

RIIO GD2 Business Plan Appendix

Environmental Action Plan

December 2019



Biomethane Plant in Coupar Angus, Perth (Scotland)



SGN

Your gas. Our network.

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Contents

1	Overview	1
2	EAP within the business plan	6
3	GD1 performance and learnings	7
3.1	Overview of service delivered	7
3.2	Legislative background	8
3.3	GD1 output delivery	9
3.4	GD1 lessons learned	10
4	Stakeholder insight	11
4.1	Stakeholder feedback.....	12
5	GD2 cross-sector issues	16
5.1	Decarbonisation and whole system	16
5.2	Innovation.....	16
5.3	Resilience.....	16
6	GD2 activity breakdown	17
6.1	Approach to GD2	17
6.2	Policy	19
6.3	Scenarios and sensitivities.....	19
6.4	GD2 Outputs and price control deliverables	20
6.5	Bespoke outputs.....	48
6.6	Investment in existing assets.....	49
6.7	Engineering justification papers	49
6.8	Managing uncertainty: Use-it-or-lose-it, volume drivers and reopeners	50
6.9	Financial summary.....	51
6.10	Assurance	52
7	Glossary	54

1 Overview

Introduction

Public awareness of climate change and environmental impact has never been higher. Blue Planet, Greta Thunberg and Extinction Rebellion have all prompted government reaction to set challenging targets e.g. the proposed policy statement for the Environmental Bill. Working with Ofgem’s guidance and minimum standards, supported by our stakeholders and customer feedback, this is the opportunity for us to set-out our ambition.

Figure 1: Summary of initiatives, costs and environmental benefits for GD2

		Cost of initiatives	Environmental benefit
Decarbonising the energy network - Acceleration of repx, proactive steel programme, deploying innovation		£78m* <small>* cost do not include ongoing repx</small>	Reducing Total Carbon Footprint by more than 25%
Decarbonising our operations - Energy efficiency, greening the vehicle fleet, installing solar PV		£27m	Reducing air pollution Reducing Carbon Footprint by more than 45%
Engaging with supply chain - Supplier Code of Conduct, Supply Chain Sustainability School, embedded carbon		£970k	Extending sphere of influence, essential to achieve Net Zero by 2045
Reducing environmental impacts - Biodiversity, resource use and waste		£4.5m	Contributing to a thriving planet which reduces both financial and environmental impact
Supporting transition to low-carbon energy network - Biomethane		£2.9	Injection of biomethane is essential for the transition to a low-carbon energy network
Climate Change Adaptation		£10.5m	Required to keep operating safely and efficiently

This Environmental Action Plan (EAP) (003) has a focus on reducing emission of greenhouse gases, which is our biggest environmental impact.

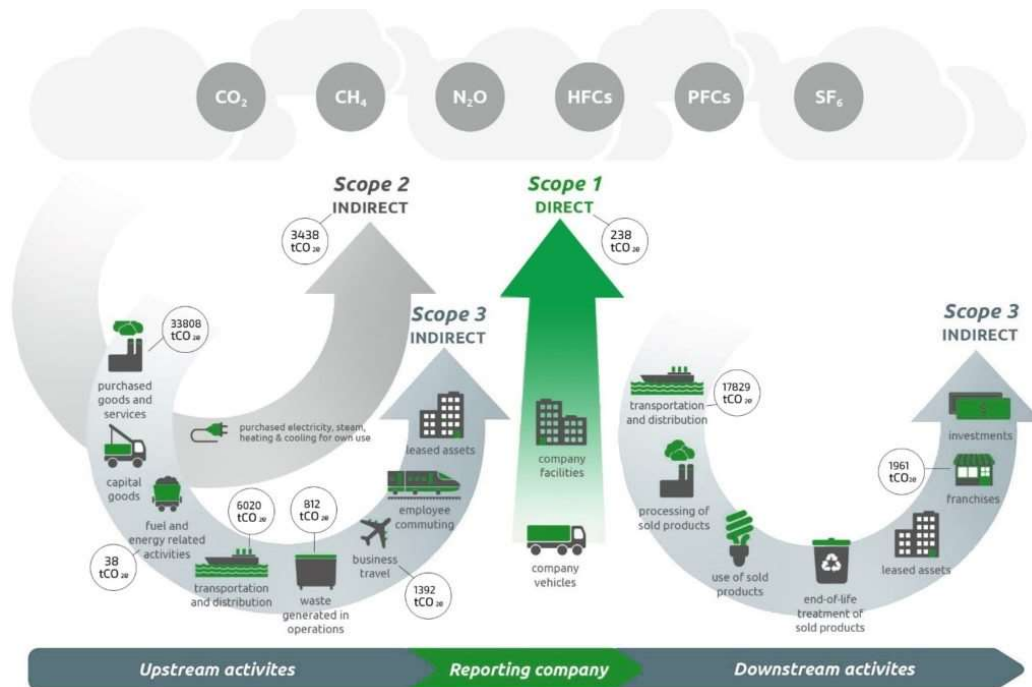
Table 1: SGN carbon footprint

Last 3 years GD1 (tCO _{2e})	2016/17	2017/18	2018/19
Scope 1	17,891	16,871	17,212
Scope 2	4,578	3,579	3,752
Scope 3	17,407	18,413	17,681
Shrinkage	851,912	828,485	796,754
Business carbon footprint (BCF) (scope 1 + 2 +3)	39,876	38,863	38,645
Total carbon footprint (TCF) (BCF + shrinkage)	891,789	867,347	835,398

Greenhouse gas emission scopes are defined by the Greenhouse Gas (GHG) Protocol, which is the world's most widely used greenhouse gas accounting standard.

- Scope 1 is direct emissions, including commercial vehicles and gas boilers;
- Scope 2 refers to electricity usage; and
- Scope 3 is indirect greenhouse gas emissions which occur in our value chain, of which we are not directly in control¹.

Figure 2: Scope 1, 2 and 3 greenhouse gas emissions²



For the purposes of our Environment Action Plan, we are not including shrinkage in greenhouse gas scope 1 but showing it separately in-line with Ofgem reporting.

¹ In scope 3 we include PE Pipe, contractor vehicles, business travel by air, rail, ferry and car hire, as well as transmission and distribution losses (electricity).

² carboncredentials.com

Executive Summary of the Environmental Action Plan

The Environmental Action Plan (EAP) is based on several initiatives which we are proposing. The graphs below show how we could reduce our carbon footprint if we receive requested funding for our business plan and EAP.

Figure 3: Carbon footprint from leakage in total over GD2 and cumulative savings if all EAP initiatives were carried out

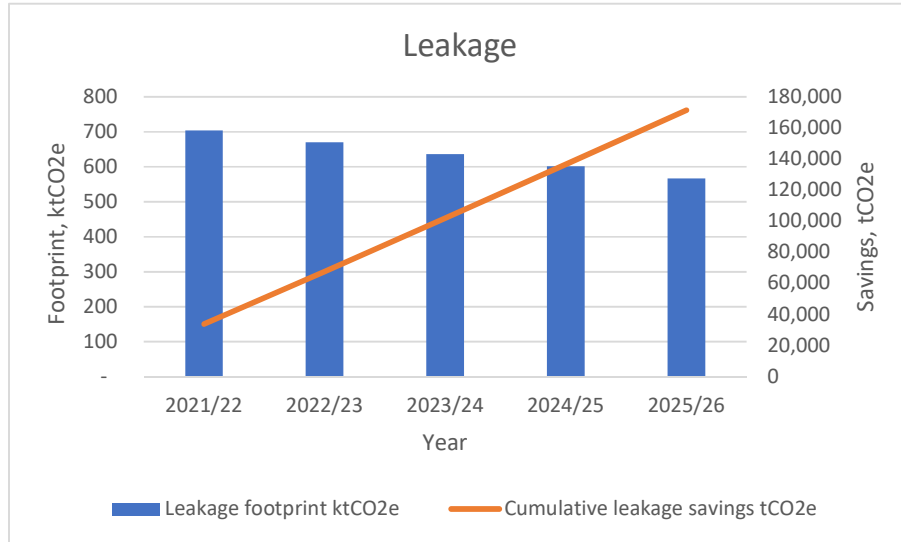
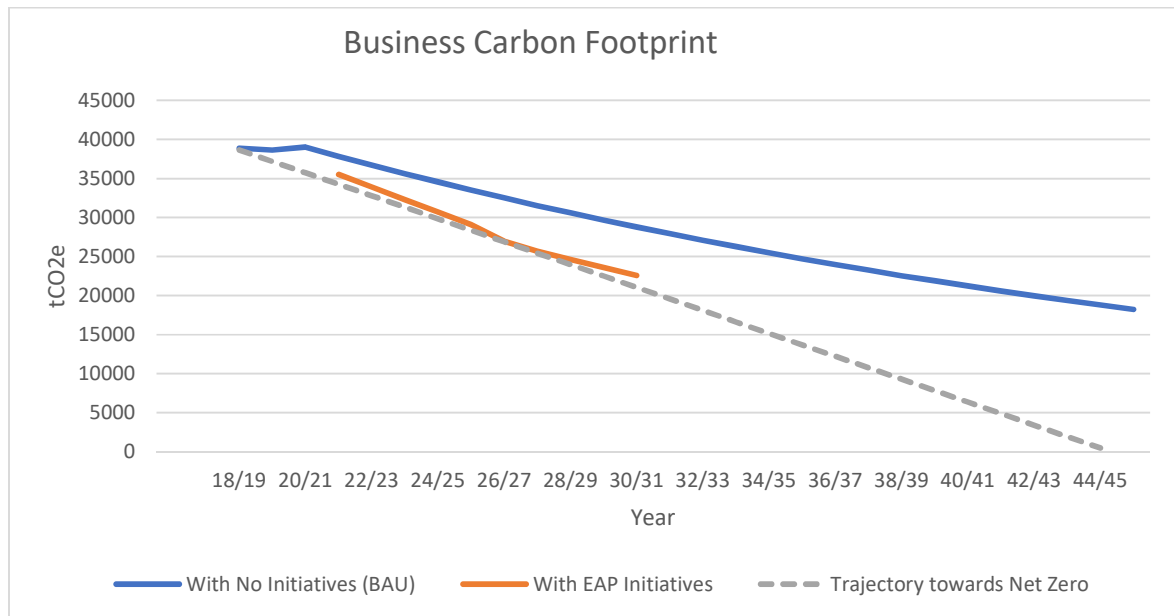


Figure 4: SGNs Business Carbon Footprint (scope 1, 2 and 3) with and without EAP initiatives in comparison with a net-zero trajectory for 2045



We are committed to building a shared net-zero future with our stakeholders and customers. We propose to do this through:

- **Decarbonising the energy network by:**
 - Setting a business-wide target for reaching net-zero by 2045;
 - Reducing our TCF (Total carbon footprint) by more than 25% by the end of GD2 (compared to baseline year 2018/19); and
 - Continuing to measure, report and improve our scope 3 emissions.
- **Reducing other environmental impacts by:**
 - Committing to establishing a baseline and target to reduce embedded carbon in new projects during GD2;
 - Supporting our supply chain so more than 80% of suppliers, i.e. 93 organisations, (by spend) meet our new supplier code of conduct;
 - Zero waste to landfill across office, depots, reinstatement, major projects and our gas holder dismantlement for non-hazardous waste by 2026; recycling 93% of total materials and reusing 6.5% of total materials by that same target date; and
 - Aim to achieve biodiversity 'net gain' by the end of GD2 on sites we manage.
- **Supporting the transition to an environmentally sustainable low-carbon network by:**
 - Enabling the connection of biomethane to our networks to provide a total of 450,000 domestic houses equivalent with green gas at the end of GD2; and
 - Building a 100% hydrogen homes demonstration network in GD2³.

Scope of this appendix

The Environmental Action Plan (EAP) supports our overall strategic vision of a shared net-zero future. It shows what role we envisage to play with a focus on GD2 and the medium-term projects and programmes we propose to implement. The initiatives provide our response to decarbonising the energy network, reducing environmental impacts, supporting the transition to an environmentally sustainable low-carbon energy system and adaptation to climate change.

Achieving net-zero greenhouse gas emissions by 2045, which is our ambitious long-term target, is central to the strategic vision and this is supported by our sustainability strategy⁴. We are developing this strategy using the UN Sustainable Development Goals (SDGs) as a framework⁵ providing a robust and holistic approach to sustainability which will take us beyond GD2.

The message from our stakeholders and customers⁶ is clear, in they want us to act on the environment and climate change emergency as declared by the UK Government in May 2019. Specifically, they asked us to focus on leakage which is the biggest contributor to our TCF⁷. Moving towards net-zero has therefore had the biggest influence in shaping the EAP.

Impact

Stakeholders and customers will benefit from our proposed step changes and the gradual increase of

³ Methilltoun, see chapter 11 of the business plan

⁴ See section 6.1 approach to GD2 – Developing the strategy

⁵ See section 5.3

⁶ See section 4 stakeholder insight

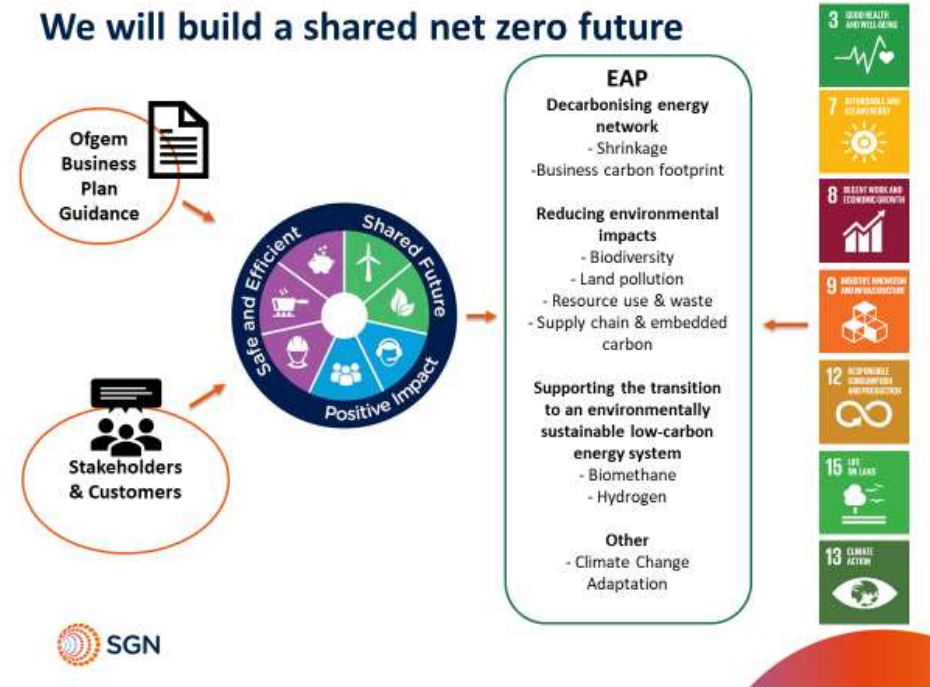
⁷ Total Carbon Footprint is defined as scope 1, 2 and 4 greenhouse gas emissions and shrinkage

investment allowing a safe and secure transition to a shared net-zero future where both people and planet flourish. The EAP and associated documentation show how investments during GD2 will reap long-term benefits.

Approach to GD2

The image below illustrates how our vision to build a shared net-zero future is developed with input from Ofgem’s RIIO-2 Business Plan Guidance⁸. Importantly, through feedback from our stakeholders and customers, it also shows how in turn, it shapes the Environmental Action Plan, supported by the SDGs which frame our strategy.

Figure 5: How feedback, Ofgem's guidelines and our sustainability strategy, interact with the Environmental Action Plan



⁸ Dated 31 October 2019

2 EAP within the business plan

Our EAP shows our aspirations for GD2 and beyond and how we as a responsible business will invest now to reap longer-term benefits.

Figure 6: Appendix structure

	Distribution Mains & Services	Distribution (Governors & Crossings etc)	Transmission	Other Assets	Cost Efficiency, Financeability, Procurement, Stakeholder Engagement
Management	Work Management & Business Support				
	Environmental Action Plan				
Systems	IT & Cyber Resilience		Electrical & Instrumentation		
	Energy Futures: Whole Systems & Scenarios, Energy System Transition, Innovation				
People	Workforce Management				
Other Assets	Property, Fleet, Plant & Equipment				
Customers	Customer Service & Vulnerability				
Emergency Service	Emergency Service			SIUs	
	Repair Service				
Inspection/ Maintenance		Asset Maintenance			
Repair & Revalidation	Repex	Integrity	Integrity & Compliance		
Refurbishment / Replace / Rebuild					
Growth/Resilience	Connections				
	Capacity Management				
Removal		Maintenance	Integrity & Compliance		

Our EAP has been embedded throughout the GD2 business plan and its deliverables. The projects and programmes to be completed during GD2 are owned and led by different teams across the business and our Group Head of Safety, Health and Environment plays a key role in challenging the business and monitoring this delivery. This approach is vital, as an essential step towards embedding sustainability into our business. Appendices, Engineering Justification Papers (EJPs) and Cost Benefit Analyses (CBAs) have been developed by the owners of the projects and are signposted in the EAP. They are collated here to show them within the broader environmental context, bringing them together as a strategy.

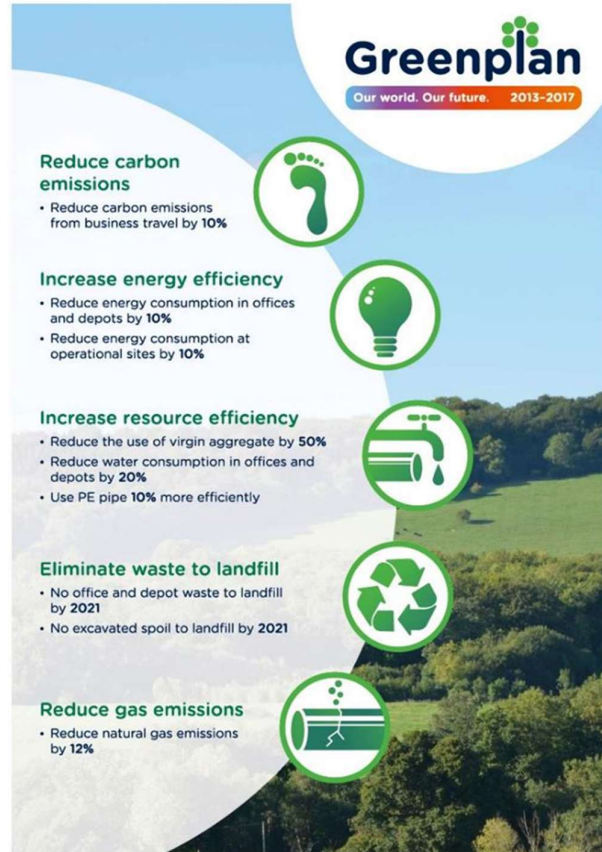
Investment decision packs

Appendices, relevant EJPs and where applicable CBAs that feed into the EAP are listed in sections 6.6 and 6.7.

3 GD1 performance and learnings

3.1 Overview of service delivered

Figure 7: Targets set for Greenplan in 2013



We set-up 'Greenplan' in 2013 from which many achievements have stemmed, including; the reduction of natural gas emissions by 21% (exceeding our 12% reduction target), close to zero waste to landfill for offices and depots (a reduction of more than 99%) and a 24% reduction of our energy consumption at operational sites. In Greenplan, four out of nine identified targets were achieved. Although we didn't achieve all our targets, we did increase awareness around the business, with director level ownership of each target.

GD1 outputs relating to leakage and biomethane connections are available in our GD1 Experience appendix (001).

Our environmental engagement track record includes:

- Five Green Apple awards for our Core and Vac innovation, Plan Bee partnership project, Biomethane plant and Greenplan progress⁹;
- LNG tanker transport – We increased the environmental weighting on a procurement tender which meant the contract was awarded to a company which promised carbon savings by prioritising rail transport over road. This has had a significant impact on reduced carbon emissions. Between August 2017 until the end of January 2018 we removed over 88,000 road miles by implementing the new rail contract. This resulted in cost savings of £1.123m. With a total of 370 loads moved between these dates, we made a 373,419kg CO₂e reduction. The road mileage has continued to drop since then, and our contractor has also increased the length of the rail journey up to Inverness, which has reduced the road mileage by a further 173 miles for each single journey. This project was shortlisted for Transport Project of the Year 2018 at the Business Green Leaders awards with our partner;

⁹ The Green Apple Award is an annual international campaign to recognise, reward and promote environmental best practice around the world.

- Holding the Carbon Trust Standard since 2011 and having reduced our carbon footprint year on year. At the last audit in 2017 we achieved an 8.4% reduction based on our 2015 standard;
- We have developed various innovations over GD1 which have led to environmental, efficiency and safety improvements. Two of these projects in particular have helped us reduce our resource use; CISBOT and Core & Vac. Both innovations have been shortlisted or won awards including ‘Innovation of the year’;
- Plan Bee, an example of community engagement - We sponsored two bee hives to be installed in a local Glasgow school. This included bee keeping lessons and our employees volunteering to build a vegetable garden with some of the pupils and teachers. This project allowed the school to introduce bee keeping into the curriculum, which has been a great success for the students who struggled with traditional subjects. We also installed two bee hives in our Glasgow depot and ran bee keeping lessons for our employees interested. This initiative was shortlisted at the Edie Sustainability Awards and we are now looking at ways to further support the bee population. This includes working with local Bee keeping associations in Scotland and Northern Ireland.

Next Steps: A wider sustainability strategy

The development of our sustainability strategy, guided by the United Nations Sustainable Development Goals, has come from a number of sources. These include the learnings of GD1, societal shifts showing a higher engagement and demand for action to tackle climate change and other environmental and social issues and drivers, such as providing increased opportunities within STEM (Science, Technology, Engineering and Maths), (see below, section 5.1). Our sustainability strategy is still work-in-progress and will be published at a later date.

3.2 Legislative background

There are numerous items of environmental legislation with which we have to comply, many of which stem from the Environmental Protection Act 1990, with more recent additions such as the Climate Change Act 2008. Among these we have a requirement to report on our performance through ESOS (Energy Savings Opportunity Scheme), NAEI (National Atmospheric Emissions Inventory) and Climate Change Adaptation Reporting Power. Where possible, we aim to go ‘beyond compliance’ and our Environmental Management System is externally verified to the ISO14001:2015 standard. We also hold the Carbon Trust Standard for reducing our total carbon emissions year-on-year.

Recent announcements and new targets set by UK and Scottish Governments steer us in a more sustainable direction, for example:

- The UK and Scottish Governments have set legally binding targets of achieving net-zero greenhouse gas emissions by 2050¹⁰ and 2045¹¹ respectively:
 - With business in both Scotland and Southern, we have decided to make a commitment to the more stretching target of net-zero greenhouse gas emissions across both our networks by 2045; and
 - For us to comply with a net-zero future, we are accelerating decarbonised energy solutions and continue to work innovatively to provide our customers with decarbonised heat.
- Declarations of ‘climate emergencies’ by nation states and regions, this ‘emergency’ classification is being used to intentionally acknowledge the size and scale of the challenge ahead in tackling climate change.
 - While not legislation or regulation, this impacts our business and reflects the increased societal awareness and rise of environmental activism, which also mirrors the feedback and

¹⁰ Climate Change Act 2008 (2050 Target Amendment) Order 2019, amending the Climate Change Act 2008 by introducing a target for at least a 100% reduction of greenhouse gas emissions (compared to 1990 levels) in the UK by 2050.

¹¹ Climate Change (Emissions Reduction Targets) (Scotland) Bill

input from our customers and stakeholders to act on our environmental impacts such as our carbon footprint.

- The Scottish Government has pledged to phase out new petrol and diesel cars and vans across Scotland by 2032, which is eight years ahead of the UK Government target of 2040:
 - There is increased air pollution in cities and the application of Ultra Low Emissions Zones (ULEZ) are becoming more common;
 - We recognise the makeup of our commercial vehicle fleet will look very different at the end of GD2 than it does today, as we replace older cars and vans with new ultra-low emission vehicles where possible.
- The Transport (Scotland) Bill was passed on 10 October 2019. It addresses roadworks and low emission zones, two areas which will have implications for how we plan and undertake necessary planned or unplanned work on our network assets in Scotland¹².

3.3 GD1 output delivery

The targets we set in Greenplan and our results are set out below.

Figure 8: Greenplan targets and results.

		Baseline year 2012/13	Final year 2018/19	Results
Goal 1: Reduce natural gas emissions				
Target 1	Reduce Natural Gas Emissions by 12% (3% a year)	54,537 tCO ₂ e	42,904 tCO ₂ e	This is a total reduction of 21% and we were successful in meeting our target. We have saved more than 11,600 tCO ₂ e of natural gas
Goal 2: Reduce carbon emissions				
Target 2	Reduce carbon emissions from business travel by 10% (2.5% a year)	17,646 tCO ₂ e	17,020 tCO ₂ e	This is an overall reduction of 3.6% but we failed to meet our target. We have saved around 626 tCO ₂ e from business travel
Goal 3: Increase energy efficiency				
Target 3	Reduce energy consumption in offices and depots by 10% (2.5% a year)	6,294,261 kWh	9,487,470 kWh	We failed to reach our target and increased our energy consumption overall by 3,193,209kWh
Target 4	Reduce energy consumption at operational sites by 10% (2.5% a year)	10,264,015 kWh	7,768,411 kWh	This is an overall reduction by 24% and we succeeded in meeting our target. We have reduced the energy at our operational sites by 2,495,604kWh
Goal 4: Increase resource efficiency				

¹² See business plan section 12.2.2

Target 5	Reduce the use of virgin aggregate by 50% (12.5% a year)	9.09%	17.02%	We have not managed to reduce our use of virgin aggregate overall but have seen large improvements in some regions along with improved reporting
Target 6	Increase PE efficiency index by 10% (2.5% a year)	54%	66%	We were successful in increasing our PE Efficiency Index by 18.2%
Target 7	Reduce Water Consumption in Offices/Depots by 20% (5% a year)	13,857m ³	17,904m ³	We did not reach our reduction target. Water usage has gone up by 29% overall and we increased our consumption by 4,047 m ³ of water.
Goal 5: Eliminate waste to landfill				
Target 8	No office and depot waste to landfill by 2021 (reduce by 12.5% a year)	14.31%	0.12%	We have almost managed to reduce our office and depot waste to landfill to zero
Target 9	No excavated spoil to landfill by 2021 (reduce by 15% a year)	2.61%	2.64%	We did not achieve our target to reduce spoil to landfill. Over the six-year period of Greenplan, it increased slightly

3.4 GD1 lessons learned

As a part of formulating the EAP we reviewed Greenplan to evaluate what worked well and not so well:

What worked well	Not so well
Simple to understand the targets	It was not very well publicised externally
Achieving very detailed Scope 1, 2 and 3 carbon footprint	It could have been supported by greater stakeholder involvement
High levels of employee participation	It could have had a clear strategic direction
High level of implementation	It could have been broader in scope

In summary, Greenplan delivered what was required. It delivered a main vision, it reduced our impact in many areas and it was a well-accepted strategy across the company. Going forward, we will build on this to create a more comprehensive and structured approach.

4 Stakeholder insight

While the future of gas is still uncertain, the gas networks will be utilised for the foreseeable future and we therefore need to take a long-term view. One of the notable differences between GD1 and GD2 is the visibility and interest topics like environment, sustainability and climate change have risen in the public agenda.

When GD1 started in 2013 there was a focus on more the traditional aspects of environmental management such as increasing recycling and compliance.

As we end GD1, our engagement has shown our customers and stakeholders now have higher expectations of us to deliver significant greenhouse gas reductions and other improvements in our environmental performance. In particular, when presented with information about our environmental impacts, customers and stakeholders expect us to focus on reducing leakage.

We have undertaken a comprehensive programme of engagement and research during the development of our GD2 business plan, helping us to understand our customers' and stakeholders' priorities. This is described in more detail in Chapter 4 of our business plan and the Enhanced Engagement appendix (022).

We have taken feedback from several engagement events (described in section 4.1. below) into consideration to shape our strategy during GD2. Frequent and on-going discussions with internal and external stakeholders as well as customers and our Customer Engagement Group (CEG) has helped build and shape this EAP.

We have a focus on our carbon footprint, decarbonisation and the transition towards an environmentally sustainable low-carbon energy system, as well as planning to create considerable positive impact across our wider estate and land that we manage.

The image below illustrates our customers' priorities, derived from our programme of research. While all priorities are seen as important, future energy solutions and minimising environmental impact are two of the main priorities' customers would like us to focus on in GD2.

Figure 9: Future energy solutions and minimising environmental impact are among the top priorities for our customers



Needs more investment from SGN/customer - where they would like SGN to focus future efforts on (investment priorities)

We have listened to customers and stakeholders and used the insight gained from our engagement programme to develop our EAP. As an example, at a stakeholder engagement workshop in Edinburgh (August 2019), we presented plans to green 30% of our commercial fleet by the end of GD2. This was presented as a high ambition. Due to feedback and overwhelming support from our stakeholders we are now proposing 50% of our commercial fleet to be ultra-low emission vehicles (ULEV), wherever possible, by the end of GD2.

Furthermore, we will have regular review sessions to assess how the ULEV market is progressing, so we can

better understand when suitable vehicles will become available. Rapid changes are seen to be coming in this space and if possible, we would like to increase our target if we can during GD2, which is why we are asking for an uncertainty mechanism in the form of a use-it-or-lose-it allowance.

Both customers and stakeholders felt the components of our Environmental Action Plan covered the right areas^{13,14}, and overall stakeholders and customers in our two networks have provided aligned views and feedback on our EAP proposals. The area where a notable difference was identified was in relation to biodiversity and increased natural capital, in particular for SME business customers. Unlike Scottish SME business customers, Southern SMEs did not see the need, or have as strong an interest, in biodiversity. For this group, gas leakage (part of shrinkage) was by far the main concern and discussing habitat improvements was seen as fairly irrelevant, with some customers commenting it felt like: “window dressing”.

4.1 Stakeholder feedback

Leading up to the submission of the business plan and this EAP, we have undertaken numerous engagement and research activities with stakeholders and customers. The key feedback received from all stakeholders and customers across both our network regions is that we should focus on reducing leakage, which is part of shrinkage, and the biggest contributor to our total carbon footprint¹⁵.

Stakeholder feedback for Shared Futures (Hydrogen) is covered in our Energy Futures – Energy System Transition appendix (006).

Figure 10: Stakeholder engagement providing feedback for our EAP

Event	Group	Topics	Location
Sustainability Roundtable	Expert stakeholders	Carbon footprint Strategy Environment	London, January 2019
Sustainability Roundtable	Expert stakeholders	Carbon footprint Strategy Environment	Glasgow, January 2019
Willingness to pay (WTP) research	Customers	Environmental impact	June 2019
Qualitative workshop - EAP	Expert stakeholders	Shrinkage/leakage Fleet Renewable energy Biodiversity Offsetting	Glasgow, August 2019
Qualitative workshop - EAP	Customers	Carbon footprint (leakage, fleet, electricity use) Supply chain Resource use waste Biodiversity	Glasgow, August 2019
Qualitative workshop - EAP	Customers	Carbon footprint (leakage, fleet, electricity use) Supply chain Resource use and waste Biodiversity	London, August 2019
Distributed entry	Stakeholders	Biomethane	London, September 2019

¹³ Qualitative workshops - Environmental Action Plan (ref 084)

¹⁴ Shared future workshop – Scotland (Ref 090)

¹⁵ Expert round tables on sustainability (Ref: 065,066)

connections (Biomethane)			
Distributed entry connections (Biomethane)	Stakeholders	Biomethane	Edinburgh, September 2019
Willingness to pay (WTP) research	Customers	Carbon footprint (fleet, electricity) Biodiversity	September to October 2019
Acceptability testing	Customers	Carbon footprint	September to October 2019

“IT’S GOOD TO SEE THAT THEY’RE TRYING TO COMBAT THAT [THEIR ENVIRONMENTAL IMPACT] BY SETTING OUT A PLAN.”

LONDON FUTURE CUSTOMER

We have received positive overall feedback on the information we shared on from the EAP and the fact we were working on developing this plan for implementation during GD2. Customers wanted to see a plan with fewer areas included, but with high ambitions for each component. They asked for the EAP to be transparent and achievable.

Expert stakeholders were very keen to see us to have a high ambition on initiatives which would reduce our scope 1 and 2 business carbon footprint (BCF). Promoting hydrogen vehicles was also something which was considered to be fully in-line with our mission to decarbonise the energy network.

We carried out customer willingness to pay (WTP) research in two waves during 2019. Customers have consistently told us minimising our environmental impact is the area they would be prepared to pay most for us to invest in.¹⁶ For example, in our first wave results, domestic customers were willing to pay £5.21 for a 20% reduction in our carbon footprint.

Wave two of our WTP research was carried out in October 2019. The table below shows a snapshot of the results:

Figure 11: Snapshot of willingness to pay results

Priority	Phrase to the customer	Best improvement	Domestic customer	SME ¹⁷ customer (mean bill value)
Minimising environmental impact	Reducing the greenhouse gas emissions from our operations and contributing to cleaner air	By the end of 2026, 100% of all vehicles to use ultra-low emission fuels (where possible) e.g. Hybrid, Hydrogen or electric vehicles	£5.05	£36.47
Minimising environmental impact	Reducing the greenhouse gas emissions from our operations	80% carbon-neutral electricity (sometimes called renewable or green)	£5.36	£31.86

¹⁶ Conjoint and WtP Summary report (Valuation Phase) (Ref 005)

¹⁷ SME are Small and Medium Enterprise, and this represents those customers of SGN falling into this category and how big average increase on their bills they are potentially prepared to pay for different initiatives.

Minimising environmental impact	Maximising opportunities to positively enhance the natural environment	Ensuring disused sites meet minimum environmental regulations + enhancing the natural environment by creating habitats for wildlife and planting wildflowers and trees for 30 sites	£3.77	£21.60
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Attributes to improve our environmental performance consistently attracted the highest willingness to pay values from both domestic and SME business customers when compared to other business improvements, underlining the findings from our earlier engagement that this is a priority area for customers.

Domestic customers would be willing to pay an additional £5.05 on their gas bills for the best improvement of making 100% of our fleet (where possible) ultra-low emission vehicles such as hybrid, hydrogen-powered or electric cars and vans by 2026. The same group would be willing to pay slightly more (£5.36) for us to ensure 80% of our electricity is carbon-neutral. Customers also exhibited a fairly high willingness to pay for our improvements to positively enhance the natural environment. Domestic customers were willing to pay up to £3.77 to create biodiverse habitats at 30 sites.


Current customers rated this topic as less important than future customers (18 to 24-year-olds) or SMEs at acceptability workshops¹⁸. In our quantitative acceptability testing customers were asked a question in relation to the reducing our carbon footprint by 25%. Southern customers gave this element an acceptability score of 78% in total, which was 3% lower than customers in Scotland, who gave this element a score of 81%. This element attracted highest acceptability from domestic customers in Scotland (81%), and lowest from Scottish SMEs (76%)¹⁹.

Figure 12: Approach for customer qualitative workshops held in August 2019

ENVIRONMENTAL ACTION PLAN WORKSHOP OBJECTIVES

Components of the Environmental Action Plan

- Business carbon footprint
 - Leakage from pipes
 - Fleet
 - Electricity use in SGN properties
- Supply Chain
- Resource Use and Waste
- Biodiversity



Important to note:

- Customers were asked to evaluate SGN's current Environmental Action Plan (EAP) for GD2. As the business plan only covers five years, it was decided to focus on what SGN could control and/or impact during the time period the plan covers. SGN acknowledged and highlighted there are topics that will extend beyond this period of time, such as the decarbonisation of gas

Workshop objectives:

1. Is the EAP broad enough/ does it cover all areas customers expect?
2. Is there anything missing from the EAP?
3. Do the ambitions of the EAP go far enough?
4. Are SGN's ambitions supported by customers and to what extent?

There were 30 domestic customers, 15 future customers and 13 SMEs that attended workshops in either Glasgow or London. There were 4 additional in-depth interviews conducted with hard-to-reach customers

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¹⁸ Business plan acceptability testing phase 1 (Ref 078)

¹⁹ Business plan acceptability testing phase 2 (Ref 079)

Figure 13: From expert stakeholder workshop discussing our level of ambition for addressing our carbon footprint

Ambition levels for Carbon Footprint

Low Ambition:

BAU; not doing anything more (or less) than we are today

Medium Ambition:

Following a science-based target approach towards a 1.5 degree Celsius trajectory in line with the Paris Agreement

High Ambition:

Aiming to reach net zero greenhouse gas emissions by 2045, as per the Scottish Government target set earlier this year. Our business is in both England and Scotland and we propose that the whole business follow the more ambitious target, using a science-based approach.



In September 2019 we held two workshops specifically focused on those expert stakeholders who engage in the Distributed Entry Connections process, for example, biomethane producers and plant operators. At these workshops stakeholders were presented with our current target of connecting homes to biomethane and discussed the target we were looking to set in GD2. They were asked their views as to whether our target of 400,000 homes supplied with biomethane by the end of GD2 was ambitious enough. All the stakeholders thought this target was either about right or too low. We have therefore increased our ambition and set a target to supply the equivalent of 450,000 homes with biomethane by the end of GD2.

This is supported by the insights from our wider programme of engagement. Stakeholders and customers want us to continue to put more green gas, such as biomethane and blended hydrogen, into our network^{20 21 22}. This was a higher priority area for most customers at our acceptability testing workshops, except for hard to reach/vulnerable customers²³. In our quantitative acceptability testing, customers were asked a question in relation to the additional element of encouraging more low carbon 'green gas' into the network.

This additional element of our plan attracted fairly high total levels of acceptability from both customers in Scotland and Southern, at 77% in Southern and 81% in Scotland. Domestic customers in Scotland gave this element the highest acceptability (81%), Scotland SME business customers gave this the lowest acceptability (78%)²⁴. This was also included as a consideration in our first wave of willingness to pay customer research. Customers are prepared to pay £3.39 for additional investment to enable 20% green gas to be carried in our network²⁵.

²⁰ Max diff prioritisation phase (Ref: 003, 004)

²¹ Future of heat specialist panel Dec 2018 (Ref 024)

²² Expert round tables on sustainability (Ref: 065,066)

²³ Business plan acceptability testing phase 1 (Ref 078)

²⁴ Business plan acceptability testing phase 2 (Ref 079)

²⁵ Conjoint and WtP summary report (Valuation phase) (Ref 005)

5 GD2 cross-sector issues

The Environmental Action Plan and related initiatives are central to GD2 and meeting our customers and stakeholders wishes. We have started this journey already in GD1, and will ramp-up in GD2 while continuing in future price control periods to support of our overall sustainability strategy.

5.1 Decarbonisation and whole system

Low carbon solutions which utilise our existing gas network infrastructure could potentially allow for the decarbonisation of heat at the lowest cost and minimal disruption to customers. Demonstrating the ability to use and repurpose our existing gas network infrastructure is therefore essential.

We propose to continue to support and facilitate the injection of biomethane and cost efficiencies on entry requirements²⁶ and demonstrate the potential for hydrogen networks²⁷.

Biomethane is a resource the gas sector should fully maximise the use of. The feedstocks used to produce biomethane such as agricultural and food waste will be produced in any case. Utilising a waste resource which would otherwise naturally decompose encourages a circular economy. When biomethane is burnt by our customers it contributes much less to climate change (the carbon conversion factor for combusted biomethane is 0.2043 in comparison to more than 2,500 for natural gas) compared to methane. The biomethane initiatives we are proposing below²⁸ would provide a total reduction of 90.9 ktCO₂e in the energy system.

The pathway to net-zero involves the gas network being re-purposed for the use of Hydrogen. We have already started trial projects across our company which are allowing us to facilitate this key transition over from natural gas to Hydrogen. It is vital we continue to remove barriers to enable this change, to allow us to stimulate the Hydrogen economy.

5.2 Innovation

Innovation is core at what we do to decarbonise heat and drive for net-zero in 2045. In the EAP we specifically refer to innovation projects to reduce leakage; smarter network control and management as well as Stent Bag and High-Volume Gas Escape Toolkit (HVGET) and in reducing our resource use and minimising waste. e.g. using a technology called iCore which we intend to roll-out in GD2²⁹.

5.3 Resilience

We are seeing rapid changes in the environmental scene and, as a result, aim to create an adaptable plan which can adjust to changing circumstances and unforeseen events. Therefore, we are looking at having a regular review of our approach to decarbonising our commercial vehicle fleet. During GD1 we will create a working group encompassing all owners of GD2 initiatives to discuss what can be done in the lead up to its start and be 'GD2 ready'. Several projects and programmes have been developed with an uncertainty mechanism to further support the adaptable approach, ensuring we can provide best value to the customer and run an agile business.

²⁶ For details on biomethane please refer to section 5.4, C - Supporting the transition to an environmentally sustainable low-carbon energy system, and the Biomethane EJPs and CBAs as referenced in this document.

²⁷ Further detail is available in the Energy Futures Appendices 006 and 007 as well as in the Business Plan chapters 9, 10 and 11.

²⁸ Section 6.4; C - Supporting the transition to an environmentally sustainable low-carbon energy system

²⁹ See section 6.4.

6 GD2 activity breakdown

6.1 Approach to GD2

Our environmental impacts

Since we were formed in June 2005, we are proud to have maintained our ISO14001 certification, making the transition to ISO14001:2015. The ISO standard requires the holder to have a register of Aspects and Impacts³⁰. Our Aspects and Impacts Register (A&I Register) quantitatively scores our environmental risks across our operations.

The methodology used to determine the most material aspects (the most important aspects – to us as a business and to key stakeholders) and impacts include the following considerations:

1. Potential to cause environmental harm;
2. Size and frequency of the aspect;
3. Importance to the stakeholders of the organisation; and
4. Requirements of relevant environmental legislation.

Our certification to the ISO standard is reviewed annually. External auditors visit our offices, depots and a selection of operational sites including streetworks, mains replacement and major projects to assess our performance against the ISO standard. They also ensure any significant environmental aspects and impacts are appropriately identified against our register.

In the process of preparing the EAP, we carried-out an internal quantitative review of the A&I Register to ensure we were not leaving out any significant environmental impacts from our network which should be part of the EAP. In addition, we asked expert stakeholders at the qualitative workshop in Glasgow (August 2019) if they felt there was anything missing from what we were proposing to cover in the EAP and they agreed it was comprehensive. This table provides a list of the identified high level impacts and how these are covered in the EAP.

Figure 14: High level impacts

Impacts	Covered in the EAP
Land pollution	Section 6.4: Reducing environmental impact – land contamination. This topic was initially not covered in the EAP. However, as it came out as the top most important aspect it is now included
Natural gas emissions	Section 6.4: Reducing leakage
Water pollution	Not covered in EAP. This is a risk that is already well managed with specific working near water risk assessments and procedures in place.
Carbon dioxide and other greenhouse gas emissions	Section 6.4: Reducing Scope 1 and 2 Business Carbon Footprint
Water consumption	This is currently not covered in the EAP. It will be monitored through the A&I Register
Unsustainable use of natural resources	Section 6.4: Reducing environmental impact – resource use and waste
Destruction of habitat	Section 6.4: Reducing environmental impact – improving biodiversity
Production of solid and liquid waste	Section 6.4: Reducing environmental impact – resource use and waste
Pollution	Section 6.4: Reducing Scope 1 and 2 Business Carbon Footprint

³⁰ Aspects are defined as any part of our company activities which interacts with the environment, e.g. emissions to air. 'Impacts' are what impact the aspects have on the environment, positive or negative.

We have decided to add Climate Change Adaptation to our EAP, as this is something we deem as essential in addition to climate mitigation. The CEG has expressed its support for this.

The makeup of our current environmental impacts is not expected to change as we move into GD2. However, although as this document shows, our impacts are expected to reduce in comparison to current level of impacts, as we reduce our shrinkage, invest in clean vehicles and renewables, identify ways of enhancing biodiversity and collaborate with our supply chain.

Opportunities and challenges

The recent climate emergency as issued by the UK Government earlier this year, and subsequent identification of a net-zero target brings both opportunities and challenges. We have the opportunity to show leadership at a critical point in time when increasingly society, including our stakeholders and customers, are asking for real action. The challenge is the policies on how to reach net-zero are not yet visible. So, while we are setting an exciting ambition, the details on how we all get there are currently not clear. We also have a great opportunity, due to heightened public awareness and research becoming more accessible, to show how we can support the transition to a low carbon economy and low carbon energy system as well as meeting other challenges that our society is facing, in terms of extinction of species and degrading ecosystems.

We have considered different options including the option of doing nothing when justifying the initiatives. Our actions have been developed to address material impact areas. Opportunities and challenges are detailed in the relevant EJPs.

Strategic approach









Alongside developing the Environmental Action Plan for GD2, we are also in the process of developing our sustainability strategy which is being aligned with the UN Sustainable Development Goals (SDGs).

The SDGs, which are agreed by UNs member states to be achieved by 2030, provide a longer-term view for us beyond GD2 and with the additional commitment in working towards net-zero by 2045, it has been welcomed by our Customer Engagement Group as an ambitious move.

Developing the strategy

During 2018 we conducted three materiality reviews with key internal stakeholders including safety health and environment (SHE), HR, stakeholder, finance, property, land management, innovation as well as operational representatives, to identify which SDGs are important to us as a business and important to our key stakeholders. We completed a comprehensive review of all the goals and the key targets underpinning each goal. These were then discussed internally between the key stakeholders to determine those most material for the business. Following this review, 8 of the 17 SDGs which directly apply to our business were selected. Underpinning KPIs and targets associated to each of the goals are currently being developed to allow us to track and measure the performance and strength of our sustainability strategy.

Figure 15: Initial KPIs associated with each of the SDGs with which we are aligning our sustainability strategy

	<ul style="list-style-type: none"> Support everyone going home safe and well Support the health surveillance programme Support the wellbeing of our employees 		<ul style="list-style-type: none"> Continue CAP Days and Community Engagement Programmes
	<ul style="list-style-type: none"> Reduce the number of people living in fuel poverty Increase the amount of generated Renewable Energy across the SGN estate 		<ul style="list-style-type: none"> Increase energy efficiency in our building and sites Work with our supply chain to reduce impact on the environment Reduce wastage in offices at Depots and in offices
	<ul style="list-style-type: none"> Create a network of sustainability champions Inspire young people to consider STEM careers Become a Living Wage Employer Support new and existing talent through training schemes and support 		<ul style="list-style-type: none"> Increase awareness of sustainability and climate change through training Reduce our carbon footprint Reduce the volume of shrinkage Develop a climate change adaptation plan
	<ul style="list-style-type: none"> Support trials of innovative products, services, tools and equipment Use collaboration to deliver improvements Facilitate the introduction of low carbon fuel into our gas network 		<ul style="list-style-type: none"> Create a positive impact on the environment

The strategy is currently going through an internal decision process and will be made available once approved, hence why we have chosen not to share further details of specific targets and KPIs here, but only the overarching SDGs to which these refer. However, some targets have been identified during the EAP process and are set out for each relevant area in section 6.4, paragraphs A, B and C.

Behaviour Change

Culture change is essential to ensure successful implementation of our sustainability strategy and therefore also the EAP. During GD2 we will continue to train, brief and listen to our employees concerns and ideas on sustainability and climate change as we recognise that we all have a role in reducing our impact; no matter how small that individual change is, it sums to a large impact. This was the central message in the Environment/Sustainability section during the 20 Safety and Environment Roadshows held across our company in March/April 2019. Behaviour change and building people’s confidence in what they do matters and has an impact is a vital message for making real, impactful, urgent and large-scale changes throughout GD2 and beyond.

6.2 Policy

National and local governments policies to implement net-zero, reducing pollution and ensuring impact on the environment is minimised are clearly impacting our business.

The National Infrastructure Commission has recently (October 2019) recommended new duties for the regulators; Ofgem, Ofcom and Ofwat, to promote the achievement of net-zero and improve the resilience of the UK’s infrastructure. It recommends the UK Government should set-out a long-term strategic vision for each of the regulated sectors, through strategic policy statements, within the first year of each Parliament, to support lasting plans and stable funding.

6.3 Scenarios and sensitivities

We have developed an adaptive plan which is aimed to be robust enough to stand the thorough scrutiny from Ofgem, stakeholders and customers and, at the same time, agile enough to adjust to a rapid changing market place and society. As an example, to help improve air quality London ULEZ (Ultra Low Emission Zone) came into effect in April 2019. ULEZs are expected to be implemented in other cities across our networks, with plans

already in Glasgow, Edinburgh and Southampton. We have had the requirement to develop an Environmental Action Plan flexible enough to accommodate such changes when they arise avoiding investments in stranded assets.

Another such area where we have to consider different scenarios, is the continuously developing research on climate change and its impacts. As even stronger evidence becomes available including an increased understanding on feedback loops, the possibilities of more stringent policies relating to climate change mitigation and even bringing the 2050 UK net-zero target forward is increasingly likely. We believe this Environmental Action Plan provides that flexibility.

6.4 GD2 Outputs and price control deliverables

We have received a strong message, delivered by our stakeholders and customers, we should focus on reducing our leakage as methane is a strong greenhouse gas. A discussion around global warming potential is available in section 6.10 Assurance.

Proposed initiatives in GD2

The table below show how we have linked the initiatives presented in the EAP to the RIIO-2 Business Plan Guidance (BPG) provided by Ofgem.

Figure 16: Initiatives and Ofgem guidance

Ofgem BPG	Area	Appendix	Initiative	Main driver
A - Decarbonising energy networks	Shrinkage including innovative and aspirational projects	Repex (019)	Reducing leakage through repex programme, remote pressure management, proactive steel programme and innovation	Improved safety and carbon reductions. Helpful as a hydrogen enabler
		EAP (003)		
	Business carbon footprint	Fleet (025)	Ultra-low emission vehicles	Reduced pollution, carbon reduction, reputational benefits
		Property (002)	On-site renewables	Carbon reduction, reputational benefits
		Property (002)	Energy management and utility reduction	Carbon reduction and cost savings
B - Reducing networks' other environmental impacts i.e. pollution to local environment; resource waste; biodiversity loss; and other adverse local effects that are specific to each sector	Biodiversity	Property (002)	Habitat and ecosystem surveys and biodiversity enhancing projects	Increased natural capital
	Land pollution	Property (002)	Land pollution – this is part of BAU	n/a
	Resource use and waste	Property (002)	Zero waste to landfill, recycling and reuse targets	Efficient use of resources
		Distribution, integrity and governors (012)	PV on governor sites – reducing hazardous waste	Efficient use of resources and reputational benefits Carbon reduction is a contributor
	Supply chain and embedded carbon	Procurement and native competition (010)	Collaboration with supply chain Monitoring and reporting on embedded carbon	Carbon reductions, reputational benefits, efficient use of resources
C - Supporting the transition to an environmentally	Biomethane	n/a	Propane reduction	Providing low carbon heat for customers, reputational benefits
			Remote pressure management	

sustainable low-carbon energy system			Within-grid compression	Transition to low carbon energy system
			SIUs feasibility study	
			Carbon capture	
	Hydrogen	Energy Futures (007)		
Other	Climate change adaptation	Property (002)	Surveys and remedial actions	Climate change

Long-term targets

We have set a net-zero target by 2045 in-line with the Scottish Governments target adapted earlier this year. The Scottish Government has further committed to a 75% reduction in Scottish Greenhouse Gas (GHG) emissions by 2030, compared with 1990 levels. We will strive for a similar trajectory.

Governmental policies are still lacking to show what net-zero by 2045 (and indeed by 2050) would look like and there is as yet no defined methodology on how to calculate this. We are working on a transition plan which will take us from where we are today to the start of GD2. This approach includes collaboration with the Carbon Trust to assess a likely pathway to reach net-zero for our business.

The biggest challenge in achieving net-zero by 2045 is the reduction of shrinkage and there are a limited number of actions we can take achieve it. The business plan and its appendices provide details on our repex programme³¹ which is due to be finalised by 2032 and which is an essential piece in reducing leakage from our pipes. We cannot exclude the possibility of domestic offsetting to reach our ambitious target.

We are aligning our sustainability strategy with the UN SDGs which will also ensure we focus on achieving longer-term targets beyond GD2.

GD2 EAP initiatives

This section present the initiatives in the order they are linked to the Ofgem business plan guidance, under paragraphs:

- A - Decarbonising energy networks;
- B - Reducing networks' other environmental impacts; and
- C - Supporting the transition to an environmentally sustainable low-carbon energy system.

All initiatives have detailed EJPs and in some cases CBAs where 'options analysis' to identify value-for-money impact reduction initiatives is included. EJPs and CBAs are clearly signposted below and a summary of all relevant investment decision packs are listed in 6.6 and 6.7.

³¹ See the repex appendix (019) and chapter 7 in the business plan.

A - Decarbonising the energy networks

Figure 17: Decarbonisation

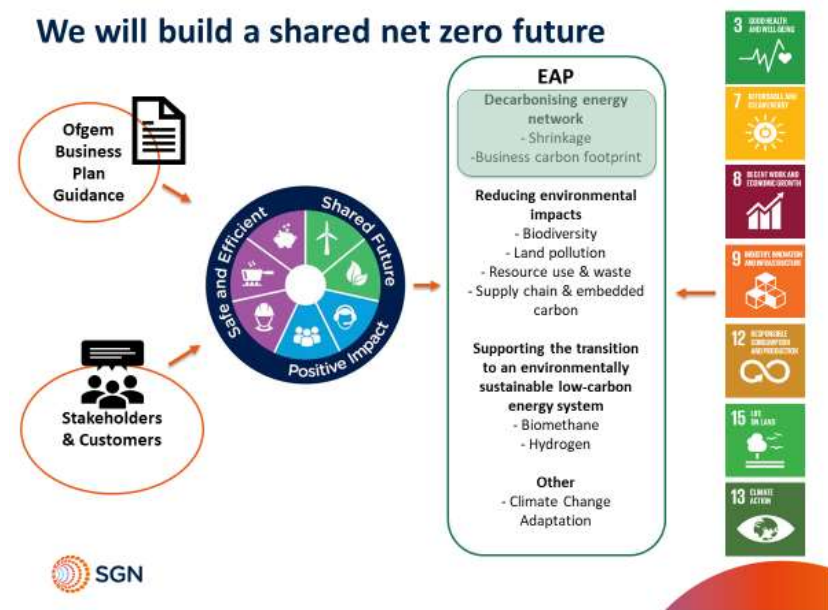


Figure 18: Current impacts, GD2 targets and longterm targets

Current impacts (2018/19)		
TCF	835 ktCO ₂ e	
Shrinkage	797 ktCO ₂ e	95%
BCF	39 ktCO ₂ e	5%

7 AFFORDABLE AND CLEAN ENERGY

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

GD2 targets:

- We will reduce our Total Carbon Footprint by more than 25% by the end of GD2 from 2018/19 levels;
- We will work collaboratively towards a 15% reduction of third-party damage on our pipes, resulting in fewer leaks of gas to the atmosphere; and
- We will continue to measure our scope 3 emissions and improve data input where possible.
 - We will continue to measure and report greenhouse gas emissions through our annual RRP submission to Ofgem.

Long-term targets:

- We are working towards Scotland’s 2045 net-zero target across both our networks; and
- We are considering further longer-term targets and associated KPIs supporting SDG 7, 12 and 13 in our sustainability strategy.

Where we are now:

- The iron mains replacement programme is ongoing and expected to be finalised in 2032;
- In 2019 we developed a science-based target approach for our scope 1 and 2 Business Carbon Footprint in collaboration with the Carbon Trust; and
- We have been measuring scope 3 since 2013. Contractor vehicles have been included since 2015 and hire cars since 2017. While there are some gaps (e.g. we do not capture all contractor travel or own travel booked by employees and paid through expenses, which we expect to be very small percentage of business travel), we have relatively high confidence in our scope 3 data.

Reducing shrinkage³²

Shrinkage refers to the gas which is lost from the transportation network. Under the Uniform Network Code (UNC), GDNs are responsible for purchasing gas to replace the gas lost through shrinkage. GDNs estimate shrinkage using an industry approved methodology and engineering model.

Shrinkage is made up of three main elements: Leakage, own use gas and theft of Gas.

Figure 19: SGN leakage reduction strategy



During GD1 we developed the following strategy to reduce leakage; a combination of replex programme, increased governance around any temporary variations in pressures, wider industry collaboration, investment in remote pressure management and MEG projects.

During GD2 we will continue this journey, but critically are proposing an acceleration of the replex programme to further reduce shrinkage (leakage), performing a proactive steel programme and placing an added focus on the deployment of innovation initiatives. The business plan data templates 5.10_BCF and 5.16_EAP show annual historical shrinkage data as well as forecasted GD2 shrinkage data.

Innovation and remote pressure management without jeopardising the safe and efficient supply of gas to our customers provide opportunities to reduce leakage further. In addition, biomethane plays an important role in the decarbonisation of heat and our ambition and proposals are detailed in the Energy Futures appendix (006), under energy system transition.

The business plan describes how we are working towards the transition to an environmentally sustainable low-carbon energy system (see chapters 9, 10 and 11) as well as appendices Energy Futures – Energy system transition (006) and Energy Futures – Whole Systems and Scenarios (007). These are supported by this EAP. In Chapter 13 of the business plan the decarbonisation pathway illustrates the key technical steps to achieve 100% decarbonisation. This has been developed in collaboration with key industry stakeholders, Scottish Government and UK Parliamentarians. In Chapter 11 of the business plan, 'Enabling whole system solutions', this is further detailed by the Potential Carbon Savings Pathway.

Leakage

Leakage from our distribution network forms approximately 95% of total shrinkage. With the net-zero target set in law it is imperative GDNs actively seek methods to control and limit network leakage. There are three main levers available to GDNs to reduce leakage: replacing existing metallic mains with polyethylene (plastic); reducing network pressures to optimal levels while still maintaining security of supply to end users and; maintaining an effective Monoethylene Glycol (MEG) programme to ensure existing lead yarn joints on iron mains are saturated to reduce risk of unintended environmental emissions from the network.

Own use gas and theft of gas

Own use gas is mainly attributable to the operation of pre-heaters at pressure reduction installations on our network and theft of gas refers to gas is illegally taken from the network upstream of the Emergency Control Valve (ECV).

³² Read more about shrinkage and environmental emissions in the business plan section 9.1.1

Options analysed to reduce leakage

The table below show a summary of the options analysed to reduce leakage.

In GD2 we are proposing to reduce leakage by the following actions:

- More ambitious pressure management (included in current approach to repex);
- Accelerated repex; and
- Proactive steel programme.

Figure 20: Initiatives to reduce leakage and associated reduction in carbon dioxide equivalents

Annual	Leakage reduction per annum in tCO ₂ e					Reference
	2021/22	2022/23	2023/24	2024/25	2025/26	
Current approach to repex	29,156	29,365	29,558	29,803	30,191	Repex appendix (019)
Initiative	Reduction per annum in tCO₂e					
Acceleration of repex	704	690	706	760	740	Repex appendix (019)
Proactive steel programme	1,504	1,515	1,544	1,542	1,559	Repex appendix (019)
Total reductions	2,208	2,205	2,250	2,302	2,299	Repex appendix (019)

Assuming these initiatives (acceleration of repex and proactive steel programme) would receive requested funding, our leakage would show an incremental total annual saving of 159ktCO₂e (and cumulatively over GD2: 475 ktCO₂e).

As we have received overwhelming support from all categories of stakeholders and customers to reduce shrinkage (leakage), we propose to go ahead with both initiatives and reduce leakage as much as possible. Further detail can be found in the repex appendix (019) and associated EJPs, CBAs and business plan data templates.

We have considered an initiative where we would purchase biomethane to replace shrinkage. Unburnt biomethane, if leaked, has a similar GWP (Global Warming Potential) as natural gas. However, when burnt it would have a significantly lower impact and this benefit would be on the customers footprint not ours. The additional cost of buying biomethane (circa £5/MWh over and above the cost of natural gas) would fall to customers for little or no environmental benefit. It is of much greater benefit to flow biomethane to customers to burn which is being discussed below in 'section C - Supporting the transition to an environmentally sustainable low-carbon energy system'.

By targeting the accelerated repex programme in areas which are more likely to be early converters to hydrogen, we are looking to achieve a hydrogen-ready network sooner in certain areas enabling the more substantive reductions in emissions.

Deploying innovation to reduce leakage

In addition to the accelerated repex programme, we have identified two aspirational projects which would reduce our leakage in GD2 through smarter network control and management. Subject to success in the ongoing innovation trials, this will be rolled-out in London, part of our Southern network. It would contribute to a carbon saving of 7.4ktCO₂e. We are not currently targeting our Scotland network as we have very good coverage across Scotland with traditional profiling. There are no other networks in Scotland where we can justify the additional spend when compared to the savings we can make. Further detail is available in the

Distribution integrity & governors appendix (012) and associated EJPs; 011 UtonSouth So and 010 UtonLon. The cost for these remote pressure control and management projects are £3.39m in total during GD2.

We are also working on two significant innovations which will help to reduce shrinkage by 4.7 ktCO₂e during GD2: High Volume Gas Escape Toolkit and the Stent Bag, at a cost of £2m. However, any emission reductions would not be captured by the leakage model and would not therefore have an impact on the headline emissions as stated by current methodologies.

High Volume Gas Escapes Toolbox (HVGET)

We recognise the risk from high volume gas escapes and have been working on several ways to reduce both the volumes of gas potentially released, as-well as reducing risk to individuals working in and around them. The first stage of the project was to develop sealing tools and plugs, which physically stop the gas from escaping, as-well as an increase in monitoring sensors to identify such releases.

The second stage in this project is to develop a HVGE Working Group with representation from across our company which will keep feeding back different projects successes and challenges. This working group, and the relative success of the different tools will help to reduce the number, severity and frequency of HVGE's, which in turn reduces our Shrinkage.

Stent Bag

The stent bag project is designed to be a tool to minimise the release of gas in high volume gas escape scenarios. The process developed involves inserting a sealing stent system into the main remotely away from the gas escape. The stent bag is then internally pushed along the main and expanded to seal the area around the leakage point, unlike a traditional flow-stop bag the stent maintains the flow of gas to any customers downstream of the affected area.

The stent bag has now been fully tested at and has proven the functionality we expected. The tests proved leakage could be vastly reduced and/or stopped while maintaining the gas flow, when the stent bag is fully deployed in the gas main over the leak.

Reducing third-party damage

In our business plan we promise to deliver a safe and efficient network by facilitating fewer interruptions to customers' supplies as a result of third-party damage, working collaboratively towards a 15% reduction³³. This will also have a positive impact on reducing leakage. In GD1 on average 431,000 cubic metre natural gas escaped through third-party damage. This is the equivalent of approximately 5.8ktCO₂. In GD2 we will reduce this by 15%, i.e. more than 850 tonnes CO₂e. Any emission reductions would not be captured by the leakage model and would not therefore have an impact on the headline emissions as stated by current methodologies.

Reducing the SGN business carbon footprint

Science based targets approach

We were one of only five organisations, and the only utility, involved in the development of the Carbon Trust Climate Leadership Framework. We have worked with the Carbon Trust continuously for a longer period of time and more recently collaborating to apply a science based methodology to calculate ambitious reduction targets. Carbon reduction targets are considered science-based if they are in line with the level of decarbonisation required to keep the average global temperature increase well below 2°C compared to pre-industrial temperatures³⁴. Science-based targets were calculated using our 2017 greenhouse gas inventory as

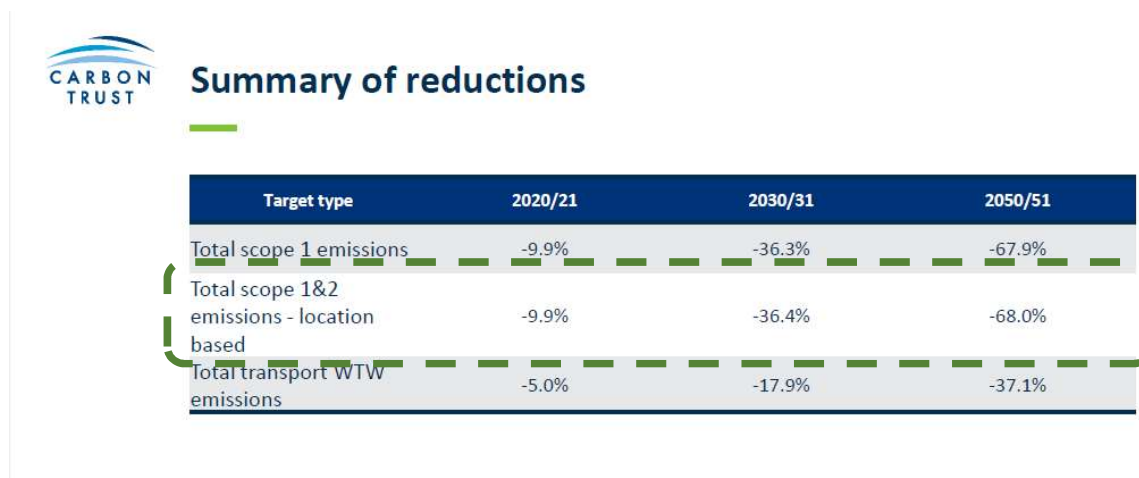
³³ Business plan 4.14.3

³⁴ As described in the Assessment Reports of the Intergovernmental Panel on Climate Change (IPCC).

the baseline year and relate to our scope 1 and 2 emissions.

The table below show the emission reductions (location based³⁵) versus the baseline year we have targeted to achieve a well below 2°C science-based target in-line with the Science Based Target initiative (SBTi)³⁶.

Figure 21: Science-based target reduction for scope 1 and 2 as developed in collaboration with the Carbon Trust



The science-based target would not achieve net zero by 2045, hence by setting a net-zero target for 2045 we are being more ambitious than by focusing on a science-based target of well below 2°C. For our business carbon footprint we will aim to achieve this without relying on international greenhouse gas offsetting.

For fleet, our ambition is to transit to a 50% ultra-low emission vehicle (ULEV) fleet (where possible) by the end of GD2. For our own electricity consumption (property and buildings) we aim to procure a 100% green tariff for gas and electricity consumption in the lead up to GD2 and during GD2 support the transition to a low carbon energy network further by installing solar PV panels on all our occupied sites. We are also proposing a range of energy efficiency initiatives for our buildings.

Reducing scope 1: Commercial vehicles

Introduction

The health and social care costs of air pollution in England could reach £5.3bn by 2035 unless action is taken. In 2017 the costs were £42.88m³⁷. Our fleet produces an estimated 15 ktCO₂e a year and stakeholder feedback says we need to do what we can to reduce this.

This section focuses on reducing our scope 1 BCF through initiatives which would make our fleet more environmentally sustainable with reduced emissions and reduced air pollution. The full workings, justifications, options considered, costs, operational impacts etc is available in the Fleet appendix (025) and the associated EJP and CBA.

³⁵ Carbon emissions has been calculated using the location-based approach, which applies an emission factor to the consumed electricity that is based on the geography of the electricity consumption. This means, for example, that all grid electricity in the UK is accounted for with an identical grid emission factor. The approach is defined by the GHG Protocol Scope 2 Guidance.

³⁶ Carbon reduction targets are considered science based if they are in line with the level of decarbonisation required to keep the average global temperature increase below 2°C compared to pre-industrial temperatures, as described in the Assessment Reports of the Intergovernmental Panel on Climate Change (IPCC).

³⁷ GOV.UK (2018) ‘New tool calculates NHS and social care costs of air pollution’

Smarter and more efficient fleet

We propose some operational measures to reduce required transport and increase the efficiency of our fleet:

- Vehicle use - We will introduce a driver training course and other communication tools to deliver driver performance improvements, eco training tips and fuel-efficient vehicle maintenance (i.e. keeping tyres inflated);
- Transport demand management and planning - We could reduce mileage and adopt efficient journey planning techniques by ensuring optimum routes are being used. We expect to be able to demonstrate significant mileage and financial savings, thereby reducing fuel and mileage costs, emissions and even the size of the fleet;
- Alternative tooling - We will develop alternate methods of tooling and operating in collaboration with our operational teams, which are much less reliant on vehicles to power equipment, such as stand-alone units or multiple vehicle types, giving better flexibility to use more environmentally friendly vehicles and technologies.
- Operating the fleet smarter - We will continue discussions with our operational teams on what can practically be done in operating the fleet in a smarter way.

We intend to collaborate with others as there are many fleet operators in many industries battling with the same challenges and we are looking into joining suitable industry initiatives to stay up-to-date with developments, e.g. EV100³⁸.

Changes to our fleet

The table below summarises the proposals to improve our fleet from an environmental perspective. For full details, including analysis of options please refer to the Fleet appendix (025). We have considered an accelerated replacement programme (i.e. changing older vehicles to newer, more efficient and less polluting vehicles), the replacement of diesel and petrol vehicles with ultra-low emission vehicles (ULEV – which can be electric, hydrogen, CNG or hybrids)³⁹ and the installation of charging points and refilling stations to support such a change in our commercial vehicle fleet.

This would enable reduced greenhouse gas emissions for our scope 1 BCF as well as better air quality in the communities in which we operate. Reduced NOx and particulates are not included in the societal benefit of reduced carbon equivalent emissions. NOx is produced from the reaction of nitrogen and oxygen gases in the air during combustion, especially at high temperatures. In areas of high motor vehicle traffic, such as in large cities, the amount of nitrogen oxides emitted into the atmosphere as air pollution can be significant. Reducing emissions of nitrogen oxides therefore will have benefits to the environment which are not quantified in here.

The table below provide a summary of our proposed fleet initiatives:

Figure 22: Proposed fleet initiatives

Initiative	Environmental benefit	Total cost GD2	Justification
Commercial fleet: 50 % ultra-low emission vehicles Accelerated replacement	Reduction by 5.4 ktCO ₂ e over GD2 Reduced air pollution; NOx and particulates	£20.5m Of which £10.8m upfront (PCD)	Stakeholders asked for a higher ambition than our starting proposal We have provided a stretching target with an aim to reach a more than

³⁸ EV100 is a global initiative bringing together forward-looking companies committed to accelerating the transition to electric vehicles and making electric transport the new normal by 2030

³⁹ ULEV is the term used to describe any vehicle which uses low carbon technologies, emits less than 75g of CO₂/km from the tailpipe and is capable of operating in zero tailpipe emission mode for a range of at least ten miles

programme; 8 to 6 years Installing EV charging/ refilling stations for ULEVs Tooling, driver training, logistics planning, smarter way of operating		and £9.7m as an uncertainty mechanism; Use- it-or-lose-it	25% reduction of BCF by end of GD2
Company cars (business mileage): Additional EV/ Hybrids / Low-emission Vehicles	Reduction by 780 tCO ₂ e over GD2 Reduced air pollution; NOx and particulates	n/a	No funding requested Important to encourage uptake of less polluting vehicles with staff
Business Travel: Encouraging use of skype Travel with less environmental impact, car sharing etc.	Carbon saving and reduced air pollution (both unquantified) – impacting our scope 3	n/a	No funding requested CEG proposed we should include business travel Right thing to do

On the first consultation with expert stakeholders on the detail in our proposals to reduce our scope 1 BCF and improving our commercial fleet from an environmental sustainability perspective, we suggested a high ambition where 30% of vehicles be replaced by ULEVs. Stakeholders gave a strong and unified message that we should be much more ambitious, and that our proposed high level of ambition should in fact represent the lowest level of ambition. We considered 100% ULEVs (which was the current state at the October submission of the business plan), however having revisited our workings and due to the uncertainty of available technology we are now proposing 50% of the commercial fleet transition to ULEVs where possible.

We are also proposing to accelerate the business as usual vehicle replacement which we operate, from eight to six years, which would bring significant environmental benefits as we would move quicker to new and improved technology. Along vehicle investment and accelerated replacement, we further propose an infrastructure investment to make suitable charging stations available. Our commercial fleet consist of 1,864 cars and vans (and more than 2,000 when including hired vehicles). As vehicles will transition to ULEVs where possible and with a suggested replacement rate of six years, this means that by end of GD2 42%, or 775 vehicles, of the actual fleet would have been replaced by ULEVs. In the table below the estimated greenhouse gas emissions are shown, as these increase over GD2 when more and better ULEVs are being introduced, alongside investment and savings in fuel cost and maintenance.

Figure 23: Estimated replacement strategy costs

50% Replacement in GD2						Total
Year	2022	2023	2024	2025	2026	
EV vehicle investment (£k)	1,553	1,553	1,553	1,553	1,553	7,767
Accelerated replacement 8yr to 6yr	2,184	2,184	2,184	2,184	2,184	10,920
Infrastructure investment (k£)	388	388	388	388	388	1,942
CO ₂ e reduction (%)	9.4	18.8	28.2	37.5	46.9	46.9
Fuel cost reduction (k£)	-317	-734	-1,101	-1,468	-1,836	-5,457
Maintenance reduction (k£)	-23	-47	-70	-93	-117	-350
Net position (k£)	3,439	2,999	2,608	2,218	1,828	13,092

Detailed forecasts of emissions from our commercial fleet are available in the BPDT 5.10_BCF and the table below shows a summary of incremental savings a year and in total over GD2 against a 2018/19 base year.

GD2 - savings per annum (tCO ₂ e)					Total GD2
2021/22	2022/23	2023/24	2024/25	2025/26	(ktCO ₂ e)
1,089.45	1,087.02	1,088.00	1,085.60	1,086.33	5.44

Compared to baseline year 2018/19 this gives an approximate reduction of 35%.

There are challenges in moving towards a fleet with a significant number of ULEVs, these are discussed in the Fleet appendix (025) and associated EJP. The market for ULEVs is moving at a rapid pace and while we know or can estimate the arrival of some suitable vehicles, there are still a lot of unknowns. To tackle this, we will conduct a six-monthly review from now on and throughout GD2 with the Fleet Manager, the Head of SHE, senior operations and a commercial manager to understand if and what new technology may be available in the market at that time and thereby, if and what vehicles could continue to be fuelled differently. We are asking for an uncertainty mechanism for our fleet initiative due to the technological uncertainties and expected changes in the marketplace.

We will prioritise towns and cities which we operate in as these are more likely to experience increased regulations on low-emission and low-pollution zones. We will explore other opportunities to introduce electric vehicles within the small van fleet prior to GD2.

We have been exploring the opportunity to use both alternative fuel and EVs in GD2. This could include hydrogen and supports our Energy Futures scenario which looks at gas network being re-purposed for the use of Hydrogen. Beyond GD2 we will continue to assess technology and availability of suitable ULEVs and stretch our target to run a fully decarbonised fleet if possible.

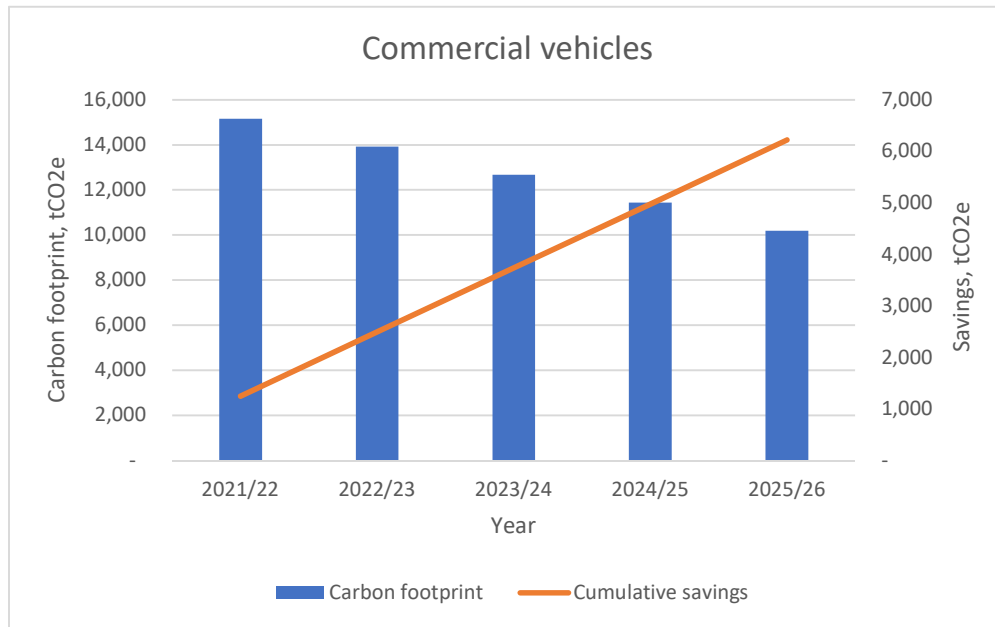
Company cars

Emissions from company cars, casual cars and opt-out cars are included in business mileage which is currently part of our scope 1⁴⁰ BCF. We operate a company car scheme for our employees who require a vehicle for business travel. Our ambition for the company car fleet is on the same terms as our commercial fleet, in moving to cleaner alternate fuelled cars to achieve a reduction in greenhouse gas emissions and air pollutants. The first step is to limit the cars on the list of available company cars to 130gCO₂/km. This CO₂ limit is planned to be reviewed annually, looking to add additional incentives to encourage greener choices by way on an enhanced allowance for lower emission cars on a sliding scale that increases the additional contribution with cars of lower emissions. The plans through GD2 would be to reduce this CO₂ limit by 5g/CO₂ every year leading to a maximum allowance of 95gCO₂/km by 2026.

We will look to encourage the uptake of low emission company cars and we will aim to reduce greenhouse gas emissions by as much as we would for the commercial fleet. Over GD2 the total annual reductions would be in the region of 780tCO₂e.

⁴⁰ BPD T RIGS stated own use vehicles should be scope 3 but we have left it in scope 1 so it can be compared to previous years and RRP

Figure 24: Carbon footprint from commercial fleet and cumulative savings over GD2



Reducing scope 2: Electricity

Introduction

Our electricity usage (which makes up all of scope 2) from occupied and operational sites contributes to 9% of our Business Carbon Footprint (BCF).

We can reduce scope 2 BCF by being more energy efficient and switching to renewable electricity in buildings and on sites which we own and have control over.

It is important to note behaviour change is an essential part of reducing energy needs and using fewer kilowatt hours to start with. This includes simple measures as reminding our people to switch off lights and equipment, not opening windows when the heating is on, turning down or switching off air conditioners when they are not needed and so on. We will explore different incentives for our employees to make improvements relating to energy reductions.

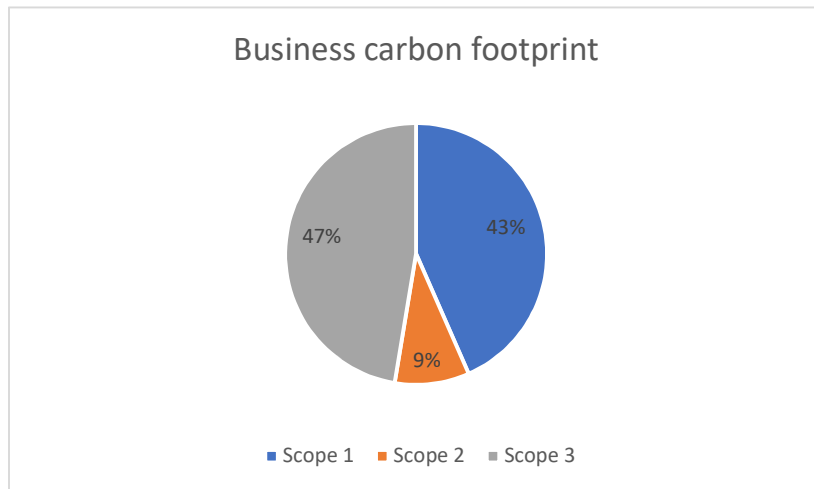
The proposals we make would enable a reduction in our business carbon footprint as well as a higher proportion of fossil-fuel free electricity in the system due to renewable energy installations.

The full workings, justifications, options considered, costs etc is available in the Property appendix (002), Energy Management and Utilities EJP and CBA, and Renewables EJP and CBA.

Initiatives

The table below summarises the proposals to improve our property and buildings from an environmental

Figure 25: Elements of our BCF; scope 2 represents electricity



perspective;

Figure 26: Property and buildings proposals

Initiative	Environmental benefit	Total Cost GD2	Justification
Installing solar PV panels on all occupational sites, in total 44 sites, and Glenmavis (non-occupational) Estimated total generation capacity 1,071 kW	Reduced carbon footprint of 1.3 ktCO ₂ e Contributing to new renewables and less fossil-fuel in the energy system	£1.7m - the total amount is asked for as uncertainty mechanism (use-it-or-lose-it)	Majority of stakeholders wanted to see a high ambition in installing renewables Best value for money in terms of renewables installation
Installing BMS and LED lighting on large and medium occupational sites, i.e. in total 14 sites	Increased energy efficiency Reduced carbon footprint of 1.3 ktCO ₂ e	£1.6m (PCD)	Stakeholder support Good value for money
Switching from standard utility tariff to 100% renewables tariff (gas + electricity)	With Renewable Energy Guarantee of Origin, REGO, backed energy from a supplier we would reduce our carbon footprint for electricity to zero (scope 2) Choosing biogas would also significantly reduce our carbon footprint (scope 1)	n/a Initiative to be carried out prior to GD2	Stakeholders considers this to be BAU. We will make this shift now and not wait for GD2, therefore no funding is requested

To reduce our scope 2 BCF across our occupied property estate, we propose energy efficiency initiatives of installing building energy management systems (BMS) and LED lighting across selected sites. We propose this has a focus on large and medium sites rather than the smaller sites as cost savings will not be beneficial here.

We further propose to install solar panels across all our occupational sites. This will also help reduce electricity costs and increase self-sufficiency. We considered three levels of ambition with regards to renewable installation as well as other types of renewable sources, like wind energy.

The GD2 initiatives of installing renewable energy on occupational sites and being smarter with our energy usage through LED and BMS, would result in a total carbon footprint reduction of in total 2.6 ktCO₂e, or 70% compared to baseline year 2018/19, by end of GD2.

Purchase of green energy

To make a difference we do not have to wait until the start of GD2. One initiative we are already working on which will significantly reduce our BCF is a switch of our main gas and electricity tariffs to 100% renewable tariffs.

We are currently exploring our options and are speaking to several suppliers who offer both 100% green electricity and green gas. The switch to green tariffs would cover all our occupied sites.

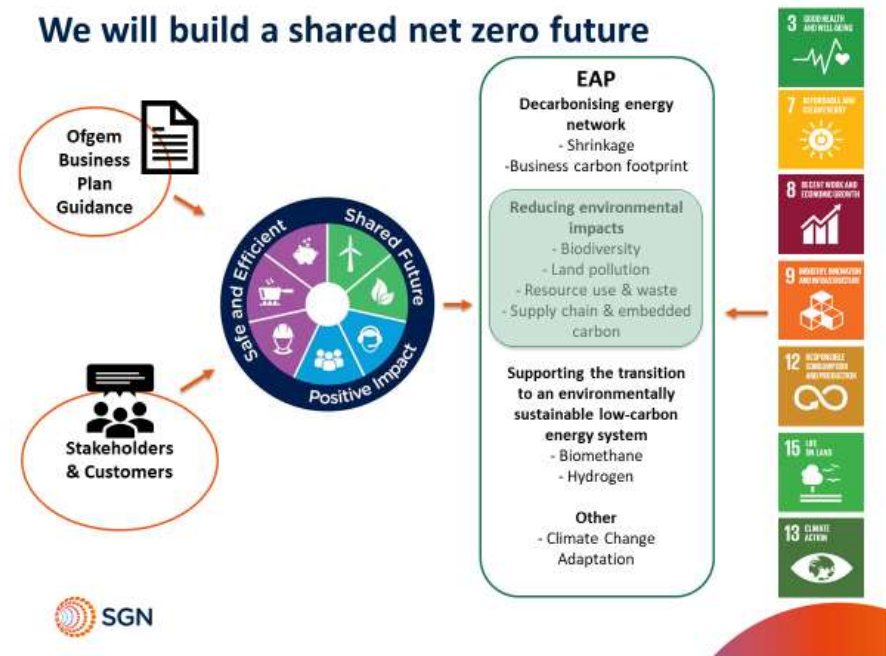
A - Decarbonising the energy networks during GD2 – Summary table

Figure 27: This summary shows that we would meet our target of reducing our total carbon footprint by end of GD2 by more than 25% in comparison to baseline year 2018/19

	Total annual reduction (incremental) during GD2	Total reduction (cumulative) over GD2	% reduction compared to baseline year 2018/19
Leakage total (BPDT + aspirational and innovation projects)	171.4 ktCO ₂ e	511.3 ktCO ₂ e	28%
Fleet initiatives (commercial fleet + business mileage)	6.2ktCO ₂ e	18.7 ktCO ₂ e	50%
Property	2.6ktCO ₂ e	7.9 ktCO ₂ e	
Reduction TCF	180ktCO₂e	538 ktCO₂e	28%

B - Reducing our networks other environmental impacts

Figure 28: Reducing other environmental impacts



In May 2019 the UK Government declared an environment and climate emergency. Reduction of valuable ecosystems and declining of species is rising on the societal agenda. A UN backed report⁴¹ reveals species declining globally at fastest ever rate due to human actions, with around a million species threatened with extinction unless action is taken. Farmland birds in the UK declined by 56 per cent between 1970 and 2015; linked to changes in agricultural practices, including loss of habitat and the use of pesticides. Butterflies are often used as an indicator species for the health of our wider environment. Defra 2018 biodiversity indicators show that since 1976, the habitat specialists butterflies index has fallen by 77%. The decline in bees' diversity and abundance would have a serious impact on how our natural world functions including food crops.

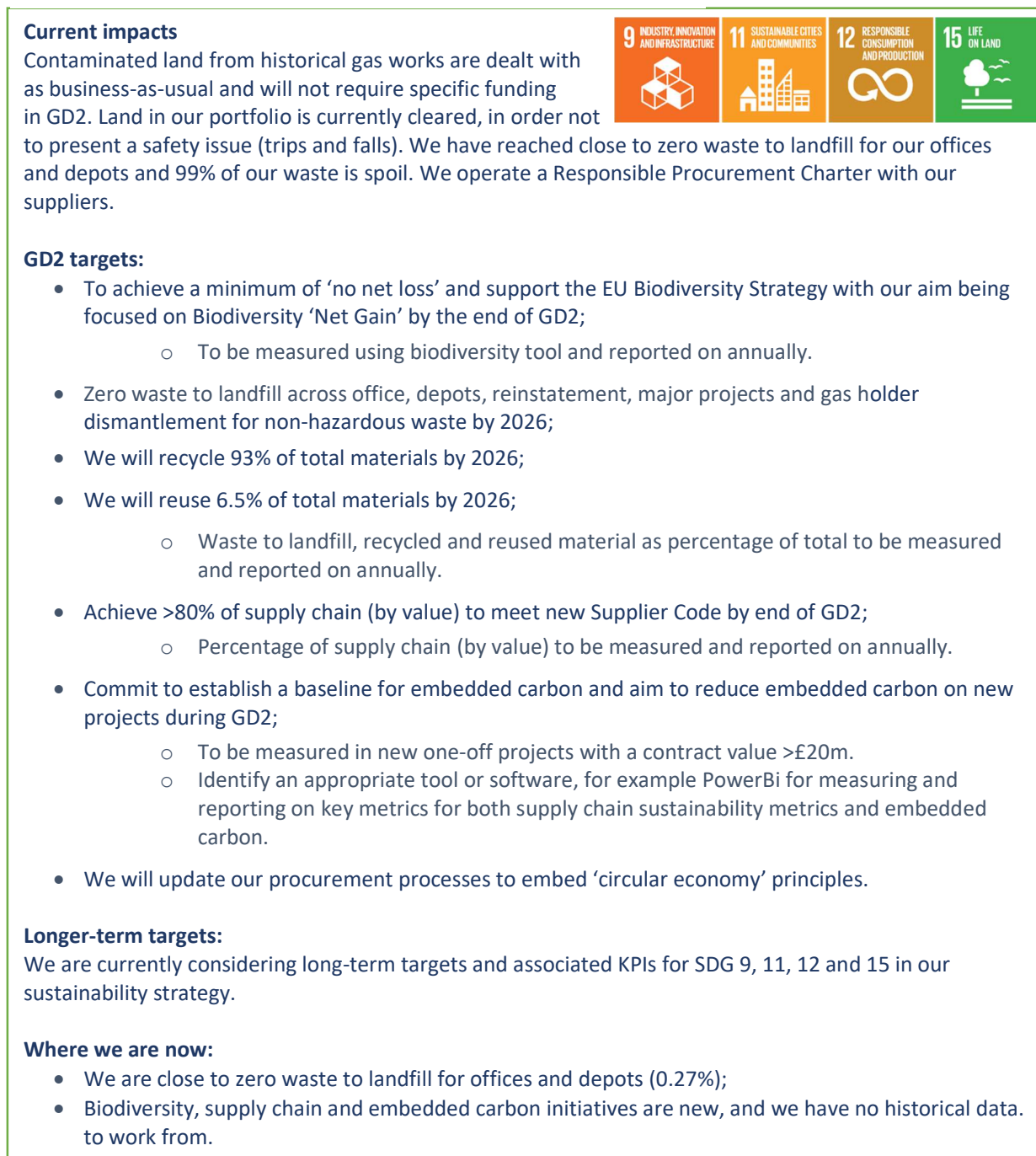
We can play a part in reversing the loss of biodiversity by committing land in our company portfolio to biodiversity enhancement projects which will improve ecosystem resilience. It is a part of the systemic changes we support through our engagement with the SDGs. We can also extend our outreach and collaborate with our supply chain, supporting them to reduce their environmental impacts which would provide positive

⁴¹ IPBES' 2019 Global Assessment Report on Biodiversity and Ecosystem Services.



contributions to the mitigation of climate change, resource use and waste and more.

Figure 29: Current impacts, GD2 targets and longer-term targets



Reducing environmental impact: Improving biodiversity

The aim of this programme is to establish the existing biodiversity profile on our sites through a series of surveys and where appropriate, implement enhancement programmes to increase the biodiversity of the ecosystems existing on them.

We have identified three key parts of the business that would have suitable opportunities for biodiversity

enhancement as part of our works or sites. These are:

- Land Management: 97 sites have been identified as potentially being suitable for biodiversity enhancement projects, totalling 747,101m²;
- Property (occupied sites): We have 44 occupied sites across our property estate on which we propose to carry out biodiversity assessment surveys. Some sites may have minimal enhancement opportunities, but this is not known in detail at this stage; and
- Major projects: Reviewing the planned projects in GD2 for major projects we have highlighted approximately 12 projects which are likely to be suitable for biodiversity improvement measures.

For additional detail please refer to the Property appendix (002) and the Biodiversity EJP.

The aim can be achieved through delivering the following objectives:

1. Understand the existing biodiversity profile across the identified land parcels;
2. Safeguard species and habitats of principal importance and improve their management;
3. Increase the resilience of our natural environment by restoring degraded habitats and creating new habitats; and
4. Improve our evidence, understanding and monitoring of biodiversity.

Parcels of non-operational land are currently managed from the point of view of health and safety compliance. This typically results in everything other than mature trees being reduced to ground level and a programme of strimming and weed killing being implemented throughout the year, to keep on top of new vegetation growth.

Safety benefits are the key focus of the total clearance approach as it reduces the possibility of slips, trips and falls on low level branches and stems and the possibility of people becoming entangled or being scraped by head high vegetation. While this appears at odds with the proposed programme, at present the vegetation that exists across the land parcels identified appears to be self-seeded and has a low biodiversity in terms of number of species; being restricted to early succession species and invasive weeds. Only the introduction of targeted management practice is likely to greatly enhance the existing biodiversity of these sites.

Figure 30: Current approach to non-operational land management, example of 'before' and 'after' photos

Site 1 – before and after



Site 2 – before and after



Proposed programme for biodiversity

The most suitable biodiversity enhancement measures to be implemented on which parcel of land is not currently known and surveys and the development of improvement strategies for each site would have to be undertaken in years one and two of GD2 to enable this to be established.

Hence, we propose an upfront (PCD) allowance for surveys and strategy development and then an uncertainty mechanism for the improvement strategy and enhancement measures. The table below summarises the approach which has further detail provided in the Property appendix (002) and the Biodiversity EJP.

Figure 31: Biodiversity proposal

Initiative	Environmental benefit	Total cost GD2	Justification
Undertake surveys and develop a biodiversity improvement strategy for all 153 sites	Best approach for each land parcel/site will allow the highest biodiversity improvement	£2m upfront (opex)	Opportunity for collaboration and partnership with local and national organisations
Implement biodiversity enhancement measures and resurvey biodiversity to monitor success of enhancement measures on all suitable sites	More resilient and adaptable ecosystems Enhanced biodiversity Contribute to better air quality Positive impact on people's health	£2.5m (capex) as an uncertainty mechanism: use-it-or-lose-it	Mixed views on biodiversity projects from different stakeholder groups We propose to carry out the suggested surveys to have a better understanding of the land we manage to identify the most cost-effective way to improve for maximal environmental and societal benefit.

We intend to use a natural capital tool (Defra Biodiversity Metric 2.0) which allows us to monitor the provision of ecosystem services from our sites and report on progress as necessary. We will use the natural capital tool before and after biodiversity enhancement works have taken place, so we can understand the success of the measures. We propose to achieve a minimum of 'no net loss' and support the EU Biodiversity Strategy with our aim being focused on Biodiversity 'net gain'. We would consider exploring schemes that could protect these new green spaces and preventing unfavourable developments on the land.

We propose to conduct surveys across the whole of our estates and our sites at a total cost of £2m. Based on the results from the surveys we are asking for an uncertainty mechanism to perform enhancing biodiversity projects on suitable sites. What those initiatives will be will not be clear until the surveys have been carried out. We intend to collaborate with local community organisations and national organisations like Woodland Trust, to make sure we use the right approach and maximise benefit to the local community.

Reducing environmental impact: Land contamination

Land pollution and contamination is our highest scoring environmental impact and is broken down as below:

Figure 32: Land pollution

Environmental aspect	Source	Significance score	Weighted significance score	Impact	Controls
Land pollution	Contaminated land from historical gas works	16	20	Changes in biodiversity, land/air/water contamination	Contaminated land remediation programme, training and competence

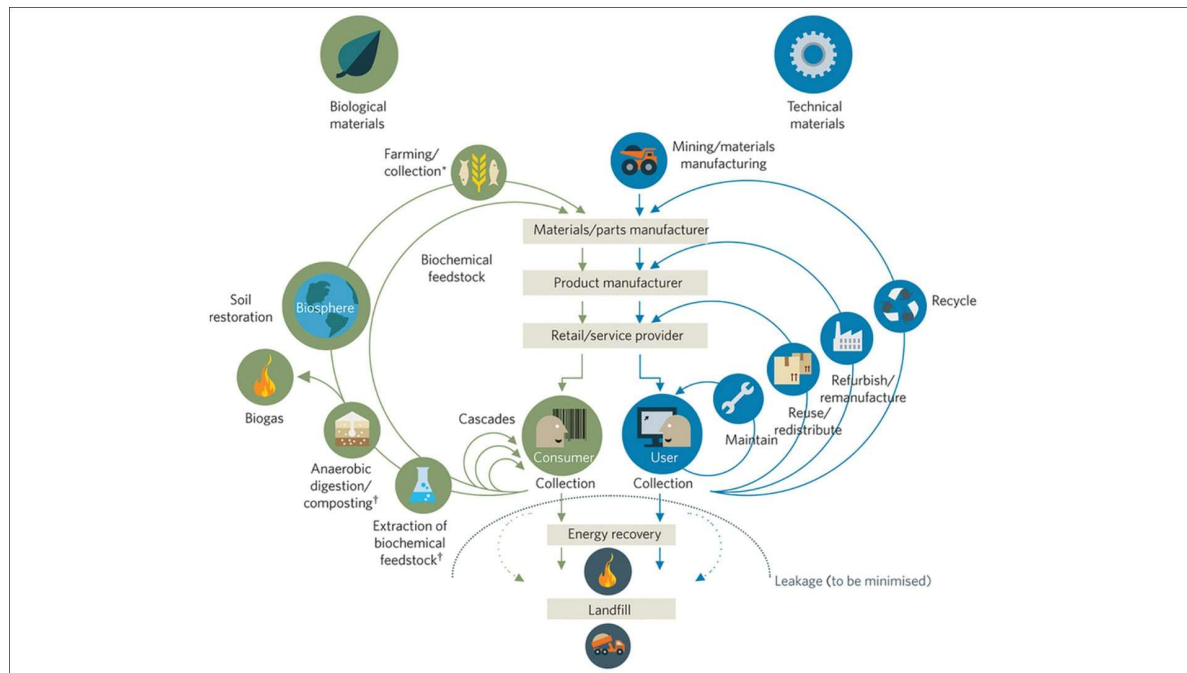
There are 260 sites (133 Southern and 129 Scotland) in the regulated business that are potentially contaminated by virtue of their historic use as coal gas production sites. We will have assessed and removed statutory risk from the vast majority of those that remain by the end of GD1. The sites which will not be dealt with in GD1 either have long-term close-out strategy through monitoring natural attenuation or couldn't be remediated in GD1 as gas plant needed to be removed to facilitate such work. Addressing land pollution from contaminated land is not formally covered by GD2, as this is part of 'business as usual' for us.

Reducing environmental impact: Resource use and waste

We have been working towards zero office and depot waste to landfill since 2013. In this time our performance has improved from 14% in 2013 to 0.27% in 2019. The 0.27% of landfilled office/depot waste comes from our Scottish Independent Undertakings (SIUs). These sites are reliant on the local councils for weekly waste collections and these have limited (if any) recycling facilities which results in a high proportion of the SIUs' waste being sent to council landfill sites. Recently we have engaged a new waste management company for our offices and depots, which will enable higher rates of recycling. Waste which is being incinerated is being used for energy.

For GD2 we propose to expand the zero-waste scope to also include other business areas: reinstatement, major projects and gas holder dismantlement. Landfill is no longer economically or environmentally viable for the majority of products. Stakeholders and customers are very supportive of us working to identify closed-loop processes and strive for a circular economy to help reduce the resource strain on the planet.

Figure 33: A Circular Economy as described by the Ellen MacArthur Foundation



Reducing waste and aiming to embed circular economy principles (which promote maintaining, re-using, refurbishing/remanufacturing before recycling to extend the lifecycle of a product, part or service) result in several environmental benefits:

- Reduced requirement for virgin resources;
- Reduction in waste to landfill and incineration across the business; and
- Reduced risk of resource scarcity and difficulties sourcing key products.

Our 4Rs strategy⁴² is a good example of us using circular economy principles in practice.

In the Resource use and waste EJP there are additional details on the options we considered. For GD2 we propose to achieve zero waste to landfill across office, depots, reinstatement, major projects and gas holder dismantlement. Throughout the price control period we will measure and report on actual waste to landfill, recycling and reuse as a percentage of total waste. We will both recycle 93% of total materials and reuse 6.5% of total materials by 2026. This leaves only 0.5% for incineration (waste to energy). We have not calculated any capital expenditure for expanding the zero-waste scope and embedding circular economy principles.

For hazardous waste there are limited disposal routes and reuse, recycling or incineration may be a challenge. There are examples where we can reduce hazardous waste, like the installation of solar PV panels on network maintenance sites replacing batteries (see section below).

We are considering external verification such as the Carbon Trust Standard. The Carbon Trust's standard for zero waste to landfill recognises organisations which take a best practice approach to waste management and actively divert all appropriate waste streams from landfill. It offers an independent, third-party validation of achievement in waste management and provides an opportunity to validate real achievements in managing solid wastes, demonstrating waste streams are being managed and that recovery, recycling or reuse solutions are being actively implemented.

Upcoming legislative changes: RPS 211

We are currently working in preparation for the withdrawal of the Environment Agency's Regulatory Position Statement (RPS) 211: Excavated Waste from Utilities installation and Repair⁴³. This allows appropriately classified waste to be designated non-hazardous. In April 2020 the RPS will be withdrawn and in preparation for this we will be working within the utility industry to develop an appropriate alternative waste classification methodology based on an industry understanding of risk. However, there is uncertainty in the hazardous waste component of all excavated material as well as the cost of disposal.

Final arrangements are unlikely to be agreed with the Environment Agency until 2020, when the breadth and financial implications are fully appreciated. Assuming we have greater confidence around the potential impact and the associated unit cost of treatment prior to our final proposal, we would prefer to present this as a volume driver reflecting the significant uncertainty around the quantity of material identified as hazardous.

However, without confidence in the key variables - the cost to treat the percentage of waste arising - we propose an early re-opener in 2022, once the new regulations have become operational and a robust sample of costs have given confidence in allowances for the remainder of GD2. Refer to the Repair appendix (014), section 6.8 for further information.

Reducing environmental impacts: Innovation

We are currently using a technology called iCore which is designed to provide minimal disruption when repairing leaking or replacing ageing pipes. It also has significant environmental benefits in terms of reduced waste and resource use, as the 'keyhole' repair and replacement results in significantly less digging and much

⁴² See business plan section 7.3.1

⁴³ Environmental Protection Act 1990, section 34 relates to waste

less materials to be transported to and from site. Once the technology is tried and tested in GD1, we hope we can deploy it further and also use it to help other industries, such as water and telecommunications.

Reducing environmental impacts: Solar PV replacing batteries

We propose to install solar panels on selected profiling governor sites across our network. These have been installed in a small number of sites so far and have proved largely successful. By installing Solar PV, we would increase our self-sufficiency, reduce our reliance on batteries and the related reduction in hazardous waste.

The solar panel systems we have trialed on our profiling governor sites have replaced the external 7.2 Volt Lithium Battery Packs. These battery packs are used on site to control the gas pressures and replacing them with solar panels reduces our reliance on standard lithium batteries. There will be associated cost savings from this.

Figure 34: Solar panel trial on profiling governor station in Dundee



The equipment would include a 10W solar PV4 kit, comprising the solar panel, mounting bracket, PV4 and cabling.

This proposal would bring a range of environmental, social and financial benefits:

- Journey times/man hours of our engineers visiting sites on average every six months. The average round trip including travel time and works completed is two hours. Multiplying this by the number of sites and over the life of the solar panel would have significant savings;
- The reduced associated health and safety dangers of extra driving time roads;
- Reduced vehicle fuel costs of these journeys;
- Reduced greenhouse gas emissions and pollution due to less travels to sites;
- No delivery and storage costs of new batteries;
- No disposal costs of old batteries;
- Less hazardous waste; and
- More efficient use of scarce resources.

Further roll-out of this proposal would help us achieve the benefits above and support our wider renewable energy strategy.

The proposal involves installation of Solar PV across 100% of suitable profiling governor stations across both our networks. The approximate number of potential sites are 900 but numbers may be lower after site specific surveys have been completed. Details of this proposal is available in the associated EJP (there are two; one for Southern and one for Scotland), including expected avoided operational expenditure and a summary is provided in the table below.

Figure 35: Solar PV installation

Initiative	Environmental benefit	Total cost GD2	Justification
Installation of solar PV panels, replacing batteries	Reduced use of resources; less hazardous waste; fewer site visits resulting in emissions savings and less pollution	£3.35m As an uncertainty mechanism; use-it-or-lose-it	Successful pilot projects implemented; good value for money; environmental benefits

Reducing environmental impact: Working with our supply chain

Introduction

A modern, forward looking relationship with our supply chain is critical for the successful delivery of our EAP. This is an exciting opportunity for us to use our influence to not only deliver value-for-money but also wider economic value to customers, communities and deliver national environment benefit, which is central to the aspirations we have when working with our supply chain during GD2.

The expectations of suppliers across all industries has shifted with a call to move beyond just meeting minimum compliance. We are committed to building relationships with suppliers which are mutually beneficial and promote best practice and continuous improvement throughout our operations. As a business, we have historically worked closely with our suppliers to ensure we minimise risk. Following the introduction of the Bribery Act 2010 and later the Modern Slavery Act 2015, we have striven to improve the level of engagement within our supply chain and ensure we, as well as our suppliers, abide to all the mandatory legal requirements.

Our sustainable approach to procurement has largely been outlined within a Responsible Procurement Charter with our intent to operate responsibly and ethically. We will use GD2 as an opportunity to strengthen the work we have done to ensure we and our suppliers operate responsibly and with minimum level of environmental impact. We will work with both internal and external stakeholders to develop a sustainable procurement strategy. We will update our procurement processes to embed Circular Economy principles.

In addition, a better understanding of the goods and services we use will be a critical part of our approach to sustainability. This is required so we can fully calculate the environmental impact of our services and work with our suppliers to ensure they can meet the standards and targets in the Supplier ‘code of conduct’ we will develop in GD2.

Supplier code of conduct

The development of our sustainability strategy has seen us aligned to support the United Nations Sustainable Development Goals and our supplier code of conduct will be aligned to support this. A benchmarking analysis and review have been completed, reviewing international environmental standards outlined in both the UN Sustainable Development Goals and the UN Global Compact⁴⁴. This allowed us to map the core elements of our supplier code of conduct and these are outlined below:

- Transparency and fair competition across the supply chain;
- Human rights;
- People;
- Minimising environmental impact;
- Health and safety;
- Cyber/information security; and
- Governance.

Using existing good practice, external benchmarking and continued stakeholder engagement we will

⁴⁴ UN Global Compact is a voluntary initiative based on CEO commitments to implement universal sustainability principles and to take steps to support UN goals

incorporate this into a sustainable procurement strategy and process. Such process will include developing a robust supply chain questionnaire to gauge the current level of supplier’s capability in relation to the key sustainability themes as shown above. This will allow us to establish a picture of the ‘as is’ and thereafter set realistic key performance indicators (KPIs) and targets for improvement. We will also develop ways to measure and monitor progress.

We propose to target reaching more than 80% of our suppliers (by value) to meet the supplier code of conduct by the end of GD2. That corresponds to 98 of our suppliers. Following the development of the code, new policies and procedures would be rolled out with our Procurement team. We will report annually to Ofgem on the percentage of suppliers meeting the code, as part of our regular Ofgem reporting.

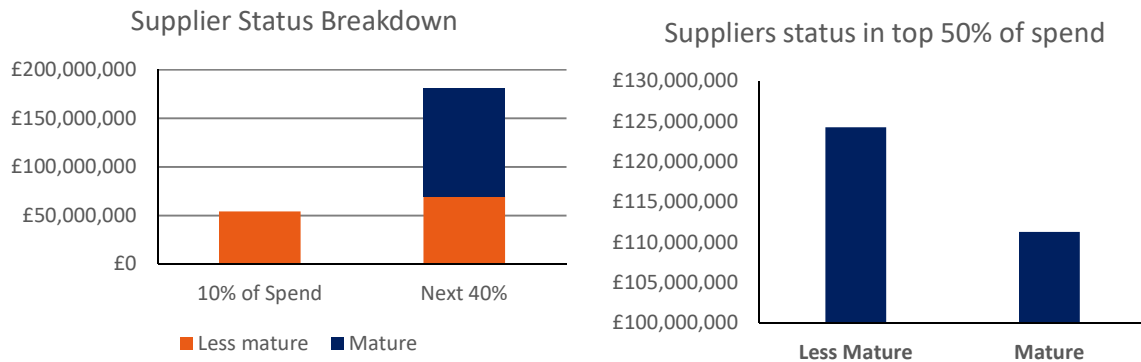
Sustainable procurement

- Pre-and post-tender phase - Develop generic/example evaluation criteria and scoring mechanism to utilise in tenders. These will be aligned to sustainable procurement principles and meet the requirements stated in the supplier code of conduct. We will update our procurement processes to embed Circular Economy principles;
- Post tender phase - continuous improvement - Continued engagement with our suppliers throughout the term of the contract which may include performance reviews or ‘supplier relationship management’ meetings. These meetings will include discussions on their performance against the supplier code of conduct;
- Disclosing - Responsible procurement charter and supplier code of conduct —finalise documentation and publish;
- Implementation - Procurement: Roll-out new policies, procedures, templates and governance to the team. Ensure the new lead for sustainability in supply chain establishes effective links with the category management and commercial team to ensure a one-team approach to supply chain. Develop a process to ensure a consistent and compliant application of our supplier code of conduct to ensure the requirements and targets that have been outlined in the code and charter are adhered to consistently;
- Supporting our supply chain - Enable through facilitation of training opportunities & engagement days. Through classroom based regional training days and meet the buyer events which will include sustainability as a key topic hosted for our supply chain, this will help to reduce costs across our supply chain and ultimately to our customers; and
- Measuring and reporting
Identify an appropriate tool or software, for example PowerBi for measuring and reporting on key metrics for both supply chain sustainability metrics and embedded carbon.

Challenges and opportunities

The tables provide an illustration of the status of our suppliers in the top 50% of spend for the last year. Mature suppliers are those we believe to have an element of environmental and social reporting within their operations already. Less mature suppliers are those which do not have a consistent approach to environmental and social considerations which may be due primarily to their size and/or availability of resources. Those suppliers will require some element of support in terms of meeting requirements outlined in the supplier code of conduct.

Figure 36: Share of suppliers which have a consistent approach to environmental and social considerations (mature suppliers) versus those that do not (less mature)

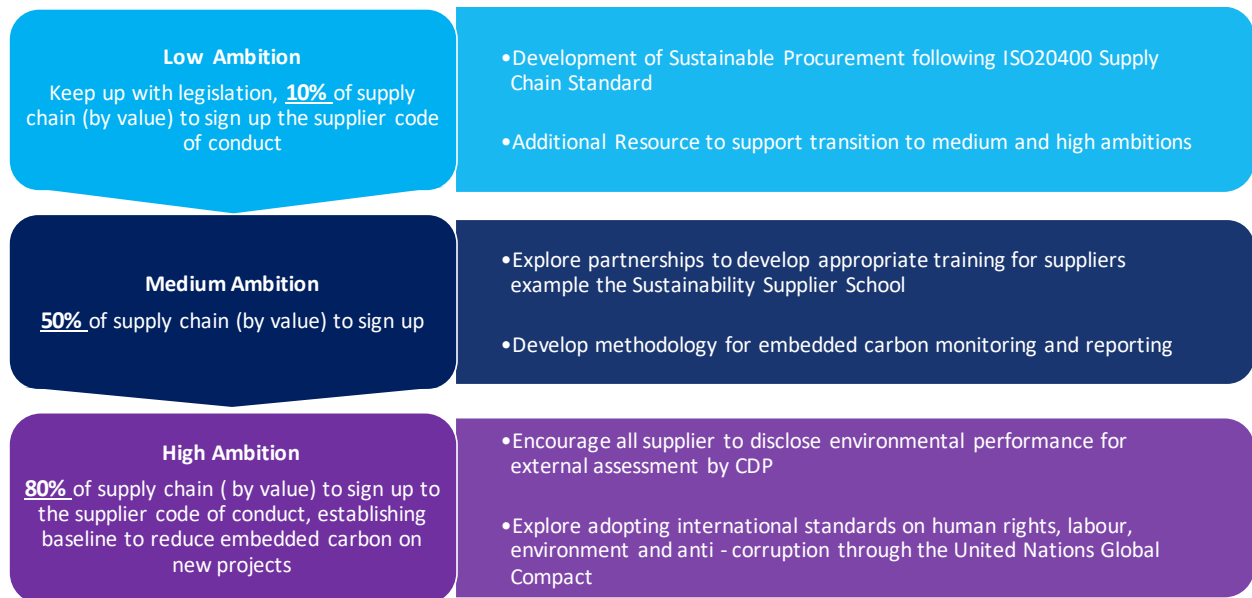


Developing a robust programme around sustainable procurement and adopting high environmental and social standards for our supply chain, which may not have the current capability to meet those standards is a challenge.

Our customers and the CEG have expressed concerns that small companies would be overburden with the requirements of a supplier code. A key focus for us will be to provide all suppliers, regardless of size, with the appropriate support and training to meet the standards in the code. We will be seeking external guidance and support as well as partnerships with external parties such as the Supply Chain Sustainability School to achieve this.

We have also adopted a staggered approach with a level of low ambition being the foundation of activities and the medium and high being the stepping stones to a sustainable procurement strategy.

Figure 37: Our approach to engaging with our supply chain to enable wider positive impact on the environment



Embedded carbon⁴⁵

With our supply chain and through the supplier code of conduct, we will develop a mandatory requirement for our suppliers to report on the carbon emissions of the materials they provide us. We will measure embedded carbon in new one-off projects (with a contract value of £20m). Once this has been calculated, we will use the first set of results as a baseline, which we would look to set appropriate reduction targets for the next project.

We will seek guidance from external consultants to develop a methodology for calculating our company specific embedded carbon for some of the key materials we use within our operations, measuring embedded carbon across three main products which represent the biggest spend on materials for us:

- 1) PE Pipe;
- 2) Concrete and asphalt; and
- 3) Steel pipe and fittings.

We will identify an appropriate tool or software for measuring and reporting embedded carbon. This will feed into our regular annual reporting to Ofgem.

Costs

Details of expected operational expenditure is available in appendix Procurement & Native Competition)10). During GD2 it comes to £0.97m (opex) in total. It should be noted that this is the direct operational cost to SGN, it does not include any supply chain impacts which might be reflected in the contractor rates.

Benefits

The benefits of engaging with our supply chain as described above are:

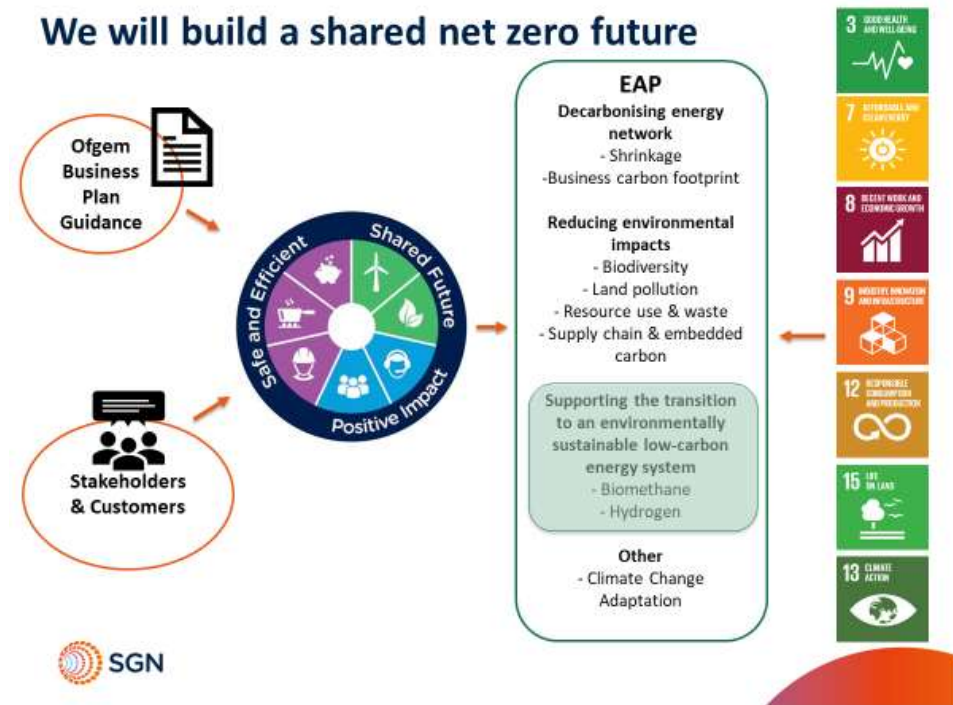
- Greater engagement and working collaboratively with supply chain to meet minimum environmental and social impacts;
- Working to put in place voluntary disclosure mechanisms such as the CDP (Carbon Disclosure Project)⁴⁶ and international standards such as the UN Global Compact; and
- Develop training and development to support supply chain across the wider GDN.

⁴⁵ Embedded (or embodied) carbon is the carbon footprint of a material. It considers how many greenhouse gases are released throughout the supply chain and is often measured from cradle to (factory) gate, or cradle to site (of use).

⁴⁶ CDP is a not-for-profit charity that runs a global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts.

C - Supporting the transition to an environmentally sustainable low-carbon energy system

Figure 38: Low carbon energy system



This section explains what initiatives we propose during GD2 to support the transition to an environmentally sustainable low-carbon energy system through enabling increased biomethane injections across our networks and how we suggest capturing carbon dioxide from biomethane plants. The future of hydrogen is dealt with extensively in the Business Plan, chapters 9, 10 and 11, appendix Energy Futures – Energy System Transition (006) and appendix Energy Futures – Whole Systems and Scenarios (007).

Figure 39: Current impacts, GD2 targets and longer-term targets

Current impacts

Post combustion greenhouse gas emissions from biomethane are significantly smaller compared natural gas. Biomethane is very important in the transition to decarbonised heating.

GD2 Targets

- Enable the connection of biomethane to our networks to provide a total of 450,000 domestic houses with green gas.

Longer-term targets

- We are currently considering longer-term targets and associated KPIs for SDG9 in our sustainability strategy.

Where we are now

- We have delivered biomethane to supply 191,000 domestic houses.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

The production of biomethane from food waste and agricultural feed stocks is a key component in achieving the Scotland and UK net zero targets of 2045 and 2050 respectively. Our GD1 outputs have delivered biomethane to grid projects supplying 193,000 domestic houses with clean and green biomethane gas energy.

Biomethane allows us as a network to progress with the decarbonisation of the energy we deliver while the road to social proof of hydrogen and the evidence base as set out in the gas quality decarbonisation pathway is proven. Reducing the processing requirements of biomethane for network injection because of changes to Gas Safety (Management) Regulations (GSMR) is a key step in our pathway to decarbonisation. Reducing our dependency on fossil fuels also enables the production of native gas within our whole energy system, which also brings multiple macroeconomic benefits and unlocks and enables the market for biomethane injection.

The table below summaries our proposals and is followed by further information in the next section. Full details are available in the Biomethane EJP and CBA. All reduction of greenhouse gases related to additional biomethane in the network will not have a direct impact on our carbon footprint. It will however benefit the customer who burns the gas for heating and reduce their footprint.

Figure 40: Biomethane proposals

Initiative	Environmental benefit	Total Cost GD2	Justification
Propane reduction	Burning biomethane gives less contribution to climate change vs methane Total carbon saving for all options would be 90.9ktCO ₂ e The benefit is realised post combustion and by network customers	£0.5m	A majority of expert stakeholders wanted us to increase our original suggested target of supplying 400,000 homes with biogas, we have therefore increased this to 450,000 Use of existing resources encourages a circular economy approach
Remote pressure management		£0.25m	
Within-grid compression		£1.84m	
SIU Feasibility studies for biomethane injection	This will support biomethane owners in potentially connecting to our network in SIUs	£0.3m	In support of decarbonised heating for SIUs
CO ₂ capture on suitable sites - 3 initial sites - 12 potential sites	Installing carbon dioxide capture would prevent the greenhouse gas to be vented directly to the atmosphere and contribute to climate change An estimated total carbon capture of 73.5ktCO ₂ (subject to feasibility studies)	Uncertainty mechanism: Re-opener	Feasibility studies would have to be carried out to understand where this would be suitable. It works directly towards enabling a decarbonisation of the energy system

Supporting the transition to an environmentally sustainable low-carbon energy system: Biomethane injection

During GD2 our objective is to facilitate an increase in the volume of biomethane entering our network. We have a target of supplying 450,000 domestic customers with biomethane by the end of the GD2. We are proposing three innovations which support this EAP. They are:

- Propane reduction: We can reduce or eliminate the volume of propane requiring injection to enrich the gas to the prevailing gas quality. The existing billing methodology, that determines the energy consumers use, needs to be changed to prevent or reduce the amount of propane being added to biomethane. Propane is a fossil gas and by reducing its use the overall carbon content of the gas network will reduce. This picture shows an example of avoided propanation.
- Remote pressure management: Smarter network pressure management which allows for more targeted and dynamic pressure control.
- Within-grid compression: This is essentially expanding the accessible mains network in which the distributed gas can be temporarily stored (i.e. 'line-packing' on the network upstream of the injection facility). This will allow increased volumes of biomethane to be injected, at a constant rate, facilitating more low carbon gas into our network. The picture to the left shows a schematic of the 'gas injection' and 'compression concept'.

Figure 41: Example of avoided propanation

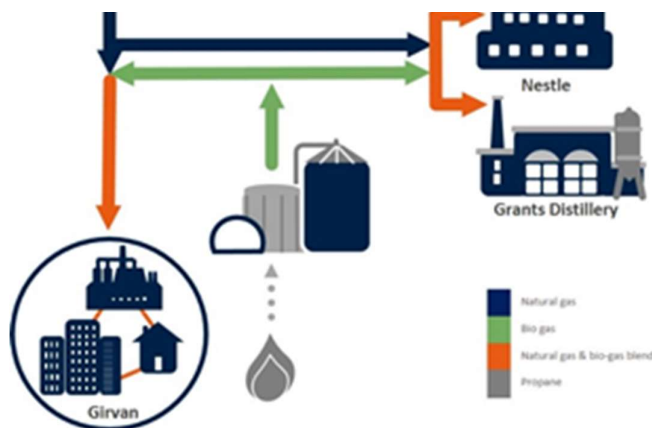
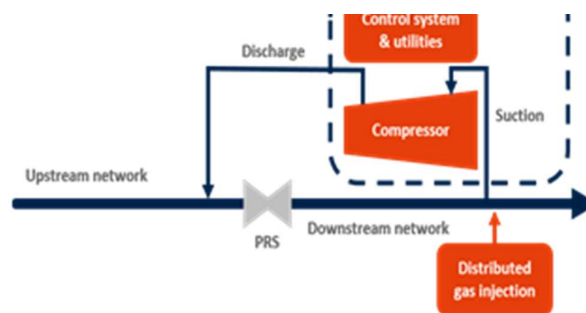


Figure 42: Schematic of within-grid compression



We also propose to undertake three further feasibility studies to assess the viability of biomethane feeding our Scottish Independent Undertakings (SIUs). For further detail on Biomethane initiatives, please refer to the Biomethane EJP and CBA.

Supporting the transition to an environmentally sustainable low-carbon energy system: CO₂ Capture at our biomethane sites

Introduction

During the process to transform raw biogas produced by the anaerobic digestion process through to the biomethane gas, which is required to meet legislative requirements, certain elements of the raw biogas are cleaned from the gas. This process is often referred to 'upgrading the biogas' or 'scrubbing the gas' of impurities to meet the Gas Safety (Management) Regulations 1996. During this process several elements of the raw biogas are removed by processes which filter out these impurities including hydrogen sulphide, oxygen, water, nitrogen, ammonia and carbon dioxide. The capture of carbon dioxide during the production of biomethane results in 15% to 30% of the biogas volume being removed leaving 70% to 85% methane which can then be injected into our grid for customers' energy use. Unless this CO₂ is captured it would be emitted straight in to the atmosphere.

In relation to our currently connected biomethane sites, on average all the plants produce 32m cubic metres of CO₂ a year which equates to 57ktCO₂ a year emitted into the atmosphere. A small number of our connected sites currently employ CO₂ capture technology which allows the operator to capture the CO₂ during the biogas upgrade process through the use of membrane filters.

The barriers to installing CO₂ capture at biomethane sites are two-fold and include economic constraints like

to the market for captured CO₂ and the biogas upgrade technology employed at the relevant site. The economic constraints stem from the available market for the captured CO₂ which largely include the food and medical industries which require it for production processes. CO₂ produced from waste sources, although not inherently any less pure than what is produced from agricultural feed stock, is not reputationally attractive for the food and medical CO₂ markets. Consequently, CO₂ captured from food waste and other waste sourced biomethane production plants has a much more limited market with a lower price per tonne than agricultural feedstock produced biomethane. Current CO₂ market prices for food grade CO₂ are in the region of £50 to £60 a tonne with non-food grade CO₂ priced in the region of £30 to £40 a tonne where a market exists.

The market price, which is also variable, does not provide stable investment signals for many biomethane producers with capital investment costs of £1m to £1.5m for each site depending on the size of the biomethane plant and the storage volume required on site. The biogas upgrade technologies employed also dictate whether CO₂ can be effectively captured during the upgrade process. Both membrane technologies and chemical scrubbing upgrade technologies permit effective CO₂ capture while water scrubbing technologies provide inherent blockers to effective CO₂ capture. We currently have seven biomethane sites employing water scrubbing technologies with the remaining sites employing membrane (15) and chemical scrubbing (3).

CO₂ capture at our biomethane sites – GD2 business plan proposal

We are proposing to include a price control uncertainty mechanism in the form of an allowance re-opener to fund the capital costs associated with the installation of CO₂ capture assets at suitable biomethane plants across the GD2 price control period. We have identified at least three existing biomethane plants with suitable gas upgrade technologies to facilitate the capture of CO₂ and which employ food waste feedstocks. These sites realistically will not have a viable economic base to justify the investment in CO₂ capture technology due to lower CO₂ price availability and a smaller market and will continue to vent CO₂ into the atmosphere. If the carbon dioxide emissions from these three biomethane plants could be captured it would prevent approximately 3.7ktCO₂ being released to the atmosphere each year.

We also have a further 12 sites due to commission prior to January 2021 which will utilise 50% waste feedstocks to meet the latest Renewable Heat Incentive (RHI) requirements. These sites will also encounter reduced prices for CO₂ captured at their sites and will not invest in CO₂ capture technologies due to financing costs making negative returns on investment likely. Removing the financing costs associated with the capital expenditure to install CO₂ capture at these sites would allow the sites to operate and maintain the assets and recover sufficient income from CO₂ sales to cover these O&M costs. We would fund the upfront capital investment associated with these sites with asset ownership and operations and maintenance (O&M) responsibilities resting with the biomethane operators. Network Entry Agreements would be varied to include an obligation to continue CO₂ capture at the relevant site to ensure capital investment delivered resulted in CO₂ emissions being eliminated and the resulting social benefits realised. The potential prevention of CO₂ to be released to the air due to carbon capture for the 12 sites is estimated to 11kt CO₂ a year.

Sites would need to be assessed to ensure CO₂ capture technology would interface successfully with existing gas upgrade technology and sufficient space is available to accommodate the necessary CO₂ capture assets. An economic appraisal would also be required for each site to forecast the market conditions for CO₂ sales in the geographic vicinity of the biomethane plant, to provide a robust likely future volume of CO₂ capture linked to the investment.

Total costs associated with CO₂ capture at our connected biomethane sites would be in the region of £4.5m and should the 12 biomethane plants forecast to connect prior to January 2021 connect a further £18m to install CO₂ capture assets. These costs would include a feasibility study for each biomethane site to detail the specific requirements at each site.

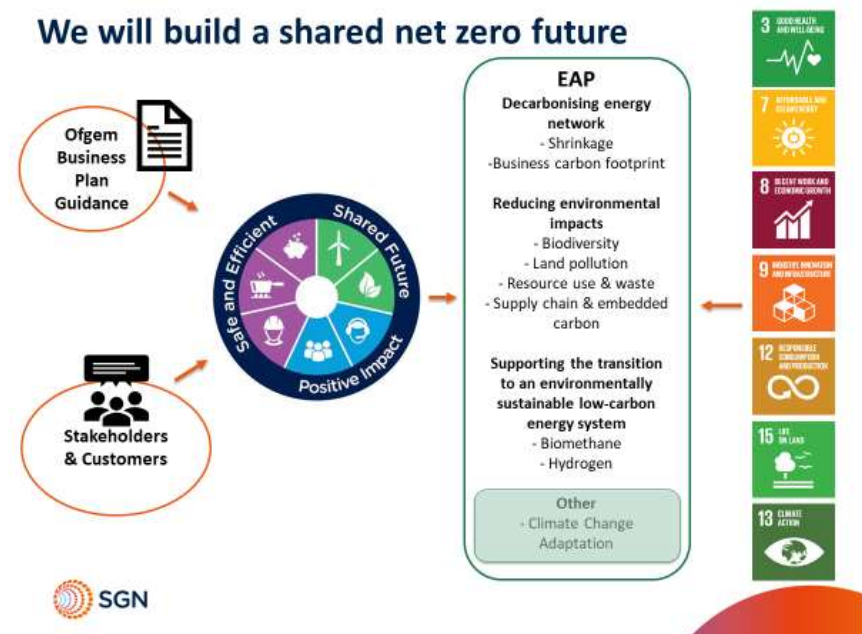
Based on a crude estimate of 11-16 years payback, we find the proposal of CO₂ capture worth exploring further including a detailed assessment of associated costs which would include potential legal and contractual agreement drafting costs. We would also need to further explore the market for CO₂ in relation to an environmentally sensitive solution for the use or storage of CO₂. We therefore suggest this should be subject to a reopener. In the first year of GD2 we would carry out a more detailed assessment, to be followed by a

reopen in year two or three of the price control period.

Current uses are in the food industry which purchase CO₂, however this is not appropriate for waste biomethane sites. There are markets for CO₂ for industrial processes (refrigeration etc), however the best solution would be carbon capture and storage (CCS).

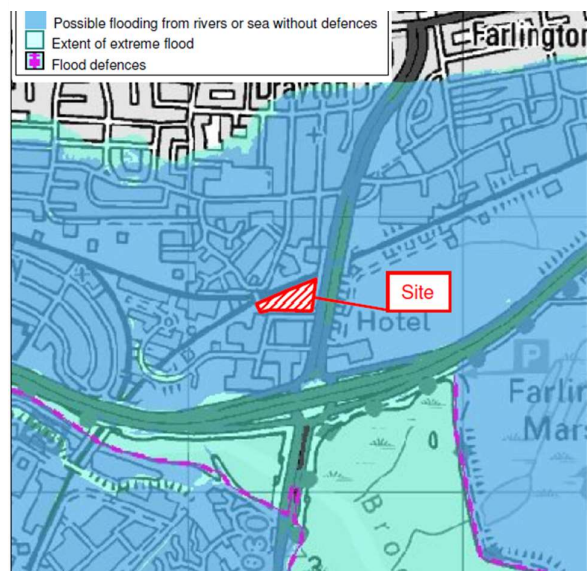
Other – climate change adaptation

Figure 43: Climate change adaptation



Based on current levels of UK policies we could be looking at an average warming of over 3°C along with increased likelihood of extreme weather events. We should be making the necessary changes to our assets and operating procedures to ensure we are well adapted and continue to operate efficiently and safely. While the impacts of climate change are well understood in some departments of our company, others are more uncertain of the impacts and what adaptation measures are required.

Figure 44: Flood survey for Walton Park (2007)



In GD1 we focussed largely on flood mapping for operational assets and surveys of pipelines at river crossings. From these surveys we highlighted assets that were at risk and relocated them if it was deemed the best option. Costs for the relocation of certain operational assets, due to increased risk of climate change, have been included within the Transmission (021) and Distribution (012) appendices. We are less clear on the risks to our occupied sites and need to broaden our understanding of Climate Change Adaptation on these. This is important as climate change impacts are spreading rapidly and we currently do not fully understand our risks.

The Climate Change Adaptation EJP, which is a part of the Property appendix (002), provides details of our approach for our own sites and assets. The aim is all our operational and occupied sites have been risk-assessed and the necessary climate change adaptation measures

have been completed.

Climate change impacts and adaptation measures for other key business areas are captured fully within departmental appendices and relevant EJPs and BPDT. These areas are:

- Transmission (021);
- Distribution (012);
- Operations (012); and
- SIUs (017).

During GD2 we intend to carry out Climate Change Adaptation Surveys at our occupied sites. This will include the use of a specialist consultant. We are also proposing to invest in landmark data and mapping tools as we will need better climate projection data. Landmark mapping is regularly validated following UK flood events and is regularly updated for the latest river flow, rainfall, land use and climate change predictions.

The highest potential climate change risks for us are flooding, coastal and river erosion and extreme temperatures. Our assets most at risk are those found above-ground, typically large Pressure Reducing Installations (PRIs), critical sites such as IT Data centres, Gas Control centres and pipelines at river crossings. In addition, prolonged periods of extreme weather could have a significant impact upon our workforce, particularly our field-based engineers, and impinge upon our ability to conduct 'business as usual'.

Notable risks we have:

- River bed and bank erosion exposing pipelines;
- Flash flooding impacting bridges carrying gas mains;
- Flooding of pressure reduction installations and other sites;
- Impacts on our critical supply chain;
- Contaminant mobilisation and migration;
- Employees unable to get to offices/depots and operational sites;
- Loss of IT and data systems; and
- Water ingress on low pressure gas systems.

We are including the survey costs as part of ex-ante allowance for GD2 (£0.52m opex) and based on the report findings, we propose a 'use-it-or-lose-it' mechanism to carry out remedial actions (£9.83m capex). Currently the recommended remedial costs are highly uncertain. Remedials may range from site relocation, to flood protection schemes, solar shading or increased drainage. Carrying out these surveys and remedial actions will help us adapt to the changing climate and reduce the impact risk.

In presenting our proposal on climate change adaptation to the CEG it was very welcomed, and they provided strong support for the initiative.

6.5 Bespoke outputs

This EAP includes several bespoke outputs:

Figure 45: Outputs

Bespoke output	Justification	Appendix
Increased replacement rate of vehicles	Moving to a six-year replacement rate of commercial vehicles in our fleet would allow us to transition to cleaner, less polluting, and more efficient vehicles at a faster pace, compared with our ordinary eight-year cycle	Fleet (025)
Replacing existing diesel and petrol vehicles with ultra-low emission alternatives	A fleet with increasingly more low emission vehicles would not only help us progress towards a net-zero target, mitigating climate change, but also reduce	Fleet (025)

	pollution across our networks which in cities in particular can be a big issue. Our stakeholders and customers tell us this is an area to be as ambitious as we can	
SIU biomethane feasibility studies	Decarbonising the SIUs is an important step towards achieving net-zero in-line with government targets. It has been raised by stakeholders in the SIUs and also our Scotland CEG	SIUs (017)
Biodiversity improvements	Improving the land, sites and property which we own and manage is an opportunity to reduce our environmental impact and contribute to the big challenges on declining ecosystems and species extinctions which is affecting essential pollinators like bees and butterflies	Property (002)
Climate change adaptation	Climate change is already happening, and we need to have a better understanding of what we need to do to adapt to the risks. Acting now is likely to reduce costs which otherwise would occur due to flooding	EAP (003)
Installation of solar PV on occupied sites	Increasing the availability of renewable energy in the energy system is essential towards achieving a shared net zero future	Property (002)
Installation of solar PV on governor sites	This initiative not only supports less hazardous waste but also more efficient use of resources and renewable energy	Distribution integrity and governors (012)

6.6 Investment in existing assets

This table references relevant CBAs which are associated with initiatives described in the EAP.

Figure 46: Cost benefits analysis

Initiative	CBA	Appendix	Area
Remote pressure control and management (reducing shrinkage) Southern	SGN GOV – 011 - UtonSouth	Distribution integrity and governors (012)	Decarbonising the energy network
Remote pressure control and management (reducing shrinkage) south London	SGN GOV – 010 – UtonLon SO	Distribution integrity and governors (012)	
Fleet EAP	SGN Fleet CBA EAP	Fleet (025)	
Renewable energy	SGN Prop 003 Renewable Energy - CBA	Property (002)	
Energy management and utilities	SGN Prop 004 Energy Management and Utility Reduction - CBA	Property (002)	
Solar PV Installation on profiling governor sites - Scotland	Sc Dint- 019 SolPV-CBA Dec 19	Distribution integrity and governors (012)	Reducing environmental impacts
Solar PV Installation on profiling governor sites - Southern	So Dint- 019 SolPV-CBA Dec 19	Distribution integrity and governors (012)	

6.7 Engineering justification papers

Below are the relevant EJPs which are referred to in this EAP.

Figure 47: Engineering justification papers

Initiative	EJP	Appendix	Area
Remote pressure control and management (reducing shrinkage) Southern	SGN GOV – 011 – UtonSouth EJP	Distribution integrity and governors (012)	Decarbonising the energy network
Remote pressure control and management (reducing shrinkage) south London	SGN GOV – 010 – UtonLon SO - EJP	Distribution integrity and governors (012)	
Innovation: Stent bag	SGN EAP – 001Stentbag2 - EJP	Distribution integrity and governors (012)	
Innovation: HVGE toolkit	SGN EAP – 001HVGE - EJP	Distribution integrity and governors (012)	
Fleet EAP	SGN Fleet – 002 EAP EJP Dec 19	Fleet (025)	
Renewable energy	SGN Prop 003 Renewable Energy - EJP	Property (002)	
Energy management and utilities	SGN Prop 004 Energy Management and Utility Reduction - EJP	Property (002)	
Solar PV installation on profiling governor sites - Scotland	Sc Dint- 019 SolPV-EJP Dec 19	Distribution integrity and governors (012)	Reducing environmental impacts
Solar PV installation on profiling governor sites - Southern	So Dint- 019 SolPV-EJP Dec 19	Distribution integrity and governors (012)	
Zero waste to landfill and circular economy principles	SGN EAP – 006 Resource U&W - EJP	Environmental Action Plan (003)	
Remote pressure control and management	SGN EAP – 001UTO – EJP	Environmental Action Plan (003)	Supporting the transition to an environmentally sustainable low-carbon energy system
Propane reduction	SGN EAP – 001PRO – EJP	Environmental Action Plan (003)	
Within grid compression	SGN EAP – 001WGC - EJP	Environmental Action Plan (003)	
Climate change adaptation	SGN Prop 002 – Climate change adaptation	Property (002)	Other

6.8 Managing uncertainty: Use-it-or-lose-it, volume drivers and reopeners

There are a number of initiatives in the EAP which carry some uncertainty with them; e.g. surveys needing to be completed before the best way forward for biodiversity improvements can be agreed, better understand how many of the sites we have identified are actually feasible to install Solar PV on, availability of ultra-low emission vehicles in the market to replace diesel/ petrol cars and vans and so on. In addition, we want to and have to stretch ourselves in setting ambitious targets and actions to achieve net zero by 2045. While we believe this is the right thing to do and we have customer and stakeholder support for doing it, we do not have the confidence that the level of ambition we are putting forward now is still ambitious enough at the start of GD2 or that the estimated costs and preferred solutions are still relevant. Hence, we are suggesting that an uncertainty mechanism should accompany some of the proposed initiatives in this EAP. For one initiative, carbon dioxide capture, we propose a reopener.

This approach is explained in detail in the relevant Appendices, EJPs and CBAs as referred to throughout this document and is summarised here:

Figure 48: Uncertainty mechanisms

Initiative	Uncertainty mechanism	
Renewable energy on occupied sites	Use-it-or-lose-it	£1.7m
Ultra-low emission vehicles	Use-it-or-lose-it	£9.7m
Biodiversity	Use-it-or-lose-it	£2.5m
Climate change adaptation	Use-it-or-lose-it	£10m
New technology (remote pressure control and management)	Use-it-or-lose-it	£3.39m
Innovation (HVGET and Stent Bag)	Use-it-or-lose-it	£2m
Carbon dioxide capture	Re-opener	
Solar panels to reduce hazardous waste	Use-it-or-lose-it	£3.5m

6.9 Financial summary

Figure 49: Financial summary

Area	Initiative	Cost £m	Uncertainty mechanism
Shrinkage	Repex programme	not costed in EAP	
Shrinkage	Acceleration of repex	48	
Shrinkage	Proactive steel programme	24	
Shrinkage	Pressure control and management - London and Southern	3.39	Yes
Shrinkage	Innovation: Stent bag and HVGET	2.0	Yes
Fleet	Greening the commercial vehicle fleet - 50% ultra-low emission vehicles by end of GD2 - Accelerated replacement programme (8 to 6 years) - Installing infrastructure (charging points)	20.6	Yes
Fleet	Company cars Additional EV/hybrids/low-emission vehicles available	n/a	n/a
Travel	Travel Encouraging use of skype, travel with less environmental impact, car sharing etc	n/a	n/a
Renewables occupied sites (Property)	Installing solar PV panels on all occupied sites	1.71	Yes
Renewables governor sites (Network integrity)	Installation of solar PV panels on network maintenance sites, replacing batteries	3.5	Yes
Utility reduction (Property)	Installing BMS and LED lighting on large and medium occupied sites	1.62	No
Biomethane	Propane reduction	0.50	No
Biomethane	Pressure management	0.25	No
Biomethane	Within-grid compression	1.84	No
Biomethane	SIU feasibility studies	0.30	No

Biomethane	CO ₂ capture	Reopener proposed	
Supply chain	Achieve >80% of supply chain i.e. 93 suppliers (by value) to sign up to supplier code of conduct, establishing baseline and a target to reduce embedded carbon on new projects during GD2	0.97	
Resource use and waste	Zero waste to landfill across office, depots, reinstatement, major projects and our gas holder dismantlement for non-hazardous waste by the end of GD2	n/a	
Biodiversity	Stage 1: Surveys carried out on all sites to determine way forward	2	
Biodiversity	Stage 2: Biodiversity enhancing projects on all (suitable) sites	2.5	Yes
Climate change adaptation	Climate change adaptation surveys and remedial activities at occupied sites	10.52	Yes

Historical data and forecasted data relating to this EAP is available in Business Plan Data Template (BPDT) 5.10_BCF and 5.16_EAP.

6.10 Assurance

Our business plan, including appendices, has been subject to a rigorous assurance process which is detailed in Chapter 3 of the Plan and the Board Assurance Statement.

Our Network Director was appointed as the Sponsor for the Environmental Action Plan (EAP) appendix (003) and the associated Cost Benefit analyses (CBAs), Engineering Justification Papers (EJPs) and Business Plan Data Templates (BPDTs); which have been through the following levels of review and assurance:

First-line

This was undertaken at project level by the team producing the document, as a regular self-check or peer review.

Second-line

This was undertaken independently within the organisation to review and feedback on product development, including a workshop on decarbonisation. Both senior manager and director sign-off was obtained.

Our GD2 Executive Committee: (i) considered the appropriateness of assurance activity for the appendix; and (ii) provided assurance to our Board the business plan meets Ofgem's assurance requirements.

Third-line

This was undertaken by external advisors and groups providing critical challenge during the development of products within the business plan. In addition to the feedback and challenge provided by our Customer Engagement Group (CEG) and Customer Challenge Group (CCG), this appendix was developed after consultation with and advice from:

Advisor/group	Contribution
Carbon Trust	Consulted
Environment and sustainability advisor	Supported in the development of the EAP

Fourth-line

This was undertaken by independent and impartial external providers, which provided a detailed and comprehensive report to both the Executive Committee and Board of Directors:



Advisor/group	Contribution
PwC	Review of EAP
PwC ('clean' team)	Review of Business Carbon Footprint BPDT

We have been working closely with PwC for the assurance of this EAP. PwC has provided valuable feedback in assuring this and associated documentation against Ofgem's Business Plan Guidance 47, both requirements set out for the EAP and minimum levels of ambitions from the Guidance appendix (002).

The science-based target approach as detailed in the EAP has been calculated in collaboration with the Carbon Trust and the methodology used and findings in this respect have been verified by the Carbon Trust. For the calculations of reduction in CO₂e emissions from shrinkage initiatives, we have used the formulas as available in the annual RRP submission to Ofgem. For other conversions to CO₂e we have used the recognised greenhouse gas reporting conversion factors as provided by DEFRA⁴⁸.

The Global Warming Potential (GWP)⁴⁹ for methane as detailed in the Business Plan Guidance is 28 over 100 years, meaning methane is 28 times more potent than carbon dioxide over a period of 100 years. This is in-line with the IPCC Fifth Assessment Report (2014). In natural gas there is a mix of greenhouse gases and methane (CH₄) is only one of them. When we calculate our greenhouse gas savings due to reduction of leakage we have applied an 84% share of methane in natural gas, resulting in 25GWP for leakage, which will provide us with a saving of carbon dioxide equivalents (CO₂e).

⁴⁷ RIIO-2 Business Plan Guidance, 9 September 2019

⁴⁸ DEFRA, Published 4 June 2019. Last updated 9 August 2019

⁴⁹ GWP is a measure of how much energy the emissions of a ton of a gas will absorb over a given period of time, relative to the emissions of one ton of carbon dioxide. The larger the GWP the more the given gas warms the Earth compared to carbon dioxide over that period of time. The period used for GWP is usually 100 years

7 Glossary

All acronyms and associated descriptions can be found within the Glossary appendix.