transmission system
  - are **economical and efficient**

VIP Projects: New Forest

- Undergrounding of approximately 4km of overhead line and removal of 8 pylons
- Highly Designated Landscape
- Working closely with Natural England, National Trust and local stakeholders

New Forest National Park

VIP Projects: Peak East

- Undergrounding of approximately 2km of overhead line and removal of 7 pylons
- Requires temporary diversion of the Trans-Pennine Trail

Peak District National Park

VIP Projects: Snowdonia

- Undergrounding of approximately 4km of overhead line and removal of 8 pylons
- Undergrounding would be through a tunnel

Snowdonia National Park

VIP Projects: Dorset

- Undergrounding of approximately 8km of overhead line and removal of 22 pylons
- Complex archaeology
- Working closely with Historic England and Dorset County Archaeologist


Dorset AONB

VIP:
Landscape Enhancement Initiative

- Spreading the allowance more widely
- Stakeholder-led
- Allowance for smaller, localised improvement projects
- Available to 30 AONBs and National Parks
- Launched in May 2016

Discussion questions

- What should be our focus when obtaining planning consent for new lines?
- Should underground cables be our default approach?
- Should we continue to look at how we can mitigate the impact of existing lines?
- Should there be a Visual Impact Provision scheme in RIIO-2?
- If so:
  - what should its focus be (e.g. undergrounding, other enhancements, or a mixture?)
  - should it continue to focus on National Parks and AONBs?

Voting

Our impact on you

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

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

Question 1

- *What are your views on our approach to obtaining planning consent for new projects?*

1. We currently focus too much on minimising costs for GB bill payers
2. The current approach is about right
3. We currently focus too much on minimising visual impact

Question 2

- *Should our default approach be to…?*

1. Propose underground cables for all new routes (where technically feasible)
2. Propose underground cables for all sections of new routes in National Parks and AONBs
3. Continue with our current approach (NB, further to a query at the workshop, this would be to consider all feasible technologies and would usually, but not always, result in underground cables being proposed in a National Park or AONB)

Question 3

- *Should there be a scheme to address the visual impact of existing overhead lines and other assets in RIIO-2?*

1. No
2. Yes, continuing to focus on National Parks and AONBs
3. Yes, with a widened scope to cover more areas than National Parks and AONBs

Question 4

- *And when considering whether to use underground cables, do you think our focus should be on …?*

1. Minimising visual impact
2. Minimising impact on the land and habitats
3. Balancing both of the above

Break

Construction

Christine Glew
Sustainability Manager

Construction portfolio

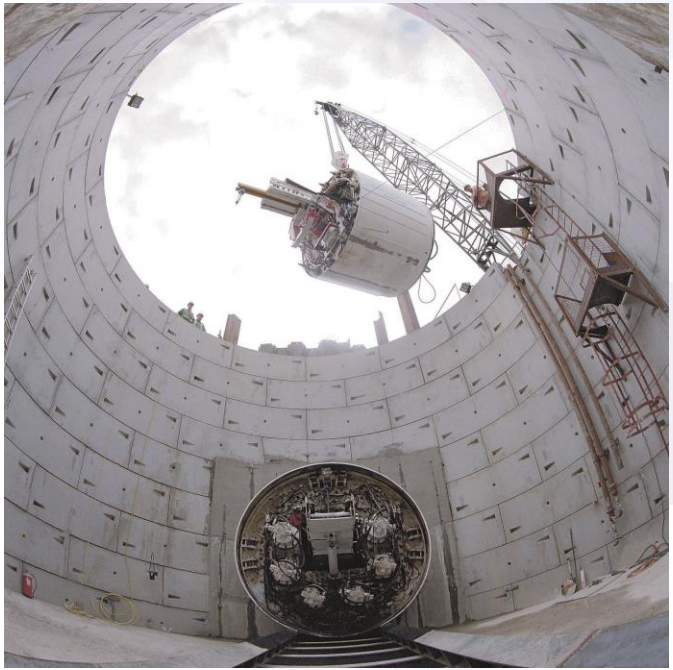
- Delivering £1bn in infrastructure per year
- Working across the country on 60-70 schemes per year
- Engaging with 25+ Tier 1 contractors

Our construction impact

Local	How do we affect our neighbours?
National	How do we consider consumers nationwide?
Global	How do we minimise our carbon impact?

Locally

- We impact our neighbours:
  - Noise
  - Traffic
  - Dust
  - Visual
  - Local environment
  - Amenity impact



Nationally

- We have UK wide impacts:
  - Using UK supply chains
  - Supply routes
  - Consumers may pay more to mitigate local impacts that aren't local for them

Global impact

- 50% reduction in carbon intensity from 2015-2020
- What's next? Only so far we can reduce…
- Can we go carbon neutral?

Case study: Carbon Neutral

Carbon footprint: 195,000tCO_2e

Carbon offsetting schemes: £6 - £12.60 per tonne CO_2e

Cost to offset: £1,170,000 - £2,515,500

Cost for consumer: 2p-4p per year

Biodiversity Net Gain

- Defined approach to quantify loss and drive positive outcome for biodiversity and ecosystems as efficiently as possible

An example…

Baseline 100 units

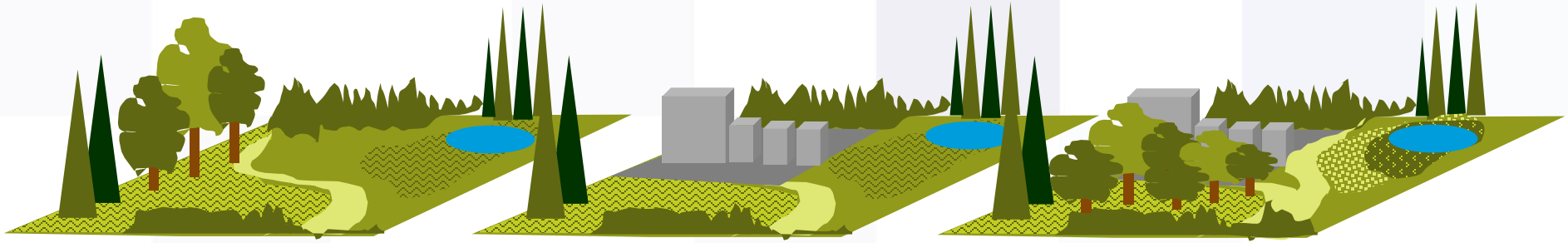
Mod: Broadleaved Woodland
Mod: Plantation Woodland
Poor: Wetland / Marsh
Mod: Semi improved Grassland
Poor: Bridleway

Loss of 20 units

Mod: Broadleaved Woodland
Mod: Semi improved grassland
Poor: Bridleway

Creation of 25 units

Broadleaved Woodland – Target GOOD + 10
Wetland / Marsh + 5
Semi improved Grassland – Target GOOD +5
Re routed bridleway – Target Con GOOD + 5



Discussion questions

- What should the balance be between:
  - mitigating the local impact of construction activities and
  - minimising the cost to GB bill payers?
- Should we aim for carbon neutral construction by minimising emissions and then offsetting?
- Should we deliver a higher net gain in environmental value than planning requires?

Voting

Our impact on you

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

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

Question 1

- *Do you think our main focus should be on …?*

1. Minimising local impact
2. Minimising costs for GB bill payers
3. Balancing both of the above

Question 2

- *Should we…?*

1. Aim for carbon neutral construction by seeking to minimise carbon emissions and then offsetting
2. Seek to minimise carbon emissions from our construction activities but not go as far as carbon neutral construction
3. Focus on minimising the financial costs of construction without making carbon our main focus

Question 3

- *What are your views on how we should approach environmental Net Gain in RIIO-2?*

1. We shouldn't go beyond the minimum required by planning regulations
2. This should be an area of focus for us as long as additional costs are reasonable
3. We should look to maximise Net Gain regardless of cost

Question 4

- *Should networks be encouraged to go beyond legal obligations and focus more on their overall carbon emissions?*

1. No, they should just meet their legal obligations
2. Yes, but not if it increases network charges
3. Yes, even if that means higher network charges

Break

Managing assets

Chris Plester
Senior Sustainability Advisor

Our *Natural Grid* approach

- Collaboration and partnership with third parties to implement more sustainable approaches to land use and management
- Identify areas of shared interest and value
- Use a Natural Capital assessment to support decision making

Our target

- 50 sites by the end of RIIO-T1 (2021)
- Explore opportunities to use our linear footprint to create green corridors

Costs

- c.£40k per year by 2021 (average £800/site)
- For all c.350 sites = £280k per year (less than ½p per year per household)

- Reactive management costs reduced
- Safety & environmental risks reduced
- Natural Capital value increased
- Positive community / stakeholder engagement

Environmental education centres

Skelton Grange Environment Centre
Skelton Grange Road
Stourton
Leeds
LS10 1RS

West Boldon Environmental Education
West Boldon Substation
Newcastle Rd
West Boldon
Tyne & Wear
NE36 0BG

Bishops Wood Environmental Centre
Crossway Green
Stourport-on-Severn
Worcester
DY13 9SE

Iver Environment Centre
Slough Road
Iver Heath
SL0 0EB

Environmental education centres

- For every £1 National Grid investment, the centres leveraged £5 of additional external funding
  - 46,542 visitors last year
  - 25,000 educational visits
  - 26,000 volunteer hours
  - >10,000 attendees at community events
- Supports access to nature for socially and/or economically disadvantaged communities
- Running cost of c.£32k per centre per year
- c.£500k construction cost for a new centre (½p per year per household)

Visitor satisfaction 9.6 / 10

100% of adults reported increased wellbeing or had developed new skills

Discussion questions

- Should we ensure that our land delivers benefits to others, not just National Grid?
- On what scale should this be for RIIO-2?
- What should we be doing in relation to the environment as part of our wider corporate social responsibility work?

Voting

Our impact on you

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

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

Question 1

- *Should we…?*

1. Continue our current approach to Natural Grid into RIIO-2
2. Expand the Natural Grid programme to more substation sites and overhead line routes
3. Just continue to manage the existing sites

Question 2

- *Should we…?*

1. Do more to support the environment through our social responsibility framework
2. Continue as is
3. Do less to support the environment through our social responsibility framework

The final vote…

Knowledge of our environmental impact

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

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

Able to contribute?

- *And finally, based on all of the information available to you and thinking about the workshop as a whole, were you able to contribute to today's topics?*

  1. Yes
  2. No

What happens next

- Our commitment
  - We'll process everything you've told us today
  - We'll summarise today's event and send it to you by the end of July
  - We'll combine your feedback with our online consultation results and other sources
  - We'll ask our Stakeholder Group to scrutinise this and we'll use it to form our RIIO-2 business plan
  - We'll publish our plan and all updates on our website, and keep you informed through our newsletters

Other topics

- Innovation: 17th July, Sandown Park
- Future of networks: online (July-August)
- Security and resilience: online (July-August)
- Reliability: workshop, September
- Communities: details to be confirmed
- Connections and customer service: conference (October)

Thank you

(and please provide feedback)

gary.stokes@nationalgrid.com