



Appendix 16: Our Environmental Action Plan

The world needs to take urgent action on climate change as well as wider environmental challenges. As a Distribution Network Operator we will play a key role in our country's response to this critical challenge by supporting our customers who are decarbonising their transport and their heating and connecting low carbon generation. However we are also a business with our own carbon and environmental footprint which comes with a responsibility to play our part and lead by example. As such, we continuously strive to outperform our environmental targets; if it becomes clear that our targets are insufficiently stretching, we revise them to push ourselves further still. Our 2019 Green Action Plan and the progress we have made on reducing our own carbon footprint is a great example of this.



I am proud to present our RIIO-ED2 Environmental Action Plan. This plan is supported by our customers and stakeholders and builds on our progress to date and commits us to specific, measurable and time-bound targets, which will leave no room for ambiguity regarding our RIIO-ED2 environmental performance. Consistent with our approach to date, we will keep these targets and actions under review annually making sure they align with emerging best-practice, customer and stakeholder expectations and remain ambitious. Where we identify opportunities to go further, we commit to updating our actions and associated targets, using our Annual Environmental Report to communicate our progress.

This Environmental Action Plan demonstrates our commitment to improving the environment for the communities we serve. We take this commitment seriously and we look forward to delivering positive change throughout the RIIO-ED2 period and building a foundation for continued progress in the future.

Mark Adolphus – Director of Health, Safety, Sustainability and Connections – UK Power Networks

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1. Executive summary

1.1. Background

The negative impact of human activity on the world's natural environment is becoming increasingly clear. The release of greenhouse gases into the atmosphere is leading to a rise in global temperatures which is already leading to far-reaching consequences for communities around the world.

Without intervention, global emissions will continue to rise, posing a threat to our way of life. Impacts may include:

- **Extreme heat** - By 2070 average Central England summer temperatures could be up to 5.8°C higher than the 1990s.
- **Water availability** - Drier summers are expected to create water deficits in around 25% of water resource zones.
- **Sea-level rise and flooding** - Coastal flooding could threaten 3.3 million people by 2050 in a 4°C scenario.
- **Systemic risks** - Climate-related disruptions create the risk of food price shocks and could force migration.

At the same time, there is growing awareness of the wider impacts to the planet's limited natural resources including a significant reduction in biodiversity. This is particularly important in a changing climate as it is responsible for ensuring the resilience of our ecosystems and is challenging to replenish once depleted.

Informed by climate science, governments, businesses and citizens around the world are taking action. The UK Government is showing international leadership in meeting the environmental challenge. This is demonstrated by the government adopting the Climate Change Committee's recommendation to reduce carbon emissions to Net Zero by 2050; being the first major economy to do so and writing it into law in 2019.

Since adopting that target, the UK Government has implemented a ban on the sale of petrol and diesel vehicles after 2030, made commitments to assist carbon capture and hydrogen development and, in December 2020, committed to reduce the UK's greenhouse gas emissions by at least 68% by 2030.

1.2. Our role

Meeting the challenges posed by the climate crisis will require a collaborative effort involving national and local government, Ofgem, companies and each and every one of us. All companies will need to play their part by addressing their environmental impact. As a business that provides an essential service to almost every household and business in London, the South East and East of England, we take that responsibility seriously. We have worked hard to fully understand our contribution to environmental risks and identify the actions we can take to eliminate and minimise them. In this Environmental Action Plan, we set out the actions we have developed, in collaboration with our stakeholders and supported by customers, to show leadership in tackling these challenges.

However, as an electricity distribution network operator (DNO), we have a further role to play in facilitating the transition to Net Zero, by ensuring that our customers have the information that they need and that the necessary infrastructure is in place to:

- Facilitate the increased uptake of Electric Vehicles (EVs).
- Support the transition away from natural gas as a heat source.
- Facilitate the connection of additional distributed generation and battery storage.

More details of how we will facilitate the transition to Net Zero are provided in chapter 12 of our business plan and the associated strategy appendix.

1.3. Assessing our impact and progress to date

We recognise that we have an important role to play in safeguarding the environment in which we operate, and we have robust policies and procedures in place to ensure we comply with all relevant environmental legislation and industry codes of practice. Where practicable and achievable, we seek to surpass the basic level of environmental compliance and work to enhance our positive impacts on the environment, whether that be improving biodiversity opportunities at suitable locations, minimising waste and maximising recycling, or working with our supply chain to improve our environmental performance.

As the UK works towards achieving the Net Zero targets it signed into law, and with environmental standards rising, customers, stakeholders and employees have emphasised the importance of the environment to them and challenged us to go further still. To ensure we meet, and in some cases exceed, these expectations, we launched our Green Action Plan at the start of 2019. This identified our environmental touchpoints as a business and set short term targets, deliverable by the end of 2021, to focus the minds of each business area on their environmental impact and what they needed to do to alleviate this.

Initiatives focusing on energy use, carbon reduction, waste, water, biodiversity, noise and pollution were launched and we are on course to meet all of the associated targets. Our Green Action Plan has provided a solid foundation for us to transition to longer term initiatives and develop this Environmental Action Plan.

In 2019/20 we became the first DNO to achieve the Carbon Trust Standard for Carbon. We were recognised by the Carbon Trust for having a well-defined responsibility structure in place for carbon management which engages individuals at all levels of the organisation.

By 2019/20, we had reduced our controllable carbon footprint by 25.5% during RIIO-ED1, exceeding our RIIO-ED1 commitment of a 16% reduction by 2023. Building on this success, we have worked in partnership with the Carbon Trust to develop challenging science-based targets (SBTs). Targets are considered 'science-based' if they are accredited by the Science Based Target initiative (SBTi). SBTs must be in line with what the latest climate science says is necessary to meet the goals of the Paris Agreement to limit global warming to well below 2°C (WB2D) above pre-industrial levels and pursue efforts to limit warming to 1.5°C. We provide details of the targets that we are setting ourselves for RIIO-ED2 in this plan.

We are not just focusing on carbon emissions as we have been reviewing our wider environmental impacts and opportunities as well. We have launched a range of initiatives to return waste materials to the value chain from trialling granulated waste plastic in asphalt mixes for pavements, through to installing high quality second hand and repurposed furniture in our new Borehamwood office. We have also sought to reduce pollution, for example, by exploring the use of hybrid generators which make use of integrated batteries to improve fuel efficiency, reduce NOx emissions and run more quietly. We continue to seek opportunities to improve biodiversity where possible, surveying 90 of our sites across our dispersed land footprint for their biodiversity potential, and supporting the nine Wildlife Trusts in our three regions, both financially and through providing a volunteer workforce.

1.4. Engaging our customers and stakeholders

In formulating our Environmental Action Plan, we have conducted extensive engagement with:

- Customers of all ages and demographics across all three of our regions, including vulnerable customers and the fuel poor.
- Business customers, of different sizes and from different sectors across all three of our regions.
- Environmental groups such as wildlife trusts, the Carbon Trust and the Energy Saving Trust.
- Customer groups such as Citizens Advice.
- Our suppliers.
- Academic experts and sector specialists.

Our engagement with customers and stakeholders has showed us that they think that the environment is a priority. It is clear that the momentum and the need for Net Zero is growing, and customers want our commitments to reflect this. Customers acknowledge our wider role in facilitating the transition to Net Zero but believe that we should "get our own house in order" in order to be credible i.e. "practice what we preach". There is, however, some scepticism about the feasibility of meeting some of the more ambitious targets set out by Government and a sense that strong leadership from policymakers is needed.

Our social contract research sought to understand customer views on company social contracts through focus groups and an online survey. When asked, unprompted, what UK Power Networks should include in their social contract, environmental considerations was a key suggestion across all groups and widely agreed to be an important principle.

Our initial "State of the Nation" quantitative customer research showed that keeping bills low is also a top priority for all customers, particularly in the post-COVID world. However, customers do not strongly think that the economy should be prioritised ahead of the environment and are open to the idea of paying for environmental improvements. However, customers want greater transparency in how their money is used and whether targets are being met.

In asking customers to consider the acceptability of our plan in relation to our environmental proposals, we summarised our business plan proposals at a high level and packaged them up to cover our proposals for both reducing our own direct environmental impact, and our proposals to facilitate the wider Net Zero transition. Overall, four in five (82%) of domestic customers found our plan for the environment to be acceptable. Business customers were slightly more likely to find this aspect of the plan to be acceptable, with overall acceptability of 85%.

Customers believe that it is important for us to "practice what we preach" and "get our own house in order" alongside facilitating the transition to Net Zero.

Key insight I-EAP2

Customers view the environment as a high, and growing priority, but within the context of economic concerns / a desire to keep bills low.

Key insight I-EAP1

Our extensive engagement with stakeholders throughout the process has also provided us with a clear message on the importance of the environment and the urgency with which it should be addressed. This ongoing engagement with stakeholders has given them the opportunity to shape our plan and suggest refinements and improvements on our proposals as they evolve.

In general, customers show a willingness to pay for environmental improvements.

Key insight I-EAP4

A detailed summary of our customer and stakeholder engagement is provided in the Line of Sight - EAP and Engagement Summary – EAP documents.

1.5. Our commitments to our customers

As we move into the RIIO-ED2 period, we are making further commitments to demonstrate that we will lead the industry in reducing our impact on the environment around us. We have set ourselves a long term target to achieve Net Zero for all our carbon emissions by 2040 in line with the Science Based Target Initiative's Net Zero standard. Through our work to understand our environmental impact and engagement with our customers and stakeholders, we have identified four clear, measurable outcomes that we will deliver for our customers and set us on the path to Net Zero. By committing to challenging targets against these outcomes, we will fulfil our vision to be the most environmentally responsible Distribution Network Operator. This Environmental Action Plan sets out our commitments to our customers and details the activities and improvements we will make to deliver them.

Decarbonisation in line with a Science Based Target to avoid irreversible damage to the environment

Reducing our carbon emissions is our contribution to the global effort to limit the damaging effects of climate change. Therefore, we have developed targets that demonstrate leadership and focus where we can have the most impact. We are proud to be the first DNO to achieve a verified SBT. Given the dominance of losses, and in order to make our SBT more meaningful, we have opted to include scope 3 emissions. At the time of verification, BEIS projections for grid decarbonisation did not support a 1.5°C target. As such, we are committing to exceed our verified SBT for a Well Below 2 Degree trajectory. We have further stretched ourselves by committing to reductions in excess of a 1.5°C trajectory for our scope 1 and 2 emissions (excluding losses) without resorting to offsetting. We will then offset residual emissions to achieve Net Zero for our scope 1 and 2 emissions (excluding losses) by 2028. We will also re-verify our SBT consistent with a 1.5°C trajectory ahead of the current requirement to do so.

Commitments:

- For our full carbon footprint, including losses and indirect scope 3 emissions, we will exceed our reduction target approved by the Science Based Target Initiative at Well-Below 2°C. We will commit to the Business Ambition for 1.5°C SBTi campaign. We will report our progress through our Annual Environmental Report and update our targets in line with SBTi protocols.
- We will reduce our directly controllable carbon emissions (scope 1 and 2 emissions, excluding losses) exceeding a 1.5°C reduction trajectory and offset any remaining residual emissions to achieve Net Zero by 2028 using high quality verified offsets. We will report our progress through our Annual Environmental Report.
- As part of our verified Science Based Target, we will work with our suppliers to reduce our supply chain carbon emissions (scope 3) by 25% by 2028, compared to a 2018/19 baseline. We will report our progress through our Annual Environmental Report.

Responsible use of resources

Disposable resources used for our business activities create an unnecessary strain on limited global resources. They also contribute to unnecessary waste that needs to be processed and recycled to avoid damage to the environment. We will implement a circular economy tool that will identify the areas of highest environmental/carbon impact and waste. We will, in parallel with our efforts to address our scope 3 emissions, target these areas with the relevant suppliers. We will recycle 80% of office, depot and network waste and 99.5% of street works material by the end of RIIO-ED2. We will send zero recoverable waste to landfill by 2025 and work towards being net-zero waste.

Commitments:

- We will develop and implement a circular economy tool to address our high impact materials by the start of RIIO-ED2. We will subsequently set and monitor our reduction targets through our Annual Environmental Report.
- We will recycle 80% of office, depot and network waste and 99.5% of street works material by the end of RIIO-ED2 with no recoverable waste to landfill by 2025.

Increase Natural Diversity

Increasing biodiversity is critical to avoid breakdown of vital ecosystems that our planet and its populations rely on. We will work to increase the biodiversity at 100 existing sites by an overall net-gain of 30% and at all major new substation developments by 10-20%.

Commitment:

- We will increase the biodiversity of new major substation developments by a net-gain of 10-20% and at 100 existing sites by a net-gain of 30% overall over the RIIO-ED2 period, compared to the beginning of the period, as measured by the DEFRA biodiversity tool.

Reduce Pollution

The pollution we create has the potential to directly impact the environment of our customers. Our two main sources of pollution are NOx emissions which we will reduce by 33% and leakage from Fluid Filled Cables which we will reduce by 15% over the RIIO-ED2 period. We will also continue to facilitate the undergrounding of nominated schemes to remove overhead lines in ANOB and National Parks.

Commitments:

- We will reduce NOx emissions by 33% over the RIIO-ED2 period, compared to the beginning of the period, improving air quality for our customers.
- We will reduce annual leakage from Fluid Filled Cables by 15% by the end of the RIIO-ED2 period compared to the beginning of the period.
- We will continue to facilitate the undergrounding of nominated schemes to remove overhead lines within AONB and National Parks, working closely with all relevant stakeholders to ensure that the full allowance is spent to maximise the benefits of works within our protected landscapes.

Overarching Commitment: We will review our Environmental Action Plan annually to ensure our work continues to meet our customers' evolving expectations, that our response is based on the latest science and that we demonstrate best-practice. We will establish a new sub-committee of the Board to monitor our performance and will report our progress through our Annual Environmental Report.

We also understand that customers' bills are very important, especially with the expected economic impact of the pandemic. Therefore, we have worked hard to make sure that the actions that we propose to meet these commitments are delivering change at the lowest possible cost. We have also ensured deliverability.

Many of our actions deliver against more than one of our customer outcomes so we have highlighted the contribution of each activity against each outcome below.

Our Actions

Table 1: Our Environmental Actions summarised

Action	Summary	Customer Outcome delivered	Cost	Regulatory Mechanism
Action 1: Setting our targets for decarbonisation	Setting science-based target of Well Below 2°C for our full footprint and net-zero for our directly controllable emissions by 2028.	Decarbonisation	No additional funding	N/A
Action 2: Decarbonising our business transport	Replace all vehicles in fleet with an electric vehicle alternative where technically available.	Decarbonisation Reducing Pollution	£17.9m	Ex ante.
Action 3: Modernising our generators	Using biofuels for our generation requirements and adopting hybrid generators where possible.	Decarbonisation Reducing Pollution	£0.2m	Ex ante.
Action 4: Increasing the energy efficiency of our occupied buildings	A programme of work to increase the energy efficiency of our buildings.	Decarbonisation Responsible resourcing	No additional funding	N/A
Action 5: Improving energy efficiency at our substations	A programme to measure and reduce the energy used in our unoccupied substation buildings.	Decarbonisation Responsible resourcing	No additional funding	N/A
Action 6: Sulphur Hexafluoride (SF6)	A programme of efficient replacement and sharper operational response to reduce SF6 leaking to the atmosphere.	Decarbonisation	£6.0m	Ex ante
Action 7: Supply chain and scope 3	Working with our supply chain to identify high impact activities and commit to a reduction in our scope 3 BCF.	Decarbonisation	No additional funding	N/A
Action 8: Embodied Carbon	Embed embodied carbon tool into our business and commit to a percentage reduction over RIIO-ED2.	Decarbonisation	No additional funding	N/A
Action 9: Carbon offsetting	Where it is not possible or efficient to reduce our own emissions, we will work with partners to reduce carbon outside our business footprint to achieve our net-zero ambition.	Decarbonisation	£0.7m	Ex ante
Action 10: Losses	A programme of efficient, CBA-justified actions to reduce losses where it delivers benefit to customers in the long-term, reducing Losses by 10,460 MWh annually by the end of RIIO-ED2.	Decarbonisation	£6.3m	Ex ante
Action 11: Circular economy resource use, waste and water	A set of targets to reduce disposable resource use, re-use materials where possible and increase our recycling.	Responsible resourcing	No additional funding	N/A
Action 12: Biodiversity Net Gain	We will commit to increasing biodiversity across 100 existing sites and major developments.	Natural Diversity	£0.5m	Ex ante
Action 13: Air quality	Our work to reduce fuel consumption from our fleet and generators, will improve air quality. We will focus on where such reductions will have the most impact for our customers.	Reducing Pollution	No additional funding	N/A
Action 14: Fluid filled cables	A programme of efficient replacement and sharper operational response to reduce fluid leaking from cables.	Reducing Pollution	£155.0m	Ex ante
Action 15: Noise	Maintain our rapid response and resolution of noise complaints and a proactive approach with local authorities to minimise impact at development stage.	Reducing Pollution	No additional funding	N/A
Action 16: PCBs	We will work in partnership with our supply chain and waste carriers to	Reducing Pollution	£45.2m	Ex ante with PCD

Action	Summary	Customer Outcome delivered	Cost	Regulatory Mechanism
	remove/decontaminate all equipment containing PCBs before the statutory deadline.			
Action 17: Visual amenity	We will continue to facilitate the undergrounding of nominated schemes to remove overhead lines with AONB and National Parks.	Reducing Pollution	£14.3m*	Use-it-or-lose it allowance
Total			£246.1m**	

* It is assumed that we will spend our full ex ante allowance for undergrounding overhead lines in AONBs or national parks. This allowance is currently assumed to be £14.3m for RIIO-ED2.

**Note total does not match sum of rows due to rounding

2. Strategic context

2.1. Overview

Environmental issues have gained prominence with both communities and governments around the world in recent years with high profile environmental campaigns gaining momentum and the consequences of climate change becoming increasingly visible.

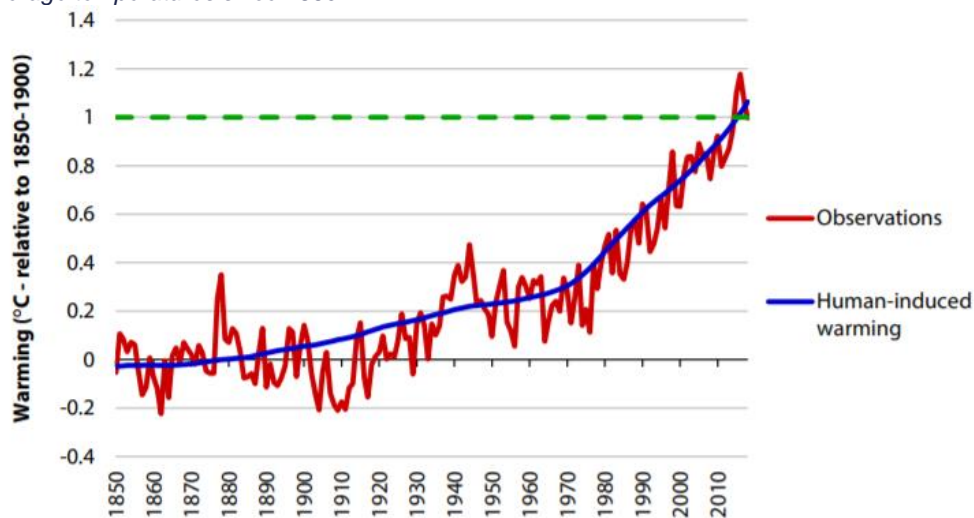
In 2019, the Committee on Climate Change (CCC) recommended a target of “net zero” greenhouse gases by 2050, a target that has been adopted by the Government. In November 2020, the Government brought forward the ban on the sale of petrol and diesel vehicles to 2030 as well as setting targets for adoption of heat pumps and made commitments with respect to both carbon capture and hydrogen. In December 2020, in advance of hosting the Climate Ambition Summit, the government went further, committing to cutting the UK’s greenhouse gas emissions by at least 68% (from 1990 levels) by 2030. In April 2021, the government went further still, announcing a new, ambitious climate target; to cut greenhouse gas emissions by 78% (from 1990 levels) by 2035.

2.2. The need for action: the consequences of climate change

The link between human activity and our climate system is well understood. As discussed in the Climate Change Committee’s 2018 report¹ and illustrated below, recent estimates from the IPCC conclude that human induced warming has so far exceeded 1°C above pre-industrial levels and continues to increase at a rate of 0.2°C per decade based on current trajectories.

¹ <https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf>

Figure 1: Global average temperatures since 1850



Source: HadCRUT4, NOAA, NASA and Cowtan & Way datasets; IPCC (2018) *Chapter 1 - Framing and Context*.

Notes: 'Observations' are the average of the four datasets above as in IPCC-SR1.5 including for the full year of data for 2018.

The negative implications of these changes are readily observable today. In the UK alone, the CCC refer to several recent events:

- The UK winter floods in 2013/14, which created around £450 million in insured losses was made more likely by climate change.
- Human-induced warming was found to be a significant contributor to the additional heat related deaths in London during the extreme European heatwave of summer 2003 in which crop yields fell, power stations were shut down due to overheating and the heat-related death toll ran into tens of thousands.

Without action to intervene, global emissions will continue to rise, with an expected 4-5°C increase in global average temperatures above pre-industrial levels by 2100.

The implications of allowing global temperatures to rise at this rate are significant and wide reaching. According to the CCC, examples of these risks for the UK could include:

- **Extreme heat** - Warming across the entirety of the UK is expected, with summers warming more than winters. Central England average summer temperatures could increase by between 1.1 and 5.8°C by the 2070s (compared to the 1990s). Temperatures experienced during the 2018 summer would be expected more often than every other year by the 2090s.
- **Water availability** - Wetter winters and drier summers are expected, with around 40% less precipitation in an average summer across the UK (compared to the 1981-2000 average), leading to water deficits in around 25% of water resource zones.
- **Sea-level rise and flooding** - The projected range of sea level rise for the UK's capital cities is between 30 cm to 1.15 metres by 2100. This is creating a growing threat of damaging coastal flooding. The population at significant risk of surface, river or coastal flooding would be expected to rise to 3.3 million by 2050 in a 4°C scenario.
- **Systemic risks** - Climate-related disruptions to global food systems and livelihoods is likely to create significant risks of food price shocks and possibly increase migratory pressures.

The impacts of such risks pose a significant threat to our future way of life. There is widespread acceptance that action needs to be taken to limit the extent of future warming to avoid the scenarios described above. This action requires significant efforts to reduce emissions to limit the extent of future warming and creates a specific role for us as a DNO.

The environmental driver of reducing carbon emissions and resource use is not the sole contributor to the challenges we face today. As outlined by the Natural Capital Committee (NCC)², there are a range of land-based interventions required to deliver Net Zero. These provide opportunities to enhance the stock of natural assets and the ecosystem services they provide, whilst delivering carbon reductions.

²https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/931695/ncc-end-of-term-report.pdf

The NCC recommend that whilst the major change required to reduce the risk of rising temperatures is to reduce greenhouse gas emissions, land use changes have an important role to play. Biodiversity is particularly important in a changing climate. It is responsible for ensuring the resilience of our ecosystems and is challenging to replenish once depleted below certain (often unknown) thresholds. The challenges we face therefore require a focus on improving biodiversity and minimising our wider environmental impact, alongside a specific focus on reducing greenhouse gas emissions.

2.3. The political momentum for action on the environment

The momentum for action on the environment is growing:

- **Net Zero legislation:** The 2008 Climate Change Act requires the UK to reduce carbon emissions by 80% compared to 1990 levels. In June 2019, the UK Government passed laws to end its contribution to global warming, committing to Net Zero by 2050, as recommended by the Committee on Climate Change.
- **25 Year Environment Plan:** In 2018, the Government set out its long-term vision for improving the environmental health of the UK. This includes specific considerations of land management, increasing resource efficiency and reducing pollution and waste.
- **10-point Green Recovery Plan:** In November 2020, the Government announced its ten-point plan for a green industrial revolution. This included specific policy decisions including bringing forward the ban on the sale of new petrol and diesel cars to 2030.
- **In December 2020,** the Government committed to cutting the UK's greenhouse gas emissions by at least 68% (from 1990 levels) by 2030.
- **In April 2021,** the Government announced a new, ambitious climate target; to cut greenhouse gas emissions by 78% by 2035 (relative to 1990 levels).
- **Phasing out the installation of new natural gas boilers:** In October 2021, the Government announced its aim to phase out the installation of new and replacement natural gas boilers from 2035 in England.

We acknowledge the need for our business plan to rise to these challenges, not simply in terms of addressing our business carbon footprint, but in recognition of the key role we have to play in facilitating the wider transition to Net Zero for our customers and stakeholders.

2.4. Economic considerations and the impact of the pandemic

In developing our business plan, we have also been cognisant of the many, far-reaching implications of the coronavirus pandemic, both for the wider economy and the individual financial circumstances of our customers, meaning that affordability and value for money are more important than ever.

We also note that the pandemic has also led to changes in the ways that people live and work and the ways that companies do business (including our own), and that, these behavioural changes often have environmental implications.

The scale and speed of behavioural change and innovation prompted by the pandemic has also highlighted what it is possible to achieve when an issue is sufficiently compelling.

2.5. Evolving environmental technologies

The fast pace of technological advances and innovation, particularly in relation to technologies with environmental benefits, means that in a relatively short time-frame, the price and availability of technologies can change dramatically. In developing our plan, we have been cognisant of the potential for our plans to be overtaken by events and, as such, we have:

- Sought to set stretching, forward-looking targets in recognition of the fact that we are not planning in a static environment.
- Recognised from the start that it will be necessary for us to revisit our targets and planned actions by committing to an annual review of our EAP, which we discuss in further detail below.

3. Our position and role as a DNO

As the owner of the distributed energy network, we have a unique role and significant opportunity to support the environmental agenda. This involves enabling others to make progress, and focusing on our own actions:

- **Facilitating Net Zero:** Supporting emissions reductions across the energy networks through the decarbonisation of key sectors.
- **Achieving Net Zero and minimising our environmental impact:** Focusing on our operations to reduce our own environmental impact.

At our latest Net Zero Networks forum, 94% of 50 respondents attending supported our role encompassing both achieving and facilitating Net Zero, with 4% believing that only Facilitating Net Zero is a DNO role and 2% not sure.

Our role in facilitating Net Zero is discussed within Section 12.1 Whole Systems of our business plan. To play a proactive role in the transition to Net Zero will require us to take a more holistic view of the energy transition. Our whole systems strategy is therefore based around facilitating the transition across three key sectors:

- **Whole Electricity:** In Section 12.1 Whole Systems, we explain how we will work with other organisations including electricity networks, system operators, distributed generators and flexibility providers to deliver flexible, efficient, reliable supply at low cost.
- **Whole Heat:** Heat is the single biggest source of greenhouse gas emissions in the UK (37% of total carbon emissions³) and natural gas, as a heat source, is currently relied upon by over 86%⁴ of the UK population. In Section 12.1 Whole Systems, we explain how we will interact across energy vectors to deliver appropriate decarbonisation of heat at least cost and work closely with gas networks to support electrification, green hydrogen generation, and hybrid systems.
- **Whole Transport:** Transport remains one of the largest sources of pollution in the UK, accounting for 28% of all greenhouse gases⁵ and contributing to poor air quality. In Section 12.1 Whole Systems, we explain how we will accelerate the transition to EVs by taking a more proactive approach; this will involve removing barriers to the deployment of EV charging infrastructure in key locations such as on-street and across motorway services.

In this Environmental Action Plan, we predominantly focus on the second component of our role: to minimise our own environmental impact and support decarbonisation.

4. Our track record on the environment

While the development of this Environmental Action Plan is an important milestone, it does not mark the start of our journey to reduce our environmental impact. Rather, this plan builds on the significant positive action and research we have been undertaking in RIIO-ED1 that has led us to meet, or exceed, our RIIO-ED1 commitments on carbon and SF6 emissions, waste, noise, recycling, and pollution from fluid filled cables.

Having met our RIIO-ED1 target of a 16% reduction in controllable carbon emissions by 2018/19 we recast the target to 20% in our 2019 Green Action Plan. By March 2020 we had also exceeded this target, attaining an overall reduction of 25.5%. We are the first UK electricity DNO to achieve the Carbon Trust Standard for Carbon. The wide range of initiatives we have enacted to meet this target, including estate rationalisation, purchase of guaranteed renewable electricity, and the use of lower carbon concrete will facilitate on-going carbon reductions.

Our Green Action Plan also established new comprehensive and ambitious targets (see table below) for reductions in waste, energy, water use and NOx emissions, while making commitments in relation to recycling, noise pollution and biodiversity. We are on track to meet each of these renewed targets.

The Green Action Plan provided us valuable experience of employee and stakeholder engagement in relation to environmental issues, while our engagement with the Carbon Trust has also proved fruitful.

We have worked with the Carbon Trust to understand and model how we can contribute to maintaining global warming at well below 2°C for our entire footprint and where we can cut much more aggressively to exceed a 1.5°C trajectory. This modelling has also helped us measure our scope 3 emissions, in line with the greenhouse gas protocols utilising the Environmentally Extended Input and Output data (spend values) to initially benchmark our scope 3 emissions and identify who our material suppliers are.

During RIIO-ED1 we have taken a cost benefit approach to energy loss management initiatives including LV and HV cable upgrades, installing amorphous steel pole-mounted transformers (50 kVA), and optimising distribution transformer sizes. This has led to tangible energy loss reductions.

We have also undertaken a range of trials during RIIO-ED1 that have provided valuable lessons for the roll-out of initiatives during RIIO-ED2. These include trialling electric vehicles, hybrid generators, and the use of granulated waste plastic in asphalt mixes for pavements.

Finally, we are proud of our biodiversity achievements. We have financially supported the nine Wildlife Trusts in our regions, facilitated staff volunteering with the same Trusts, and undertaken research that will enable us to enhance the biodiversity in 90 of our sites during RIIO-ED2.

³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766109/decarbonising-heating.pdf

⁴ Newsroom – Energy Networks Association (ENA)

⁵ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/863325/2018-final-emissions-statistics-summary.pdf

The table below shows how our Green Action Plan, set in 2019, sets tougher targets than our initial RIIO-ED1 commitments for many environmental areas. We are on track or already exceeding these targets in all areas.

Table 2: Our progress against our original RIIO-ED1 targets

KPI Action	ED1 Commitment by 2023	Baseline	Green Action Plan Target	Performance today
BCF Reduction %	16%	Year 2014/15 77,341 tCO ₂ e Target 64,966 tCO ₂ e	Increased to 20% by end of 2021	Exceeding Target for RIIO-ED1 2020\21 53,405 tCO ₂ e Reduction 30.9%
Office and Depot Waste % diverted from Landfill	70%	Year 2014\15 Tonnes Landfill 986 Diverted 2,624 Total 3,610 % diverted 72.7%	Increased 90% by end of 2021	On Target for RIIO-ED1 Tonnes 2020\21 Landfill 531 Diverted 3,916 Total 4,447 % diverted 88.1%
Streetworks Waste % diverted from Landfill	98%	Year 2014\15 Tonnes Landfill 6,921 Diverted 404,646 Total 411,567 % diverted 98.3%	No change	On Target for RIIO-ED1 62.9% decrease in volume 2020\21 Tonnes Landfill 4,504 Diverted 145,555 Total 150,059 % diverted 97%* (Average 98% across RIIO-ED1)
SF6 – Maintain emissions % of bank per annum.	0.2% p.a.	2014/15 (kgs) Bank 95,463 Lost 100 Leak rate 0.1%	No change	On target for RIIO-ED1 2020\21 (kgs) Bank 122,680 Lost 130 Leak rate 0.11%
FFC – Reduce by % per annum from RIIO-ED1 start.	2% p.a.	2014/15 (litres) Bank 7,150,171 Lost 283,434 Leak rate 3.96%	No change	On target for RIIO-ED1 2020/21 (litres) Bank 7,296,432 Lost 187,519 (net) Leak rate 2.6% 20% improvement against average DPCR5 leak rate
Noise - % of all noise complaints investigated	100%	N/A	Ambition Increased Contact all LA's on development plans by end of 2021 Map potential site with potential problems against Strategic Housing Land Assessment Availability (SHLAA)	On target Workshops with LA's Nov 2021
Energy Consumption % kWh reduction	No target for RIIO-ED1	Year 2018 6,343,126 kWh	10% reduction in top six buildings by end of 2021	On target Year 2020 5,844,855 kWh 7.8% decrease
Biodiversity	No target for RIIO-ED1	N/A	Enhance potential by 20-30% at 100 of our sites by end of 2021	On target 100 sites surveyed 88% of sites assessed for BNG potential

KPI Action	ED1 Commitment by 2023	Baseline	Green Action Plan Target	Performance today
				Average potential increase 29.6%
Water	No target for RIIO-ED1	2018/19 22,443 M ³	10-15% reduction of top six buildings by end of 2021	On target 2020/21 18,509 M ³ 20.3% decrease
Pollution	No target for RIIO-ED1	Proxy data based on fuel reductions	33% reduction by 2030	On target – Good progress on benchmarking NOx Hybrid/battery back engines identified and low carbon fuel suppliers (tender pending)
Third party certification for Carbon, Water, Waste reductions (Carbon Trust Triple Tick)	No target for RIIO-ED1	N/A	Carbon Reduction Standard Waste Reduction Standard Water Reduction Standard	Carbon Standard - Achieved Waste and Water Standard discontinued but completed work on these will feed into resource and circular economy initiatives.

Assessing our environmental aspects (ISO14001)

We have long sought to understand our environmental impact as a business. We have certified our Environmental Management System (EMS) to the international standard ISO 14001:2015 and this has driven continual improvement since our certification in 2003. This EMS is audited and assessed by DNV who are an independent UK Accreditation Service certification body.

An integral part of this standard (clause 6.1.2) covers 'environmental aspects' whereby an organisation must identify those activities, products and services it can control and those that it can have influence on. An assessment must then be completed to determine what the impact is on the environment and its significance, both under normal and abnormal operations.

A summary of the environmental aspects, activities and impacts is provided in Annex 4.

5. Customer and stakeholder engagement and understanding best practice

In formulating our Environmental Action Plan, we have conducted extensive engagement with:

- Customers of all ages and demographics across all three of our regions, including vulnerable customers and the fuel poor.
- Business customers, of different sizes and from different sectors across all three of our regions.
- Environmental groups such as wildlife trusts, the Carbon Trust and the Energy Saving Trust.
- Customer groups such as Citizens Advice.
- Our suppliers
- Academic experts and sector specialists.

We have had to adapt our engagement to the changes in ways of working necessitated by the pandemic, moving from face-to-face to on-line engagement where appropriate.

Our engagement with customers and stakeholders has shown us that they think that the environment is a priority. It is clear that the momentum and the need for Net Zero is growing, and customers want our commitments to reflect this. Customers acknowledge our wider role in facilitating the transition to Net Zero but believe that we should “get our own house in order” in order to be credible i.e. “practice what we preach”. There is, however, some scepticism about the feasibility of meeting some of the more ambitious targets set out by Government and a sense that strong leadership from policymakers is needed.

Our social contract research sought to understand customer views on company social contracts through focus groups and an online survey. When asked, unprompted, what UK Power Networks should include in their social contract, environmental considerations was a key suggestion across all groups and widely agreed to be an important principle.

Our initial “State of the Nation” quantitative customer research showed that keeping bills low is also a top priority for all customers, particularly in the post-COVID world. However, customers do not strongly think that the economy should be prioritised ahead of the environment and are open to the idea of paying for environmental improvements. However, customers want greater transparency in how their money is used and whether targets are being met.

Acceptability testing has provided us with an understanding of customer views towards the proposed business plan and ultimately how acceptable it is in their eyes. It is the final ‘check-in’ with customers before the plan is submitted and is therefore a relatively high-level assessment of the overall package, the constituent parts of which have been developed with previous customer feedback and insight.

In asking customers to consider the acceptability of our plan in relation to our environmental proposals, we summarised our business plan proposals at a high level and packaged them up to cover our proposals for both reducing our own direct environmental impact, and our proposals to facilitate the wider Net Zero transition. Overall, four in five (82%) of domestic customers found our plan for the environment to be acceptable. Business customers were slightly more likely to find this aspect of the plan to be acceptable, with overall acceptability of 85%.

Our extensive engagement with stakeholders throughout the process has also provided us with a clear message on the importance of the environment and the urgency with which it should be addressed. This ongoing engagement with stakeholders has given them the opportunity to shape our plan and suggest refinements and improvements on our proposals as they evolve.

Key insights from our stakeholder and customer engagement are provided in relation to our proposed plan actions later in this document. Further details of how our customer and stakeholder engagement has informed these key insights are provided in the Line of Sight - EAP and Engagement Summary - EAP documents.

In developing our plan, we have also sought to understand best practice, not just amongst direct comparators, but globally and across other sectors. We believe that we can learn important lessons from others about what is achievable and this can help us to make environmental improvements at the speed demanded of us by legislation, society, our stakeholders and our customers.

Where available, we have provided short examples of best practice for each of our activities that have an environmental impact in the corresponding sections of this plan.

Customers view the environment as a high, and growing priority, but within the context of economic concerns / a desire to keep bills low.

Key insight I-EAP1

Customers believe that it is important for us to “practice what we preach” and “get our own house in order” alongside facilitating the transition to Net Zero.

Key insight I-EAP2

In general, customers show a willingness to pay for environmental improvements.

Key insight I-EAP4

6. Opportunities and challenges for addressing areas of environmental impact

Network losses represent any electricity lost in transit between the transmission network and the end user. Our network losses therefore result from everyone’s use of electricity across London, the South East and the East of England, and make up around 74% of our total business carbon footprint. We can replace transformers with more efficient models, install larger cables and manage loads more efficiently to help minimise losses, which we are doing. However, replacing large parts of the network well ahead of the replacement life cycle would result in a large draw down on materials, natural resources and embodied carbon. In addition, significant elements of the causes of these losses are outside our control.

The factor that makes the biggest impact on the carbon associated with these losses is how the electricity is generated in the first place, which determines the average grams of carbon per kWh generated. In the last decade, the rapid increase in low and zero carbon generation sources, particular wind and solar and the demise of coal, has seen the average carbon intensity of the grid more than halve. While the carbon intensity of power generated is outside of our control, we do have a significant role to play in ensuring that the network can support as much renewable energy generation as possible. Section 12.1 Whole Systems, and the associated appendix detail our strategy for facilitating the transition to Net Zero.

Accredited science-based targets must conform to the Greenhouse Gas Protocol, which requires DNOs to include emissions associated with network losses. Given the dominance of losses in our total carbon footprint, the pace of decarbonisation is the primary determinant of reductions in our total footprint. The modelling we completed with the Carbon Trust, using the BEIS 2019 projections for grid decarbonisation, showed that a 1.5°C reduction trajectory was not achievable for our full footprint, including losses. For that reason, we have committed to exceed a Well Below 2°C (WB2D) target. However, in order to make our SBT more meaningful and stretching, and reduce the dominance of losses in our SBT, we opted to include our scope 3 (indirect) emissions (including embodied carbon), which represent 24% of our total business carbon footprint (scope 1, 2 and 3). We could, under SBTi rules, legitimately exclude them as they fall below the 40% threshold. However, without losses, scope 3 emissions would make up 84% of our footprint. Including scope 3 emissions in our SBT, will challenge us to improve resource use, and reduce embedded carbon and pollution, by working in partnership with our supply chain and has the potential to achieve wider beneficial impacts beyond the immediate boundaries of our organisation.

We have also sought to set specific stretching, but achievable, targets for those emissions that we can more directly control (scope 1 and 2 excluding losses). For these emissions, we will exceed a 1.5°C trajectory without resorting to carbon offsetting. We will then offset any remaining residual emissions to achieve Net Zero by 2028 using high quality verified offsets. This ensures that we focus on the aspects of our emissions that are more visible to our customers and directly controllable by us, such as the fuel we use, the efficiency of our fleet and plant, the energy we use in our buildings, and the emissions of our supply chain.

We note that since verifying our SBT, the SBTi has revised its requirements such that all newly submitted plans must align with a 1.5°C trajectory. We have signed the Business Ambition for 1.5°C Campaign which commits us to re-verify our Science Based Target at 1.5°C (ahead of the current re-verification cycle in 2026) and will also require us to move to the new verified Net Zero Standard. This reflects our expectation that investment into carbon capture and storage, renewable generation and energy storage will accelerate and that BEIS will update their generation forecasts to reflect this in due course.

In managing our impact on the environment more widely, more opportunities present themselves, for example by enhancing biodiversity at our sites, and reducing waste. However, we are also presented with challenges. These include uncertainty regarding:

- The price and availability of zero emissions vehicles to meet some of our more specialised requirements.
- The feasibility and availability of appropriate hybrid generators.
- The speed at which the grid will decarbonise (discussed further below) and the extent of flexibility services, which could increase losses.
- The rate of load growth, and hence network reinforcement, which will affect our ability to invest and minimise losses accordingly.

In addition, some of our essential activities have an environmental impact, which we need to manage. For example, our necessary tree-trimming activities run counter to our aim to increase biodiversity. We also face issues with managing certain categories of waste.

How decarbonising our business interacts with general decarbonisation trends

As outlined earlier and in chapter 12 of our business plan, we aim to facilitate Net Zero in RIIO-ED2 through three key channels: heat, transport, and distributed generation. These initiatives all aim to reduce the carbon intensity of energy supplied across our networks. Additionally, our use of flexibility services provided by customers to help connect these technologies can reduce the embedded carbon associated with building network assets yet increase losses.

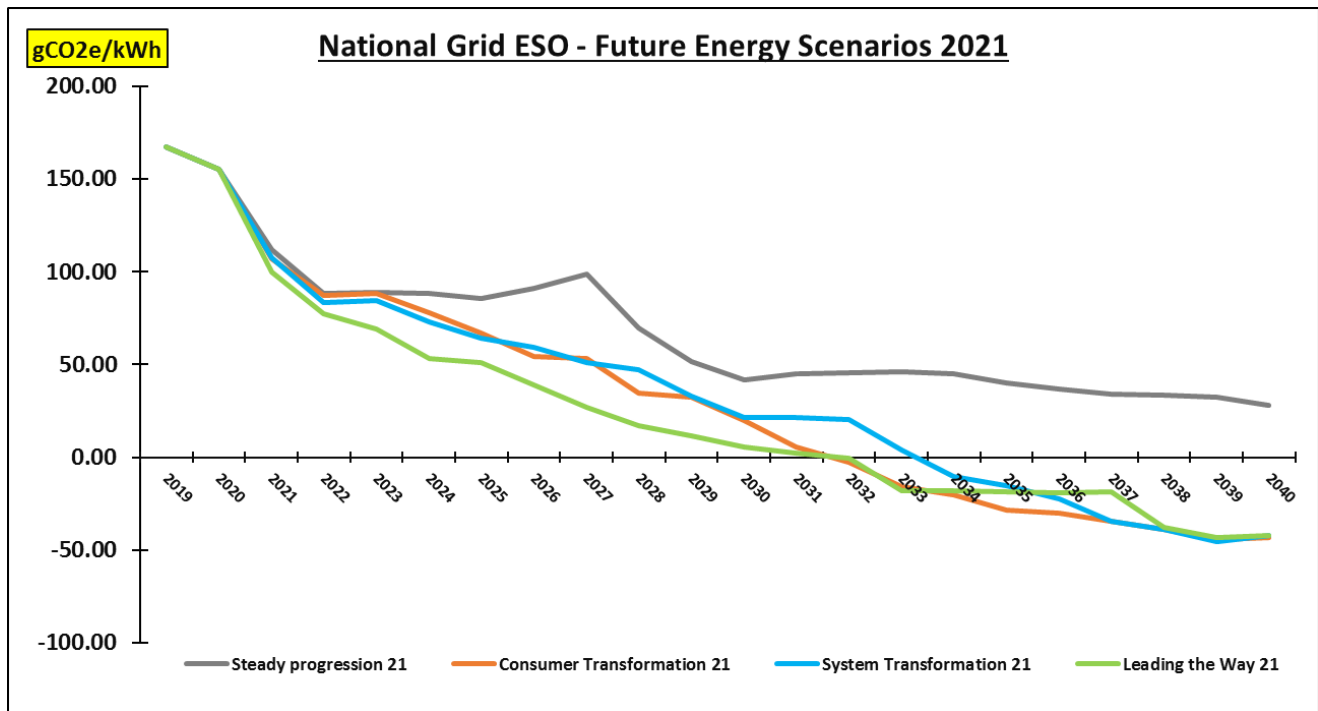
In its Future Energy Scenarios 2021, National Grid ESO considered the potential power sector carbon intensity to 2050 across a range of scenarios. These scenarios included:

- **Steady Progression:** The slowest credible decarbonisation path, involving minimal behaviour change, and decarbonisation in power and transport but not heat.
- **System Transformation:** Involving hydrogen for heating, with consumers less inclined to change behaviour, lower energy efficiency and supply side flexibility.
- **Consumer Transformation:** Involving electrified heating, consumers willing to change behaviour, high energy efficiency and demand side flexibility.

- **Leading the Way:** The fastest credible decarbonisation path, involving significant lifestyle change, and a mixture of hydrogen and electricity for heating.

As illustrated below, in all scenarios, carbon emissions from the power sector continue to fall.

Figure 2: Power sector carbon intensity



The decarbonisation of the grid has implications for our efforts as a DNO to achieve Net Zero:

- **Losses:** As the grid decarbonises, so do losses as the carbon intensity of electricity transported across our network falls. Once the power sector becomes net negative, losses will no longer be a source of carbon emissions, but rather an opportunity to increase efficiency across the network.
- **Purchased electricity:** Whilst we already procure 100% renewable energy for our needs as a DNO, the Greenhouse Gas protocol requires us to report scope 2 emissions using a location-based method. This reflects the average emissions intensity of grids on which energy consumption occurs⁶. As described for losses, over time, our purchased electricity will stop being a source of carbon emissions under this location-based reporting approach once the grid becomes net negative. However, we will continue to focus on the efficiency of our energy use and report the impact of our green tariff purchases via the market based reporting approach.

7. Our vision

We must play our part in limiting irreversible change to our climate and the impact this will have on the environment, the economy and society. We take this challenge seriously and this is underpinned by our Company Vision to be an employer of choice, a respected corporate citizen and sustainably cost efficient.

We have worked to embed our values, and the importance of the environment, within our business by:

- Making a clear environmental commitment to our customers as part of our social contract and incentivising sustainability as part of our executive team short-term incentive plan.
- Embedding the environment in our corporate governance structure.
- Engaging with our employees on sustainability.
- Building on the UN’s strategic development goals in developing our Environmental Action Plan.
- Setting long-term objectives for our environmental performance.

⁶ https://ghgprotocol.org/sites/default/files/Scope2_ExecSum_Final.pdf

7.1. Our Social Contract

As a private company delivering an essential public service, we recognise the privileged position we hold within society. A key objective of our organisation's vision during RIIO-ED1 has included being the most socially and environmentally responsible DNO. For RIIO-ED2, we are placing increasing importance on the social purpose of our company given how important trust and fairness are going to be to maintain public support for Net Zero. We will introduce a Social Contract containing seven commitments, co-designed with our customers and stakeholders, which will report all of the organisation's Environmental, Social and Corporate Governance arrangements and performance in a single place, maximising transparency and public scrutiny. One of these seven commitments is to: "deliver the best possible environmental performance in our operations". This Environmental Action Plan is a key part of that commitment. Further details are provided in the Social Contract chapter (Chapter 5) of our business plan.

7.2. Embedding the environment in our corporate governance structure

A key concern identified by our stakeholders was the governance of our Environmental Action Plan and how this is managed within the wider context of our Environmental, Social and Governance (ESG) commitments. They wanted to see a more visible level of control and input from senior managers and the Board to ensure that responsibility for delivery is clear and that leadership from the top is visible to employees, customers and suppliers alike. Our existing environmental management system, certified to ISO 14001, requires us, under clause 5.1 of the standard, to demonstrate senior leadership and control. However, we agreed that, with the growing strategic importance of these matters within our RIIO-ED2 Business Plan, a Board sub-committee was warranted.

This was already under consideration and the new ESG Board sub-committee will be up and running from Q1 2022. The membership will be drawn from the current Board members and other shareholder representatives, including the independent directors.

Some examples of the notable strategic areas it will address are:

- Our Social Contract.
- Facilitating Net Zero in our Service Territory.
- Achieving Net Zero at UK Power Networks.

7.3. Employee engagement on sustainability

It is clear that an important part of our Environmental Action Plan is the buy in and support of our employees. The launch of the Green Action Plan was partly in response to the push from our own workforce to be more ambitious in our targets and actions on sustainability.

As an employer of choice, we have successfully maintained high rankings in the 'Best Big Companies to Work For' list, achieving a ranking of 6th place this year, our highest ever. We also ranked as 2nd on the newly created Utilities top ten list. The benefits we offer our work force through health and wellbeing packages, preferential deals with leading retailers, charity volunteer days and strong support for training have helped us secure our high engagement scores.

During RIIO-ED2, we will provide more green and sustainable options with our employee benefits partners and look at potential options for assisting our employees with making their own lives more sustainable. For example, we will include Electric Vehicles in our company car scheme, and consider improved options on greener utility tariffs, home energy efficiency initiatives, biodiversity volunteer days, carbon-offsetting options with trusted partners and more sustainable products with our retail partners. We will also seek to train and upskill our employees in new environmental requirements, ensuring that environmental awareness and sustainability is part of our corporate DNA.

7.4. Building on the UN's Sustainable Development Goals

The UN's sustainable development goals (UNSDGs) are the blueprint to achieve a better and more sustainable future for all. To test our focus against the wider sustainability challenge, we mapped our goals against the UNSDGs. Our goals for our Environmental Action Plan have the strongest alignment with the UNSDGs shown below.

Figure 3: Our EAP has the strongest alignment with the following UN Sustainable Development Goals



7.5. Our strategic goals

In developing our over-arching strategic goals for addressing our environmental impact, we have been cognisant of the UNSDGs and the outcome of our customers and stakeholder engagement.

We believe that, not only are the following strategic goals consistent with the UNSDGs, but they reflect what is important to our customers, and encompass the full scope of our environmental impact: our climate change impact, the resources we use, the land over which we have stewardship and the pollution we are responsible for.

In considering pollution, we are applying a broad definition, to include the introduction of substances, materials or energy into the environment, resulting in negative impacts on human health, living resources and ecosystems or the impairment of amenities and other legitimate uses of the environment. As such, we are including the impact of noise and the visual amenity of our overhead lines in this category.

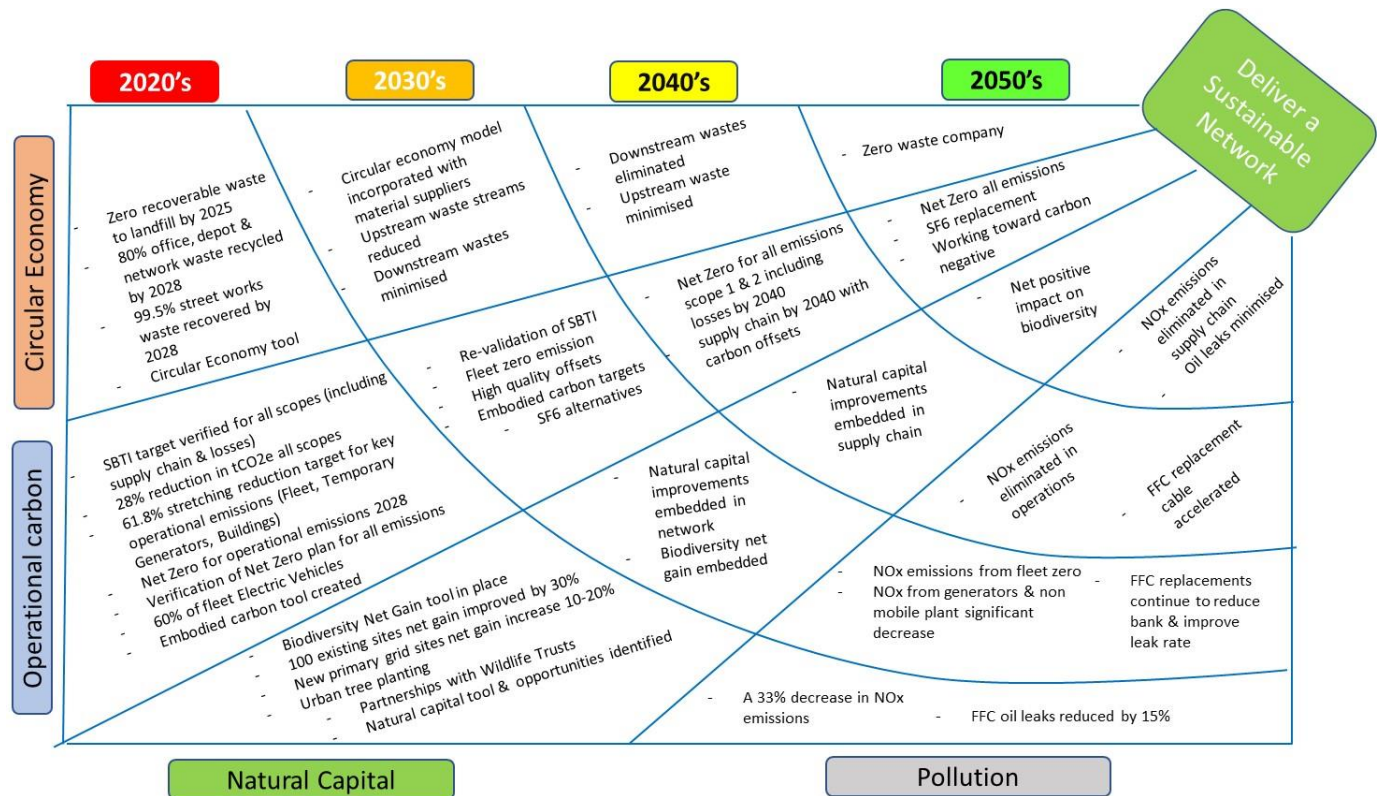
Figure 4: Our strategic goals



7.6. Our long-term environmental objectives

This Environmental Action Plan, and the annual iterations that will follow it, sits within the context of a longer-term environmental vision. Whilst the focus of this plan is on the RIIO-ED2 period, our mission to reduce our environmental impact reaches much further into the future. Many of the activities and associated actions covered by this EAP are part of longer-term strategies and represent steps to achieving longer-term environmental objectives which reflect our wider goals as shown in Figure 5 below.

Figure 5: Putting our EAP into a longer-term context



Science-Based Targets

Our Science Based Targets for decarbonisation are long-term goals tied to the latest climate science and reflect the role we need to play to ensure global warming is kept under control. This can only be achieved if we have enduring targets in place and this is what we have done by registering our targets with the Science Based Targets Initiative (SBTi). Our commitments

and associated actions in this Environmental Action Plan for the RIIO-ED2 period are set to put us on track to achieve these outcomes.

We have long-term decarbonisation objectives that extend beyond the RIIO-ED2 period:

- For our full carbon footprint, including scope 3 emissions, we will exceed our reduction target approved by the Science Based Target Initiative at Well Below 2°C and seek to achieve Net Zero for our full carbon footprint by 2040.
- We note that since verifying our SBT, the SBTi has revised its requirements such that all newly submitted plans must align with a 1.5°C trajectory. We have signed the Business Ambition for 1.5°C Campaign which commits us to re-verify our Science Based Target at 1.5°C (ahead of the current re-verification cycle) and will also require us to move to the new verified Net Zero Standard.
- For our directly controllable carbon emissions (scope 1 and 2 emissions, excluding losses), we will exceed our reduction target, consistent with a science-based target pathway of 1.5°C.

This is consistent with the science-based decarbonisation targets that we have set for RIIO-ED2, which are described in more detail under: Action 1: Setting our targets for decarbonisation.

Sulphur Hexafluoride (SF6)

SF6 gas was introduced as a safe way to extinguish electrical arcing that occurs when equipment operates on our networks to cut power when faults occur on the network, protecting equipment and people. While it is an effective substance to achieve this, it also has a powerful greenhouse effect when it leaks to the atmosphere, contributing to global warming. Better understanding of the impact leaks have on our environment means that we are now working to find alternatives. We will not install any new SF6 gear on the network at 132kV and EHV voltages. We are working with manufacturers and suppliers to source equipment that uses alternatives to SF6 while maintaining performance and reliability so that, in the future, we will phase out the use of SF6 at all voltage levels. As we get a better understanding of available alternative equipment, we will use our annual updates of our EAP to set a target date for no new SF6-based equipment being installed on our network. While we work toward this, we will build on our success to date in managing leaks to further reduce the amount of gas leaking to the atmosphere as described in Action 6: Sulphur Hexafluoride (SF6).

Fluid Filled Cables

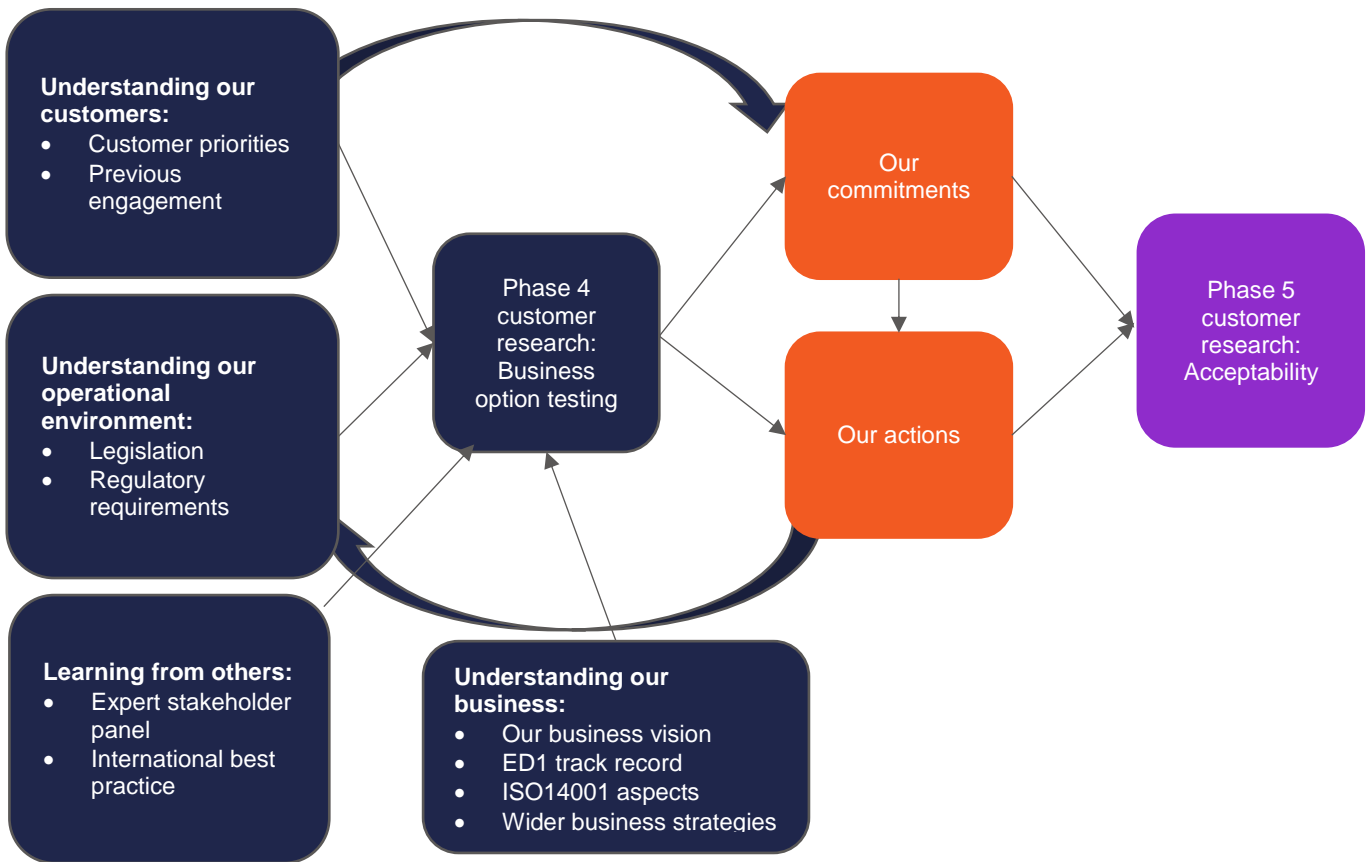
In early cable designs, specially formulated fluid was used to maintain the integrity of the insulation in high-voltage cables to maintain the reliability of the network. As these cables age, the fluid can leak into the surrounding environment and cause damage. We no longer install cables that use this technology and prioritise them for replacement to further reduce fluid leaks. Replacement of the cables is a high cost activity and can often result in major disruption to customers where major roadworks are involved. To manage the cost and disruption to customers, we focus our replacement programme on the cables that have the highest environmental impact and base our plan on a targeted reduction in leaks. In each planning cycle we assess what mix of operational and investment solutions are required to achieve our leakage reduction target to provide the greatest value for money to customers. Our plans in this area for RIIO-ED2 are described in Action 14: Reducing leakage from fluid filled cables.

8. How we have developed our strategy for RIIO-ED2

As Figure 6 below shows, our strategy has not been developed in a vacuum. Its development has been shaped by:

- Our operational environment, not just in terms of the legislative and regulatory landscape and the need to transition to Net Zero, but the current economic and social forces, which themselves have been heavily influenced by the pandemic.
- A deep understanding of our business and a vision for what we want to achieve as a business, taking into account our track record.
- An understanding of our customers' and stakeholders' priorities and best practice.

Figure 6: The process of building our Environmental Action Plan



We combined our extensive knowledge of our business, views of experts and the wider operational environment that we function in to build potential options for actions and associated targets and commitments. We have tested these options with our customers and our EAP is built on this support.

Our 2019 Green Action Plan has formed the foundation for this Environmental Action Plan:

- It has enabled us to review the targets that we set at the start of the RIIO-ED1 period, setting more stretching targets to recognise our outperformance so far in the period.
- It has prompted conversations with our employees, stakeholders and customers about our environmental impact and targets.
- It has given us greater confidence to set more stretching targets for RIIO-ED2.
- It has taught us the value of revising targets and commitments, given that targets that seem stretching at the time of setting can be quickly overtaken by behavioural or technological changes.

Our work with the Carbon Trust has enabled us to gain a greater understanding of our environmental impact and we have implemented trials of new technologies such as electric vehicles and hybrid generators to give us confidence that our plans are deliverable.

8.1. The need for action: environmental impact without intervention

It is our view, and that of our customers and stakeholders, that doing nothing when it comes to the environment is not an option. The scale and urgency of the climate crisis requires us to step up and take action and the consequences of inaction are grave, as outlined above. All of the actions that we outline in this plan will have tangible environmental benefits that would not occur in their absence.

Whilst ongoing grid decarbonisation will lead to an estimated 23% reduction in our total business carbon footprint by 2028, absent any intervention from us, this is not enough. We have a key role to play in facilitating the transition to Net Zero for both our customers and stakeholders in London and the South East and East of England. Our customers have been clear that, in order to have credibility in fulfilling this role, we need to lead by example and ambitiously address our own environmental impact.

To assess the impact and effectiveness of all the actions within this plan, we have used an implied baseline of “no intervention”. The stated benefits of our actions are therefore against this baseline showing how we are delivering improvements for our customers.

8.2. Considering alternative options

As we note above, we believe that the case for action is clear. However, we have an obligation to ensure that our plans have the support of our customers and stakeholders, represent value for money and are deliverable. As such, we have considered alternative options at various stages of plan development.

- At an early stage of plan development, alternative options were worked up for the initiatives under consideration and the relative merits of alternative approaches were discussed with stakeholders. We provide further details of these, as appropriate, for our proposed actions.
- As part of our Phase 4 Business Options Testing, we presented alternative options to customers as detailed below.
- For the areas of significant spend, we have undertaken formal cost benefit analysis of alternative options, as detailed in the relevant Engineering Justification Papers and Investment Justification Papers.

Our phase 4 business option testing

In order to understand customers’ preferences across the range of our EAP, we asked separate questions to understand customers’ ambitions, firstly, for decarbonisation and, secondly, for sustainability in general, covering issues such as resource use and waste, pollution and biodiversity.

Given the high costs associated with addressing oil leakage from fluid filled cables, we did not include this in our question about sustainability as we feared that it could skew customers’ responses as the associated costs would dominate those of the other areas. However, we asked a separate question about the replacement of fluid filled cables and customers’ preferences given the associated costs and the implications for both reliability and the environment.

As such, the three questions we posed sought to understand:

- **Decarbonisation:** what level of ambition should our science-based targets for our business carbon footprint (scope 1 and 2 excluding losses) reflect?
- **Sustainable business:** what should our level of ambition be with respect to generator upgrades to improve air quality, recycling of recoverable waste, and improving biodiversity?
- **Fluid filled cables:** what combination of reliability and oil leakage reduction do customers favour given the associated costs?

In each area we have defined options which reflect a low, medium and high level of ambition. These are associated with increasing bill levels. Qualitative research has provided deeper insight to the results and how they should be interpreted. We tested this with both domestic and business customers.

For **decarbonisation**, the three options presented to customers were a science-based target in line with different maximum global temperature rises.

- **Option 1:** 2°C (+£0.04 on annual bill).
- **Option 2:** 1.5°C (+0.11 on annual bill).
- **Option 3:** less than 1.5°C, noting that this may involve carbon offsetting (+£0.22 on annual bill).

For a **sustainable business**, we presented three options to customers.

- **Option 1:** upgrade 30% of generators to clean fuels, continue to recycle 40% of recoverable waste, and improve biodiversity at 100 UK Power Networks sites (+£0.01 on annual bill).
- **Option 2:** upgrade 80% of generators to clean fuels, recycle 70% of recoverable waste, and improve biodiversity at 125 UK Power Networks sites (+£0.03 on annual bill).
- **Option 3:** upgrade 100% of generators to clean fuels, recycle 80% of recoverable waste, and improve biodiversity at 150 UK Power Networks sites (+£0.06 on annual bill).

For **fluid filled cables**, we presented three options for different programmes of routine maintenance and repair.

- **Option 1:** maintain the same reliability of service as provided today and reducing oil leakage by 10% over 5 years (+£3.60 on annual bill).
- **Option 2:** maintain at least the same reliability of service as provided today and reduce oil leakage by 18% over 5 years (+£3.91 on annual bill).

- **Option 3:** improve network reliability of service and reduce unplanned power cuts and reduce oil leakage by 24% over 5 years (+£5.63 on annual bill).

The results of this engagement informed our ambition in the development of our plan and are discussed in more detail in relation to the relevant actions in the later sections of this plan.

Cost benefit analysis for areas of significant investment

Where we are proposing major investment, our proposals are supported by an Engineering Justification Paper (EJP) or Investment Justification Paper (IJP), as appropriate, with its own underlying cost benefit analysis of alternative options. Those of relevance to our EAP proposals are:

- For decarbonising our business transport: ED2-IJP-05-Fleet.
- For modernising our generators: ED2-CBA-EAP.
- For losses: ED2-EJP-SG-012.
- For Fluid Filled Cables: 12 EJPs: ED2-EJP-AS-037, ED2-EJP-AS-038, ED2-EJP-AS-039, ED2-EJP-AS-040, ED2-EJP-AS-042, ED2-EJP-AS-043, ED2-EJP-AS-046, ED2-EJP-AS-047, ED2-EJP-AS-050, ED2-EJP-AS-074, ED2-EJP-AS-095, ED2-EJP-AS-095: FFC Replacement Programme Paper.
- PCB removal programme: ED2-EJP-AS-093.
- For improving visual amenity: ED2-EJP-NP-009.

Further details of our asset replacement programme are provided in Appendix 10a: Non load overarching investment framework.

9. Regional aspects of our EAP

Our Environmental Action Plan is common across all three of our regions: South East England, East of England and London. The climate crisis is global in nature, and, as such, decarbonisation activities in each of our regions have equal value. However, for some aspects of our plan, the volume of activity we are proposing, or the impact of our activities varies by region, as a result of their different characteristics and geography. For example:

- Given the nature and distribution of our sites and their suitability for biodiversity enhancement, a greater proportion of the sites we address during RIIO-ED2 will be in the less urban areas, and therefore our EPN region will have more sites targeted for improvement.
- The air quality implications of our deployment of diesel generators and internal combustion engine vehicles are greater in areas of high population density. Where possible, we will therefore prioritise urban areas for deployment of cleaner alternatives. However, for generators, our proposed focus on using HVO fuels in hired generators, the majority of which are in our SPN and EPN regions, means that in LPN, we will explore the purchase of hybrid generators.
- The incidence of noise complaints has historically been lower in the LPN region. We anticipate a continuation of this trend, and therefore fewer noise mitigation interventions in the LPN area during RIIO-ED2.
- Our activities to address visual amenity by undergrounding overhead lines in areas of outstanding natural beauty (AONBs) or national parks is focused on our EPN and SPN regions given that there are no AONBs or national parks in our LPN area.

We provide further details for each of these activities in the relevant section later in this document.

10. Our commitments

Through the process described above, we have defined four strategic goals in collaboration with our customers and stakeholders. Under these four goals we have formed specific, measurable commitments to our customers. These commitments are how we will be held to account for delivering the outcomes of the actions we are proposing in our EAP. The commitments, and the actions that will deliver them, have both been developed based on customer research to deliver what our customers expect from us in protecting the environment they live in.

These commitments (and the associated actions to achieve them) under each of the four strategic goals are outlined in full in the sections that follow and summarised in Figure 7 below.

Figure 7: Commitments under each of our four strategic goals



We are also making one over-arching commitment to review our Environmental Action Plan on an annual basis to ensure that our work continues to meet our customers’ evolving expectations and that our response is based on the latest science and that we demonstrate best practice.

Commitment EAP1			
We will review our Environmental Action Plan annually to ensure our work continues to meet our customers’ evolving expectations, that our response is based on the latest science and that we incorporate any emerging best practice. We will establish a new sub-committee of the Board to monitor our performance and will report our progress through our Annual Environmental Report			
Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex.	Included in baseline allowances.	This ensures that we have the latest evidence on customer expectations and best practice to ensure we are continuously stretching ourselves to deliver ambitious outcomes for customers on the environment.	Feedback from our engagement programme has given us a strong message that we should seek to be ambitious with our environmental targets. (See key insights I-EAP1 – I-EAP14 in our Line of Sight – EAP document)

Feedback from our customers and stakeholders at each phase of our engagement process, has given us a strong message that we should seek to be very ambitious with our environmental targets in recognition of the urgency of the climate and environmental crisis we all face. The environment is a clear, urgent and growing priority for the majority of our customers and stakeholders, and the pace of change in technology and customer behaviour can be fast and unpredictable.

We have learnt from past experience, that environmental targets that feel ambitious at the time of setting, can be rapidly eclipsed by events. With the benefit of hindsight, the environmental targets that we set ourselves for RIIO-ED1 were not challenging enough. This prompted us to launch our Green Action Plan in 2018 with a new set of comprehensive and ambitious targets.

We have sought to be ambitious in shaping our RIIO-ED2 business plan, and we believe that all of our targets, including the target to achieve Net Zero in our controllable carbon emissions by 2028, reflect that. However, in order to ensure that we continue to stretch and challenge ourselves, we will engage annually with our customers and stakeholders to shape our Environmental Action Plan and revisit our targets, as appropriate. We will use our Citizens’ Assembly to gain customer insight and an Environmental Expert Panel to gather the views and expertise of our wider stakeholders to evolve our action plan on an annual basis. We will establish a new sub-committee of the Board to monitor our performance and will report our progress through our Annual Environment Report.

We are seeking to improve the quality of the environmental data that we collect and analyse. We are developing tools with partners in this area, specifically in relation to carbon reporting, circular economy and embodied carbon. We are also ensuring greater integration of our data platforms, for example, our noise contour analysis using Strategic Housing Land Availability Assessments (SHLAA) data.

We are not requesting additional funding to enable us to fulfil this commitment, as it will be conducted as a “business as usual” activity.

The following sections outline our remaining commitments, and the actions to achieve them, under each of our four strategic goals:

- Decarbonisation in line with a science-based target to avoid irreversible damage to the environment.
- Reduce our impact on the world’s limited resources.
- Increase natural diversity.
- Reduce pollution caused by our business operations and network activity.

11. Decarbonisation in line with a science-based target to avoid irreversible damage to the environment

Our phase 2b customer engagement showed that the momentum for decarbonisation is growing. Across all groups, engagement with decarbonisation was high, but the younger groups were most passionate about the requirement for urgent action suggesting Net Zero targets for 2025-2030. However, there was some scepticism about Net Zero being achieved. Our stakeholders share this sense of urgency, as we discuss further below.

We are making the following decarbonisation commitments for RIIO-ED2:

- For our full carbon footprint, including losses and indirect scope 3 emissions, we will exceed our reduction target approved by the Science Based Target Initiative (SBTi) at Well below 2 °C. We will commit to the Business Ambition for 1.5°C SBTi campaign. We will report our progress through our Annual Environmental Report and update our targets in line with SBTi protocols.
- We will reduce our directly controllable emissions (scope 1 and 2, excluding losses) exceeding a 1.5°C reduction trajectory and offset any remaining residual emissions to achieve Net Zero by 2028 using high quality verified offsets. We will report our progress through our Annual Environmental Report.
- As part of our verified Science Based Target, we will work with our suppliers to reduce our supply chain carbon emissions (scope 3) by 25% by 2028, compared to a 2018/19 baseline. We will report our progress through our Annual Environmental Report.

We provide further details of each of these commitments in turn below, before explaining our proposed actions to achieve these commitments.

Commitment EAP2			
For our full carbon footprint, including losses and indirect scope 3 emissions, we will exceed our reduction target approved by the Science Based Target Initiative (SBTi) at Well below 2 °C. We will commit to the Business Ambition for 1.5°C SBTi campaign. We will report our progress through our Annual Environmental Report and update our targets in line with SBTi protocols. **NEW**			
Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
£30.3m	Expenditure included in baseline forecast.	Customers will benefit from an overall reduction in our environmental impact, alongside improved air quality and associated health impacts.	Stakeholders believe that we should implement more ambitious carbon reduction targets that are science-based and aligned to at least a well-below 2-degree trajectory, for all emissions, including those relating to our supply chain. (See key insights: I-EAP1, I-EAP2, I-EAP3, I-EAP4, I-EAP9 in our Line of Sight – EAP document)

UK Government greenhouse gas conversion factors, July 2020 for a medium diesel car, travelling 10,000 miles p.a.

Over the RIIO-ED1 period to date, we have reduced our scope 1 and 2 carbon footprint by 1,436,577 tCO₂e (50.7%), from a RIIO-ED1 baseline of 2,833,335 tCO₂e. This decrease is largely due to the grid decarbonisation of losses. This baseline only includes a small fraction of our scope 3 emissions.

Prior to 2018/19, we didn't have a recognised methodology for measuring scope 3 emissions. Using 2018/19 as our baseline year, we had 1,537,140 tCO₂e scope 1 and 2 emissions plus 485,557 tCO₂e for scope 3 giving a 2018/19 baseline of 2,022,697 tCO₂e. In line with our Science Based Targets, we will further reduce emissions by 564,384 tCO₂e (28%) by the end of the RIIO-ED2 period.

Consistent with best practice, and responding to feedback from our customers and stakeholders, we have worked with the Carbon Trust to achieve a verified carbon reduction target with the Science Based Target Initiative (SBTi). We are the first DNO to achieve this milestone, putting us in a position to deliver a comprehensive set of actions to reduce our carbon emissions in line with a meaningful target.

Our work has shown that we can exceed a science-based target for our full footprint (scope 1, 2 and 3, including losses) in line with

Science-based targets

Targets are considered “science-based” if they are in line with what the latest climate science says is necessary to meet the goals of the Paris Agreement to limit global warming to well below 2°C above pre-industrial levels and pursue efforts to limit warming to 1.5°C. The Science Based Target Initiative (SBTi) officially accredits them.

a Well Below 2°C trajectory through a set of identified initiatives which equates to a 28.7% reduction in our total carbon emissions by 2028 and sets us on a path to be Net Zero for our full carbon footprint by 2040. We have also committed ourselves to the Business Ambition for 1.5°C, which will see us bring forward the re-validation of our SBTi targets as outlined in section 6. This level of ambition reflects the fact that both our customers and stakeholders view the environment as a high priority, as discussed above. As part of our co-creation stakeholder engagement, stakeholders said that we should include our scope 3 emissions in the well-below 2°C trajectory and set a more ambitious 1.5°C trajectory for our directly controllable emissions (scope 1 and 2 excluding losses). They agree that this is an appropriate target given the direct control we have on this aspect of our business carbon footprint and that we should look to upgrade targets as the investment streams into renewable power generation ramp up and new technologies are deployed.

Commitment EAP3			
We will reduce our directly controllable emissions (scope 1 & 2, excluding losses) exceeding a 1.5°C reduction trajectory and offset any remaining residual emission to achieve Net Zero by 2028 using high quality verified offsets. We will report our progress through our Annual Environmental Report.			
Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
£0.7m*	Expenditure included in baseline forecast	Customers will benefit from an overall reduction in our environmental impact, alongside improved air quality and associated health impacts. Our Net Zero target will deliver a combined reduction of 62% (equivalent to 31,295 tCO ₂) compared to 2018/19 levels**. This is the equivalent of taking 11,688 medium diesel cars off the road. The remaining emissions will be mitigated by renewable energy contracts and UK-based offsets. #	Customers and stakeholders believe that caring for the environment is a priority and all businesses have a responsibility to play their part. (See key insights: I-EAP1, I-EAP2, I-EAP3, I-EAP4, I-EAP6, I-EAP8, I-EAP13 in our Line of Sight – EAP document)

* The cost quoted here is for offsetting. The costs of the other actions required are included under commitment 2 above.

UK Government greenhouse gas conversion factors, July 2020 for a medium diesel car, travelling 10,000 miles p.a.

** Location based reporting – actions excluding grid decarbonisation = 18,532 tCO₂e (37%), including grid decarbonisation = 24,563 tCO₂e (50%) and with REGO backed electricity under market based reporting = 31,295 tCO₂e (62%).

Over the RIIO-ED1 period to date, we have reduced our scope 1 and 2 emissions (excluding losses) by 14,443 tCO₂e (24.4%). Using 2018/19 as our baseline year, in line with our Science Based Targets, we will further reduce emissions by 31,295 tCO₂e (62%) by the end of the RIIO-ED2 period.

We do not want the dominance of losses in our total business carbon footprint to prevent us from setting even more ambitious targets for those direct emissions that we have greater direct control over, namely scope 1 and 2 emissions, excluding losses. As a result, we are making a further commitment to reduce this element of our emissions, exceeding a science-based target pathway of 1.5°C without the use of offsets. We will then offset remaining emissions to achieve Net Zero for our directly controllable emissions by 2028. We will work with trusted partners to purchase these offsets using high quality, UK-based offsetting schemes. We have estimated the cost of these offsets at £0.7m This includes £0.54m expenditure in the final year of the RIIO-ED2 period to achieve Net Zero. However, we have also budgeted for the purchase of offsets in the third and fourth years of the RIIO-ED2 period, of £0.06m and £0.1m respectively, so that we can gain experience in the offset market before our target date and stimulate the market.

This, again, reflects our customers' and stakeholders' view that we need to urgently address the climate crisis and set an example. Domestic and business customers, as part of our phase 4 business options testing, opted for the most ambitious decarbonisation option: a pathway consistent with less than 1.5°C with some carbon offsetting used as a last resort. Our stakeholders share this sense of urgency: at the November 2020 Sustainability Critical Friends Panel, Net Zero by 2050 was not considered a challenging target - 2030 was suggested as an alternative. In addition, while actions to reduce emissions must take priority, the panel felt that we needed to develop mechanisms for utilising offsets well before this target date to stimulate the market. These views were supported by our stakeholder co-creation engagement in November and December 2020 and further stakeholder engagement in September 2021.

Our current view of actions will reduce our scope 1 and 2 emissions by 62%. We will continue to explore new solutions and offset what remains. Learning from other leading organisations, we are exploring the option to apply an internal price of carbon to embed carbon impacts in our decision-making and promote continuous improvement in our approach to reducing them. While some companies in other sectors are achieving or targeting carbon negative status, our use of offsets to achieve Net Zero by 2028 will put us in a good position to understand what can be achieved into RIIO-ED3 and beyond.

Commitment EAP4			
As part of our verified Science Based Target, we will work with our suppliers to reduce our supply chain carbon emissions (scope 3) by 25% by 2028, compared to a 2018/19 baseline. We will report our progress through our Annual Environmental Report.			
Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex.	Included in baseline allowances.	Customers will benefit from an overall reduction in the environmental impact of our supply chain, alongside improved air quality and associated health impacts.	Our stakeholders support addressing scope 3 emissions and setting targets for reduction in partnership with our suppliers. (See key insights: I-EAP1, I-EAP2, I-EAP3, I-EAP4, I-EAP7, I-EAP10 in our Line of Sight – EAP document)

UK Government greenhouse gas conversion factors, July 2020 for a medium diesel car, travelling 10,000 miles p.a.

We have developed a scope 3 reporting methodology to produce a baseline of our full supply chain emissions. Using 2018/19 as our baseline year, (485,557 tCO₂e) in line with our Science Based Targets, we will further reduce emissions by 121,389 tCO₂e (25%) by the end of the RIIO-ED2 period.

Our scope 3 emissions represent 24% of our total business carbon footprint. Therefore, whilst we are targeting Net Zero in our scope 1 and 2 emissions (excluding losses), our stakeholders also recognise the importance of seeking to address our scope 3 emissions i.e. those associated with our supply chain. For example, at the November 2020 Sustainability Critical Friends Panel, and as part of our wider stakeholder co-creation engagement, it was agreed that scope 3 carbon emission reductions should be targeted given their scale and impact. Our consideration of best practice has also taught us the importance of understanding and measuring our scope 3 emissions and collaborating with suppliers to address them in partnership.

We are therefore committing to work in partnership with our suppliers and external groups to reduce our supply chain carbon emissions by 25% by 2028. We measured our high-level scope 3 footprint for the first time in 2018/19. We are now increasing the granularity of our knowledge and will use this to identify and address high-impact activities in collaboration with our suppliers.

We believe that 25% is a stretching, but realistic target, but we will keep this under review, consistent with our first commitment discussed above. By working efficiently with our supply chain, this reduction will be achieved at no extra cost to our customers; we are not requesting additional funding to enable us to fulfil this commitment.

Table 3 summarises the decarbonisation actions we propose to enable us to fulfil our decarbonisation commitments. Further details are provided on each of these actions in the sections that follow.

Table 3: Our decarbonisation actions

Action	Summary	RIIO-ED2 contribution to target for scope 1 & 2 excl. losses		Contribution to commitment:			Additional benefits	Cost
		tCO ₂ e	%	2	3	4		
Action 1: Setting our targets for decarbonisation	Exceeding science-based target of Well Below 2°C for our full footprint and Net-Zero for our directly controllable emissions by 2028.	N/A	N/A	✓	✓	✓	N/A	No additional funding
Action 2: Decarbonising our business transport	Replace all vehicles in fleet with electric vehicle alternatives where technically available.	10,422	21%	✓	✓		Reducing Pollution	£17.9m
Action 3: Modernising our generators	Using biofuels for our generation requirements and adopting hybrid generators where possible.	4,054	8%	✓	✓		Reducing Pollution	£0.2m

Action 4: Increasing the energy efficiency of our occupied buildings	A programme of work to increase the energy efficiency of our buildings.	788	2%	✓	✓		Responsible resourcing	No additional funding
Action 5: Improving energy efficiency at our substations	A programme to measure and reduce the energy used in our unoccupied substation buildings.	2,584	5%	✓	✓		Responsible resourcing	No additional funding
Action 6: Sulphur Hexafluoride (SF6)	A programme of efficient replacement and sharper operational response to reduce SF6 leaking to the atmosphere.	684	1%	✓	✓		N/A	£6.0m
Action 7: Supply chain and scope 3	Working with our supply chain to identify high impact activities and commit to a reduction in our scope 3 emissions.	N/A	N/A	✓	✓	✓	N/A	No additional funding
Action 8: Embodied Carbon	Embed embodied carbon tool into our business and commit to a percentage reduction over RIIO-ED2.	N/A	N/A	✓	✓	✓	N/A	No additional funding
Action 9: Carbon offsetting	Where it is not possible or efficient to reduce our own emissions, we will work with partners to reduce carbon outside our business footprint to achieve our Net Zero ambition.	N/A	N/A		✓		N/A	£0.7m
Action 10: Losses	A programme of efficient, CBA-justified actions to reduce losses where it delivers benefit to customers in the long-term.	N/A (see losses section below)	N/A	✓			N/A	£6.3m
Total		31,295[#]	62%[#]					£31.0m^{**}

Includes all direct actions amounting to 18,532 tCO₂e plus all remaining electricity purchased is REGO backed renewable contracts adding another 12,763 tCO₂e reduced.

**Note total does not match sum of rows due to rounding

11.1. Action 1: Setting our targets for decarbonisation

Decarbonisation

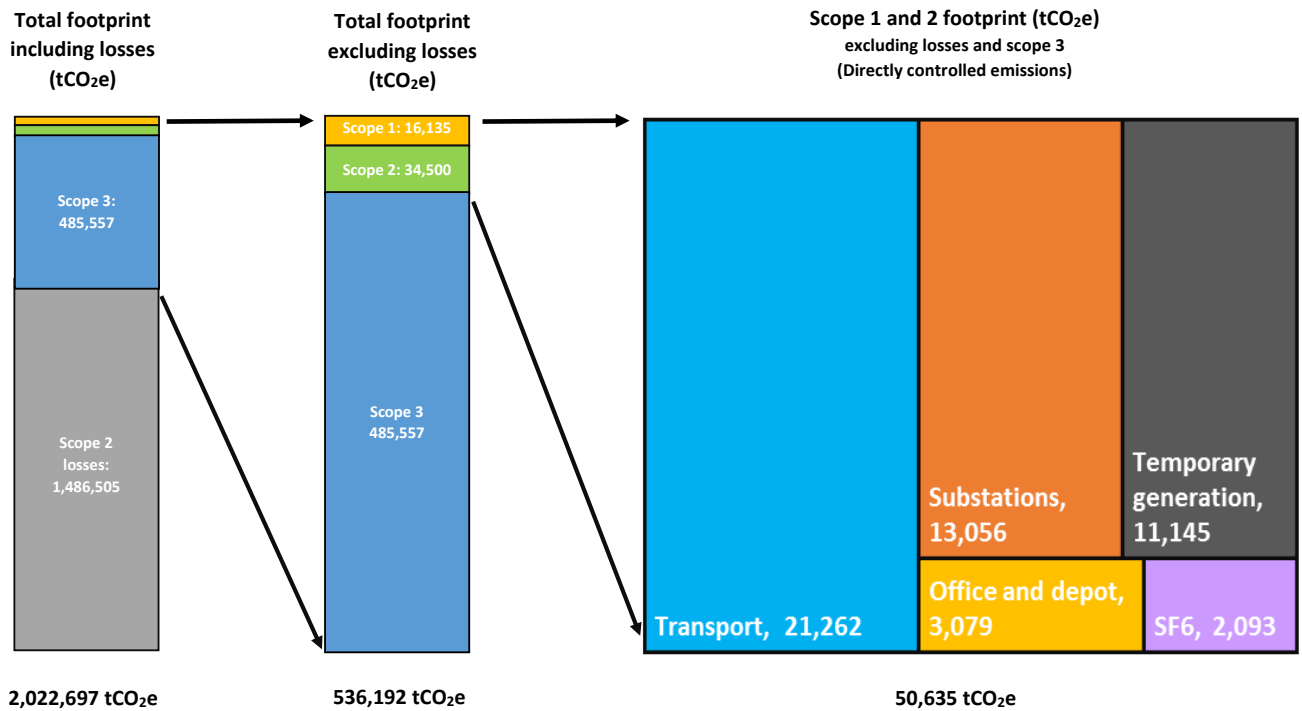
Setting a science-based target will ensure that our reduction in greenhouse gas emissions is based on a robust methodology and is in line with what is required globally to tackle climate change.

The consequences of climate change are significant and the need for action to mitigate these impacts is urgent. As a socially responsible business, we recognise the contribution we can make to the rest of society by minimising our environmental impact and supporting the path to decarbonisation. We also acknowledge that protecting the environment is a high priority for our customers and stakeholders.

In 2019, the Committee on Climate Change (CCC) recommended a target of “net zero” greenhouse gases by 2050, a target that has been adopted by the Government.

We have set an SBTi approved emissions reduction target in line with keeping global warming well-below 2°C. This applies to the full scope of our carbon footprint (scope 1, 2 and 3, including losses), the breakdown of which is illustrated below.

Figure 8: The make-up of our carbon footprint 2018/19



We have more direct control over our scope 1 and 2 emissions (excluding losses) and therefore we have set a more stretching target for reducing these emissions. We have identified actions that can reduce these controllable emissions that will exceed a target consistent with keeping global warming below 1.5°C without the use of offsets. Where we are unable to efficiently reduce our emissions in the RIIO-ED2 period with current solutions available, we are committing to work within our own business and with partners to deliver projects that offset our remaining scope 1 and 2 emissions (excluding losses) to achieve Net Zero by 2028. We will adopt the Oxford Principles for offsetting and work with reputable partners to ensure that these are high quality verified offsets. These offsets could have multiple stacked benefits as we will look at the full range of offsetting solutions to either avoid, remove or capture and destroy emissions (nature based solutions, community projects, energy efficiency, renewable generation and supply chain opportunities etc.).

Why is a science-based target for decarbonisation important?

The maximum increase in global average temperatures that is deemed the least damaging for our societies is well below 2°C (WB2D) and ideally no more than 1.5°C. At the Paris climate summit 196 countries agreed to this target and signed the accord, accepting the need to rapidly decarbonise their economies.

The Science Based Target Initiative (SBTi) was created with the express purpose of providing companies with a clearly defined path to reduce their emissions in line with these targets. Companies committing their targets to the SBTi will have to accurately benchmark their carbon footprint in line with the greenhouse gas protocols. They will also have to have emissions reduction targets that are in line with the Paris agreement trajectories and have near term target dates (8 to 15 years).

All submissions are independently verified by the SBTi and companies are required to publicly report their progress annually as well as re-validate their footprints every five years. A verified SBT is also a minimum requirement for our Environmental Action Plan in RIIO-ED2.

What did we achieve in RIIO-ED1?

We have seen a significant reduction in our carbon emissions of 30.9% at the end of 2020/21 which has surpassed the target we set ourselves at the beginning of RIIO-ED1 of 16%. Halfway through RIIO-ED1 we actually increased our target to 20%, as part of our Green Action Plan. Our actions in this area have helped with this steep decline but an important element has been the rapid decarbonisation of the grid. As a DNO we are a significant enabler of this and will continue to have a very important role to play going forward in facilitating Net Zero.

In light of this, we took early action and approached the Carbon Trust to assist us in accurately benchmarking our carbon footprint, setting targets that are compliant with the SBTi framework and then submitting them for verification. This required

over a year of assessment and scrutiny that was in some part assisted by our accreditation to the Carbon Trust Standard for carbon reduction.

Our Carbon emissions and the dominance of losses.

Under the Green House Gas (GHG) protocols carbon emissions are categorised into the three scopes shown below

- **Scope 1** emissions are directly under an organisation's control. For us, this is the fuel we use in our owned or hired vehicles and plant, any fuels combusted on site such as the gas we use to heat some of our buildings and also any gas leaks from our equipment such as SF6.
- **Scope 2** emissions result from the electricity we use, with the associated emissions occurring at the point of generation. Uniquely, under the GHG Protocol, DNOs' scope 2 emissions include network losses i.e. the recorded difference between the electricity entering our network and the electricity used across our network.
- **Scope 3** emissions are all other indirect emissions from sources we don't own or control, such as through business travel on public transport or in employees' own cars, the goods and services we procure, the emissions embodied in our waste and in our water use.

Including losses in our scope 2 emissions results in them making up 74% of our entire carbon footprint. We do have control over some elements associated with losses but a lot of factors are outside of our control. The biggest impact on carbon reduction with regards to losses is the way the electricity is generated in the first place. As the grid continues to decarbonise then the significance that losses play in carbon diminishes.

It is important that we do not lose sight of the areas where we have much greater control such as the decarbonisation of our fleet, buildings, heating, temporary generations and supply chain. Therefore, we have set much tougher and stretching targets for the emissions that we have greater control of, or influence over. These are also areas that have multiple benefits in terms of environmental impacts, costs and value to the customer.

Customer and stakeholder engagement

The majority of our customers and stakeholders view the environment as a high priority and have been unequivocal on the need to act in terms of decarbonisation.

As part of our phase 2b customer engagement, it was clear that the momentum and need for Net Zero is growing, and customers want our commitments to reflect this. The climate crisis felt like a priority for most age groups, and with COVID-19 illuminating how quickly countries can enforce change, the 2050 Net Zero target felt too far away for some. Across all groups, engagement with Net Zero was high, with most wanting the target to be achieved as soon as possible. For younger customers, dates that felt more appropriate ranged from 2025-2030. However, there was some scepticism about Net Zero being achieved. For some of the older generation, there was a disconnect between the targets and the feasibility of it.

As part of our quantitative phase 4 business options testing, we presented customers with three alternative options for decarbonisation, namely a science-based target for scope 1 and 2 emissions excluding losses in line with a maximum global temperature rise of:

- Option 1: 2°C (+£0.04 on annual bill).
- Option 2: 1.5°C (+0.11 on annual bill).
- Option 3: less than 1.5°C, noting that this may involve carbon offsetting (+£0.22 on annual bill).

The results showed us that customers want us to be ambitious in setting our decarbonisation goals and feel strongly about this. The most ambitious option (option 3: targeting a rise less than 1.5°C) was the most popular choice amongst both consumers and businesses being chosen by 39% of consumers and 48% of businesses. Not only was option 3 the most popular amongst consumers and businesses, but those who chose option 3 felt most passionately about it with high strength of preference scores of 7.9 and 8.2 for consumers and businesses respectively. Option 2 (targeting a rise of no more than 1.5°C) received a further 31% and 27% of votes from customers and businesses respectively. Customers we talked to as part of our qualitative engagement thought that option 3 provided excellent value for money. For some, seeing the prices raised the question why we would consider anything less ambitious than option 3.

As part of our co-creation stakeholder engagement, stakeholders were firmly in favour of ambitious science-based decarbonisation targets. They said that we should include our scope 3 emissions in the well-below 2°C trajectory and set a more ambitious 1.5°C trajectory for our directly

Customers believe that we should be ambitious in setting decarbonisation targets: the majority of customers believe that we should set an SBTi decarbonisation target in line with a rise of no more than 1.5°C. Of those customers, more favour targeting a rise of less than 1.5°C.

Key insight I-EAP13

Option 2 (targeting a rise of no more than 1.5°C) received

Stakeholders believe that we should implement more ambitious carbon reduction targets. These should be science-based and aligned to at least a well-below 2-degree trajectory, for all emissions, including scope 3.

Key insight I-EAP3

controllable emissions (scope 1 and 2 excluding losses). They agreed that this is an appropriate target given the direct control we have on this aspect of our business carbon footprint.

Understanding best practice

As part of RIIO2, transmission and gas distribution companies tended to focus their decarbonisation targets on scope 1 and 2 emissions (excluding shrinkage) with the magnitude of reductions over GD2 averaging around one third. Cadent led the way, targeting Net Zero by 2026. The 9 UK water and sewerage companies in England and Wales have unveiled a route map detailing how the sector will reach Net Zero emissions by 2030. This includes transitioning 100% of passenger vehicles to electric and 80% of commercial, heavy goods and large goods vehicles to alternative fuels. Globally, companies such as Google are already carbon neutral and have gone, or plan to become, carbon negative. Best performing companies:

- Set ambitious, science-based targets.
- Build a strong case for action to achieve company-wide buy-in.
- Understand the scale and nature of their scope 3 emissions.
- Collaborate: across departments within their business; throughout their supply chain and across their industry.
- Offset as a last resort, using carbon credits that are: real; measurable; permanent; additional (i.e. would not have otherwise been undertaken); independently verified; and unique.

Our plans for RIIO-ED2

During RIIO-ED2:

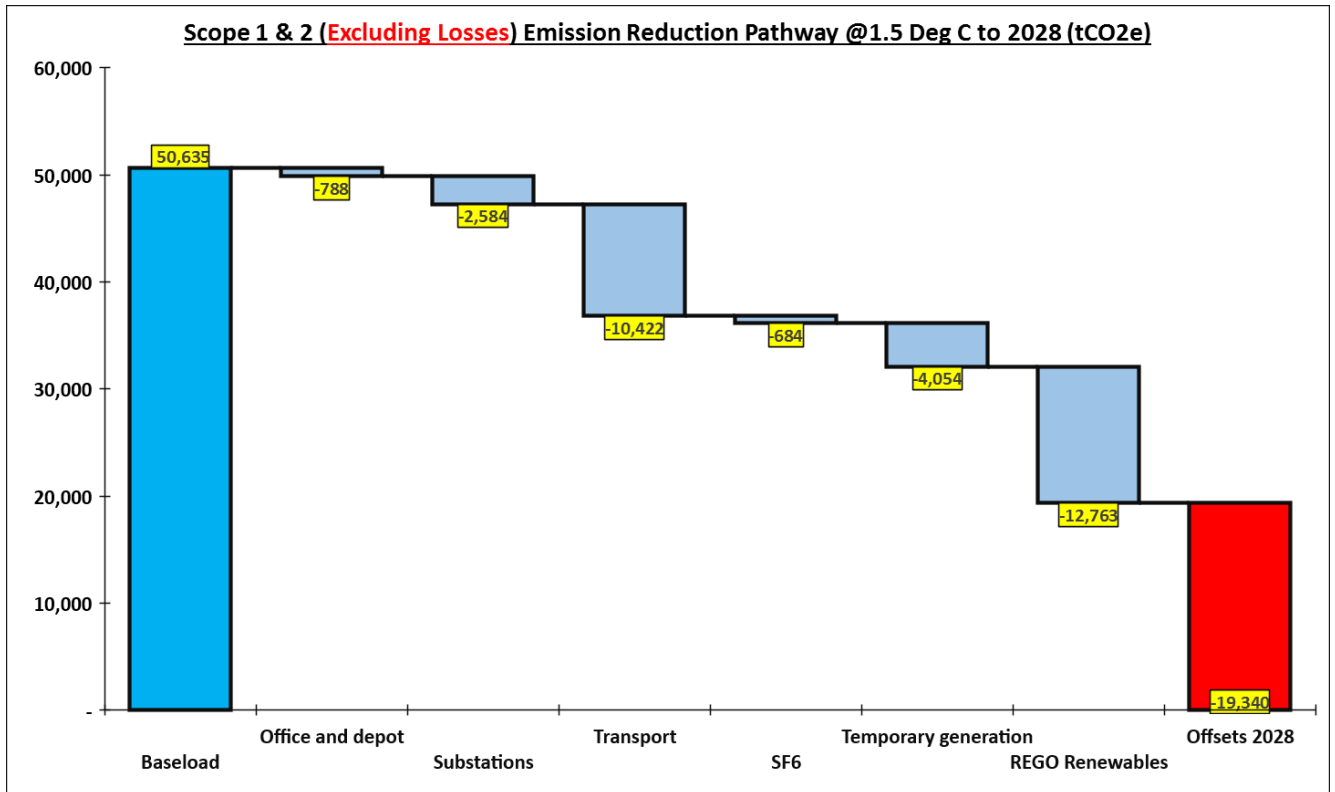
- **For our full carbon footprint, including losses and indirect scope 3 emissions, we will exceed our reduction target approved by the Science Based Target Initiative (SBTi) at Well below 2 °C. We will commit to the Business Ambition for 1.5°C SBTi campaign. We will report our progress through our Annual Environmental Report and update our targets in line with SBTi protocols.** The setting of an externally verified, science-based target reflects best practice. The level of ambition also reflects the fact that both our customers and stakeholders view the environment as a high priority and that it is important for us to set an example if we are to be credible in facilitating a just transition to Net Zero. Our stakeholders agree that this is an appropriate target given the direct control we have on this aspect of our business carbon footprint. Whilst the SBTi methodology does not require us to include scope 3 emissions in our overall target, we have done so to challenge ourselves. This would equate to a reduction of 2.5% of our total greenhouse gas emissions for every year in RIIO-ED2.
- **We will reduce our directly controllable emissions (scope 1 and 2, excluding losses) exceeding a 1.5°C reduction trajectory. We will report our progress through our Annual Environmental Report.** We do not want the dominance of losses in our total business carbon footprint to prevent us from setting ambitious targets for those direct emissions that we can control. Our customers and stakeholders recognise the need to address the climate crisis, and our need to set an example. Our business options testing confirmed this with customers opting for the most ambitious option of a pathway consistent with less than 1.5°C with some carbon offsetting used as a last resort. We have gone one step further, and are committing to reduce our scope 1 and 2 emissions excluding losses, consistent with a science-based target pathway of 1.5 °C, without any carbon offsetting. We will measure this with the rigour of an SBTi approved target.
- **We will offset any remaining residual scope 1 and 2 emissions (excluding losses) to achieve Net Zero by 2028 using high quality verified offsets. We will report our progress through our Annual Environmental Report.** Again, this reflects the urgency with which our customers and stakeholders view the climate crisis and their view that we should show leadership in this area. We will measure this with the rigour of an SBTi approved target and only purchase offsets as a last resort. This will allow customers to hold us fully to account during the RIIO-ED2 period.
- **As part of our verified Science Based Target, we will work with our suppliers to reduce our supply chain carbon emissions (scope 3) by 25% by 2028 compared to a 2018/19 baseline. We will report our progress through our Annual Environmental Report.** Our stakeholders and customers recognise the importance of seeking to address our scope 3 emissions i.e. those associated with our supply chain. Furthermore, our consideration of best practice has taught us the importance of understanding and measuring our scope 3 emissions and collaborating with suppliers to address them in partnership. We believe that 25% is a stretching, but realistic target, but we will keep this under review, consistent with our commitment to review our Environmental Action Plan annually.

The diagram below shows the result of our target setting approach for our scope 1 and 2 emissions excluding losses. We show clearly the split between how much of our target is:

- Already scoped.
- A stretch to be delivered by the development of additional initiatives, through innovation or through carbon off-sets as a last resort.

This demonstrates how we have balanced ambition with deliverability.

Figure 9: Illustration of our Net Zero target for our controllable emissions and contribution from initiatives described in sections below.



In the figure above, the emission reductions associated with office, depots and substations applies a location-based approach, which applies the grid average emission factor to our electricity consumption and therefore encourages us to reduce our electricity consumption, regardless of whether the electricity we purchase is renewable. However, as all of our electricity is REGO certified, the carbon footprint associated with this electricity usage would be zero regardless of our energy efficiency and therefore represents an important final consideration before an assessment of the need to purchase carbon offsets.

For our full carbon reduction target including losses, even if we undertake our most ambitious proposals, grid decarbonisation would account for 91% of this reduction with our actions contributing the remaining 9%.

In the sections that follow, we consider each of the business activity areas that contribute to our total business carbon footprint in turn, outlining the initiatives that we are planning in each area to help us to achieve these targets. The associated costs are detailed in the relevant sections where there is an associated funding request.

11.2. Action 2: Decarbonising our business transport

Summary – At a glance

Decarbonisation

Our transport accounts for 42% of our scope 1 and 2 emissions, excluding losses. Our actions will reduce this by 49% (10,422 tCO₂e) which is a 21% contribution to reaching our carbon reduction target.

Reduce Pollution

Our actions to decarbonise our business transport will reduce our total NO_x emissions by 25% overall.

Why is decarbonising our business transport important?

Our road vehicle fleet accounts for 42% of our direct carbon emissions, excluding losses. Our vehicles are used to respond to faults and carry out essential work very close to where our customers live and work. Therefore, reducing the emissions, especially those that contribute to air pollution, will improve our customers’ local environment and make a significant

contribution to achievement of our decarbonisation targets. Furthermore, decarbonising our fleet is a very visible part of our commitment to support the decarbonisation of the UK economy and sets an example for others, giving us credibility in our wider role to facilitate the transition to Net Zero.

What did we achieve in RIIO-ED1?

During the RIIO-ED1 period, we commissioned feasibility studies around EV adoption, introducing a small number of electric vans and associated depot charging as part of an initial trial of the technology on the fleet. This analysis confirmed that our fleet is ready to move beyond the trial phase to the introduction of electric vehicles. We have since carried out detailed modelling of our vehicle fleet, based on in-vehicle tracker data, to assess electric vehicle capability against our operational patterns and the manufacturers' expected roll outs of new vehicles.

We are the first DNO to integrate smart meters into the digital customer journey so that customers reporting a power cut online have their smart meter checked automatically, without needing to call us or wait for an engineer's visit. We avoided 713 unnecessary customer visits, and their associated emissions, in the first four months of 2020/21 alone.

Customer and stakeholder engagement

As stated above, our fleet represents a major component of our direct carbon emissions, excluding losses. As such, given our customers' prioritisation of the environment, decarbonising our fleet is a necessary part of reflecting our customers' priorities.

Our stakeholders also recognise the need for fleet electrification; at the 3 November 2020 Sustainability Critical Friends Panel, it was noted that the fleet is public facing and needs to reflect our environmental ambitions. It was agreed that chargers should be provided for employees and that cars and small vans should be electric and larger vans may use alternative fuels or LPG / hydrogen. As part of our stakeholder co-creation work in November and December 2020, it was noted that the main barrier to an EV fleet relates to enabling employees to charge vehicles at home. It was agreed that the associated infrastructure and behavioural changes required pose the greatest challenge. It was noted that potential parasitic loads on the battery given the complex need for battery power in our vans should be a critical consideration when looking at the suitability of EVs.

Stakeholders are in favour of fleet electrification, but highlight delivery risks associated with EV fleet roll out given uncertainties regarding infrastructure, behavioural change and the ability to purchase appropriate larger EVs.

Key insight I-EAP6

Understanding best practice

A wide range of vehicle fleet operators have set ambitious targets to convert their fleets to zero or ultra-low emissions (carbon and NOx). For example:

- Severn Trent Water have committed to converting their fleet of 2,000 vehicles to electric by 2030.
- Tesco aims to convert its fleet of 5,500 vans to electric, installing charging at its 600 stores by 2030.
- NGN have committed to at least 50% of their commercial vehicle fleet being ultra-low emission or hybrid by 2026.

The full uptake of EV variants to our fleet will depend on the availability and suitability of vehicles capable of operating with large loads, and in poor weather conditions. Nonetheless, our ambition to replace the majority of our fleet with EVs during the RIIO-ED2 period puts us on track to emulate these leading organisations.

Options analysis

As set out in more detail in our Investment Justification Paper (IJP) (ED2-IJP-05-Fleet), as part of developing our plans for RIIO-ED2, alternative options were worked up for the initiatives under consideration to guide our strategy development. The options considered for electrification of our fleet are provided below in Table 4.

Table 4: Options considered for decarbonising our fleet

	Option 1: Market based	Option 2: 45% minimum carbon target	Option 3: Maximum available
Activity description	This option continues with a majority ICE fleet alongside a growing car and category B vehicle EV fleet where the whole life cost, range and use profile allows replacement without significantly affecting operations.	This option is based on meeting an emission target of a 45% reduction in scope 1 and 2 emissions by 2028. Significant operational changes are required to meet the increased penetration of EVs.	This option replaces all vehicles with an EV equivalent when the existing ICE reaches the 7 year lifetime and includes operational changes. This option identifies that maximum that could be achieved with current technology and known EV availability.

	Option 1: Market based	Option 2: 45% minimum carbon target	Option 3: Maximum available
Costs	£5.76 million	£13.52 million	£17.89 million
Benefits	13% emissions reduction by the end of RIIO-ED2.	26% emissions reduction by the end of RIIO-ED2.	49% emissions reduction by the end of RIIO-ED2.

Our plans for RIIO-ED2

Following consideration of the options above, we have selected the more ambitious option 3 to achieve the maximum possible decarbonisation and air quality benefits, consistent with the strong customer views expressed on these subjects.

During RIIO-ED2, we will adopt the maximum available number of EVs operationally possible with current technology when the retiring Internal Combustion Engine (ICE) vehicle reaches the end of its 7-year lifespan such that the EV penetration of our fleet will be at least 60% by the end of the RIIO-ED2 period. This will result in a 49% reduction in our fleet carbon emissions by the end of RIIO-ED2, and 25% reduction in NOx emissions. Additional, non-quantifiable, benefits include leading by example to facilitate the wider transition to Net Zero and seeding the second-hand market for EVs.

This will begin with the transition of our cars and smaller vans. Present vehicle availability and capability does not allow a full fleet transition as c. 790 of our fleet vehicles are specialist vehicles such as 4x4s, large plant and vehicles modified to carry specialist equipment with associated additional power demands.

We have set our target at this level through a bottom-up modelling of our entire fleet using assumptions and forecasts for what low-emission vehicle models will be available to us throughout the RIIO-ED2 period. It is important to us that we set ourselves an achievable target when requesting funding to deliver outcomes for our customers and we have balanced this with our ambition to decarbonise our operations. We will keep this stretching, but realistic target, under annual review, consistent with our commitment to review our Environmental Action Plan and anticipate that a target for fleet emissions may be included in Ofgem's specification for the balanced scorecard financial incentive on the environment, which we discuss further in Annex 2.

Regional aspects of our RIIO-ED2 plans

When deploying electric vehicles within our fleet, we will be cognisant of the impact of fleet usage patterns and location on their environmental impact. As such, we will seek to deploy EVs in areas of high population density in order to maximise the air quality benefits.

We therefore anticipate accelerated EV deployment in our LPN region.

Table 5:

	2023/24	2024/25	2025/26	2026/27	2027/28	RIIO-ED2
EV purchased	373	120	212	205	93	1003
Cost (£m)	4.4	2.1	4.2	3.2	1.6	15.5

We estimate that the cost of achieving this goal (over and above our baseline option) will be £15.5m, as shown in the table above, plus a further £2.5m for fast charging infrastructure – a total of £17.9m (Note total does not match sum of parts due to rounding). This includes the cost of installing the necessary depot and home charging points. Low carbon vehicle technology continues to develop at a rapid pace and we expect this to continue throughout the RIIO-ED2 period. This will mean improvements to vehicle categories currently available including extended range allowing us to deploy to roles with higher mileage. It will also mean that more categories of vehicle and vehicles that run on alternative low carbon fuels such as HVO, LPG or hydrogen are likely to become commercially available.

At a high level, the risks associated with achieving this goal are:

- Vehicle availability – can manufacturers, particularly battery manufacturers, meet market demand?
- Workforce acceptance – associated changes to working practices will require workforce engagement.
- Vehicle suitability in practice – are EVs capable of operating with large loads and in poor weather conditions without reducing service effectiveness?
- Charging infrastructure review – the selection of suitable sites for en-route charging is in progress and necessitates grid reinforcement.

We will also continue to work to reduce unnecessary customer visits, leveraging smart meters into the digital customer journey so that customers reporting a power cut online have their smart meter checked automatically, without needing to call us or wait for an engineer's visit.

Further details of these risks, and our proposals to mitigate them, are provided in the associated Investment Justification Paper (ED2-IJP-05-Fleet) along with more detail on how we have quantified the costs involved and developed our plan following the consideration of alternative options.

11.3. Action 3: Modernising our generators

Summary – At a glance

Decarbonisation

Our generators account for 22% of our scope 1 and 2 emissions (excluding losses). Our actions will reduce this by 36% (4,054 tCO₂e) which is an 8% contribution to our carbon reduction target.

Reduce Pollution

Our actions will reduce our total NO_x emissions by 8% overall.

Mobile diesel generators are essential to maintaining the integrity of supply to our customers and are used during planned works or in storm damage emergencies when power supply could be interrupted to households and business. The deployment of these generators varies considerably depending on how severe the storm season is, impacting on fuel consumption year to year.

Why is modernising our generators important?

Mobile generators for temporary supply are a flexible solution and easily deployed but have the disadvantage of being fuelled by diesel. Burning diesel impacts on air quality as it produces oxides of nitrogen (NO_x) and particulate matter (PMs) and is a high emitter of carbon dioxide. Generators also have the disadvantage of causing nuisance through noise which, even though they are shrouded, can be more noticeable at night.

What did we achieve in RIIO-ED1?

During RIIO-ED1, we have sought to reduce the emissions from mobile generators by reducing the need for generators in the first place; reducing the number of interruptions and re-instating interrupted supplies as quickly as possible.

We have engaged directly with our supply chain to seek alternative cleaner, but palm oil free, fuels that could be deployed into the hired generator fleet, such as Hydrotreated Vegetable Oils (HVOs) which are manufactured from waste vegetable oils and animal fats. We have also engaged with our suppliers regarding hybrid options for generators that use battery technology.

Cleaner engines innovation project

We have initiated a trial of new hybrid generators that have never been deployed before to assess safe storage, handling and the impact on efficiency, reliability, carbon and NO_x emissions. This includes:

- converting two 6kW diesel powered generators into a 10kVA hybrid running on biofuel; and
- designing and operating two LPG hybrid generators and two three phase glycerine fuelled generators.

The six hybrid generators were commissioned in Summer 2021 and deployed in our SPN region. We will compare and contrast the performance, efficiency, reliability, customers responses, CO₂ and NO_x emissions to help us to make the right decisions for generator deployment during the RIIO-ED2 period. The project will also develop the storage and handling procedures for large volumes of these alternative fuels. These procedures will be demonstrated in a depot hosting the alternative fuelled hybrid generators.

Customer and stakeholder engagement

Whilst we have not engaged extensively with our customers or stakeholders specifically on reducing the emissions from our generators, as a significant component of our controllable business carbon footprint, it is one of the main ways we can achieve the level of ambition on carbon that customers and stakeholders value, as outlined above. It is also notable that customers have stressed the importance of us “leading by example” and “practising what we preach” with regards to our role in facilitating the transition to Net Zero. This aligns with improving air quality and the support we received on the sustainable business themes from both domestic and business customers, as part of our phase 4 business options testing, and from stakeholders, as part of our co-creation work.

Understanding best practice

Companies such as National Grid, Thames Water and Mace have been actively trialling cleaner fuelled generators and hybrids with the latter committing to hydrogen powered non-mobile generators for its construction sites as part of its commitment to Net Zero by 2030. We are also conducting our own trials as outlined above. We will keep generator innovations under review so that we can continue to challenge ourselves to further reduce our generator emissions.

Our plans for RIIO-ED2

We will, subject to supply constrictions and regulation, introduce HVO fuels to our generator fleet covering a minimum of 45% and a maximum of 95% of our generators (dependent on fuel availability). HVO reduces carbon emissions by 94% and NOx reductions range from 7 to 30% depending on application. However, we may face constraints in terms of our, and our contractors', ability to source sufficient volumes of fuel in an ethical, environmentally sustainable manner. Nonetheless, irrespective of such constraints, we are unwavering in our commitment to meet our high-level decarbonisation and air quality commitments.

We will also explore the possibility of introducing hybrids to our fleet, initially on the smallest generators (30-40 kW) which would account for 10% of hires, as well as introducing additional battery technology and cleaner fuels as they come to market.

We believe that a target for generator emissions should be included in Ofgem's specification for the balanced scorecard financial incentive on the environment, which we discuss further in Annex 2.

Costs and Benefits

Through discussions with our suppliers, we have established the near term availability of lower emission alternatives for the types of generators we hire from them. We have included the incremental cost of hiring these alternatives, where available, in our baseline cost forecast: we are requesting £0.2m of ex ante funding. We will continue to strive to find new and innovative ways of reducing our generator emissions as technology evolves and we will review our plans annually as part of our annual Environmental Action Plan review.

11.4. Action 4: Increasing the energy efficiency of our occupied buildings

Summary – At a glance

Decarbonisation

Occupied buildings emissions account for 6% of scope 1 and 2 emissions (excluding losses). Our actions will reduce this by 26% (788 tCO₂e) which is a 2% contribution to our carbon reduction target.

In order to lead by example and establish a sustainable way of working, we plan to drive energy efficiency across our building portfolio. We will look to rationalise our estate to determine what sites we need to release, refurbish or upgrade as a starting point. Actions will then focus on building management controls, plant upgrades and building fabric and insulation. All lighting replacement and upgrades will be LED as standard with occupancy sensors and dusk to dawn sensors for external lights.

We have compared our top consuming six sites against the Better Building Partnership benchmark for office estates. This ranks typical practice as 258 kWh per metre squared of floor space and 189 kWh as good practice in terms of energy consumption. At the moment, three sites are below good practice, with three exceeding typical practice. The target will achieve kWh/m² intensity ratios in line with the Better Building Partnership benchmarks for offices and drive down energy consumption by 26%.

In addition, we commit to continue purchasing renewable energy for all our electricity supplies that is Renewable Energy Guarantee Origin certified (REGO) as well as green gas. While this means our electricity is zero emissions, this does not dilute our ambition to achieve greater energy efficiency as outlined above. We have also identified several sites where it is feasible to install solar PV to generate our own power and further reduce our energy demand from the grid.

Why is increasing the energy efficiency of our occupied buildings important?

Our built environment consists of the occupied offices and depots and our unoccupied sites which are predominantly Grid and Primary transformer stations (covered in their own section below). The occupied sites' contribution to our scope 1 and 2 emissions (excluding losses) is 6.1%. Overall, it accounts for the scope 2 element of purchased electricity with some gas used for heating in relatively few buildings. Seven buildings account for two thirds of our occupied sites' energy consumption.

Regional aspects of our RIIO-ED2 plans

When deploying HVO or hybrid generators, we will be cognisant of their environmental impact. As such, we will seek to deploy low emission generators in areas of high population density in order to maximise the air quality benefits.

However, given our proposed focus on generator hires, the majority of generator hires are in our SPN and EPN regions, and so these areas would be the primary focus of our emissions mitigation measures. In the LPN region, we are looking at the cost of purchasing hybrid generators.

In this report, we have chosen to present our carbon footprint for our scope 2, occupied buildings emissions using a location-based approach and track our progress towards our science-based targets on this basis. This, location-based approach, requires us to apply the grid average emission factor to our electricity consumption and therefore encourages us to reduce our electricity consumption, regardless of whether the electricity we purchase is renewable. The alternative, market-based approach, would reflect the emissions from the electricity that we purchase and, as all of our electricity is REGO certified, the carbon footprint associated with this electricity usage would be zero regardless of our energy efficiency. We believe that it is important for us to set an example with regards to energy efficiency and such energy efficiency initiatives should sit alongside a commitment to purchase renewable energy.

However, our REGO certified electricity and green gas purchases do help us towards achievement of our aspiration to be a Net Zero company, and therefore represent an important final consideration before an assessment of the need to purchase carbon offsets.

What did we achieve in RIIO-ED1?

In 2019, as part of our Green Action Plan, we identified that six of our occupied sites account for more than 60% of the energy consumption for all our occupied sites. We targeted a 10% reduction in energy at these sites by the end of 2021 and we are on course to achieve this. This has been achieved through initiatives to rationalise our estate and upgraded lighting and plant, including:

- £2m refurbishment of the Cambria building to upgrade the building fabric (windows, insulation) and heating and ventilation improving it from an EPC rating of E to a rating of B.
- Purchasing Energy and Pacific House in 2018 for 300 staff, upgrading to LED lighting, improving lift efficiency, and refurbishing the revolving doors to reduce heat loss.
- Moving 300 staff to a new site in 2020 with an EPC rating of A, Solar PV, Building Management systems and Electric Vehicle charging points, allowing us to vacate two less-efficient sites.
- Insourcing parts of our Facilities Management service to gain better visibility and more control over environmental issues in the workplace.
- Switching all of our purchased electricity to a renewable tariff.

Customer and stakeholder engagement

Whilst we have not engaged extensively with our customers or stakeholders specifically on increasing the energy efficiency of our occupied buildings, as a significant component of our controllable business carbon footprint, it is one of the main ways we can achieve the level of ambition on carbon that customers and stakeholders value, as outlined above. It is also notable that customers have stressed the importance of us “leading by example” and “practising what we preach” with regards to our role in facilitating the transition to Net Zero.

Understanding best practice

We have considered how other organisations have improved the energy efficiency of their building stock. In doing so, we have noted that, as well as reducing the firm’s environmental impact, energy efficiency measures can also lead to cost savings. For example, at the Department of Energy and Climate Change, the introduction of LED lighting facilitated a nearly 30% reduction in electricity use in their Whitehall Place offices. The c. £400k project produced annual energy savings of 183,596 kWh, annual Carbon savings of 96 t/CO₂ and annual cost savings of c. £22k.

Companies such as Ikea have switched the focus away from energy consumption to energy production. In 2017, they generated the equivalent of 73% of their energy use from renewable sources; they have 750,000 solar panels on their stores worldwide and have committed to owning and operating almost 450 wind turbines.

We have worked in partnership with the Carbon Trust to understand how we might reduce our carbon emissions by improving the energy efficiency of our occupied buildings. They explain⁷ that understanding building stock and engaging with building users can highlight low-cost options to reduce demand on energy systems. For example, engagement with building users may identify sources of discomfort, enable optimised use of natural and artificial lighting, and assist in reducing the quantity of energy-using equipment.

Our plans for RIIO-ED2

We are targeting a 20% reduction in energy consumption at our occupied sites by:

- Reviewing our office space requirements.
- Implementing web-enabled Building Management Systems at the top seven sites.

⁷ <https://prod-drupal-files.storage.googleapis.com/documents/resource/restricted/Office%20based%20companies%20guide%20-%20GBF.pdf>

- Improving insulation at the top seven sites.
- Installing 100% LED lighting and absence detection at all occupied sites (internal and external).
- Upgrading plant at the top seven sites plus 25% of next 8 sites and remove gas where present.
- Replacing diesel generators at all occupied sites with more eco-friendly type.

We also reviewed seven sites for their potential for onsite generation from Photovoltaic (PV) systems. For each site there were site specific issues that would need resolving such as roof access, loading on roof (wind and PV) as well as long term considerations (longevity of site/occupation). In addition, we need to consider PV with reference to other actions such as plant and building fabric upgrades, which may be a better option in terms of cost per tonne of carbon abated. Initial surveys and desk top assessments suggested that the total capacity of the PV systems across seven sites would equate to an 811 kW peak, generating approximately 723,800 kWh, saving 168 tonnes of carbon per annum, at an installation cost of £770,000.

We also commit to purchase 100% of our electricity needs through renewable (REGO backed) contracts and to purchase green gas to satisfy our gas needs throughout the RIIO-ED2 period.

The cost of these initiatives will be part of our business as usual costs, and therefore we are not requesting specific funding during RIIO-ED2.

We believe that our plan strikes an appropriate balance between protecting customers and the environment and is deliverable. We believe that this is a stretching, but realistic target, but we will keep this under review, consistent with our commitment to review our Environmental Action Plan annually.

11.5. Action 5: Improving energy efficiency at our substations

Summary – At a glance

Decarbonisation

Substation electricity emissions account for 26% of scope 1 and 2 emissions (excluding losses). Our actions will reduce these emissions by 20% (2,584 tCO_{2e}) which is a 5% contribution to our 1.5 Degree target

Energy consumption at our substations represents 80% of our total energy consumption from the grid and is a significant contributor to our carbon emissions. In 2018/19 the energy consumed was 46,123,685 kWh which is the equivalent to 10,982 medium UK homes (Profile 2 type meters). Of this total, 83% is classed as unmetered supply (UMS) meaning this volume of electricity consumed is estimated without reference to any reads. The volume of supply at UMS is estimated using a methodology that was agreed and developed in 2011. This UMS sits predominantly in the SPN and EPN areas of our network.

Why is improving metering and energy consumption at substations important?

Unmetered supplies are classed as non-technical losses and nationally contribute approximately 3.7% to network losses. Unmetered supplies are an historical anomaly from the days of national ownership of the network and represent a significant opportunity for improved accuracy of data which will benefit losses calculations and our own energy monitoring and targeting.

Our substations contain a number of items of plant used to run the sites to ensure equipment runs effectively and to provide welfare to staff. These items range from lighting, de-humidifiers, electric heaters, sump pumps, water heaters, CCTV, fans, ventilation and chillers. Improved metering will not only improve our data accuracy but enable us to identify poor performing sites through energy monitoring and targeting. You cannot manage what you cannot measure.

What did we achieve in RIIO-ED1?

During RIIO-ED1, we reviewed our design standards and amended them to ensure that all new substations and upgrades would have, as a minimum, a meter for the billed supply and, where relevant, a smart meter. We also carried out modelling of our supplies for the metered and unmetered sites to determine what the actual consumption was and how this compared to the fixed/estimated assumptions for the unmetered supplies. This included assessing the energy consumption from the various items of plant and controls at these sites to build a more reliable picture of actual consumption.

We also ensured that all supplies for substations, whether UMS or metered, were on a green zero carbon tariff.

Customer and stakeholder engagement

Whilst we have not engaged extensively with our customers or stakeholders specifically on increasing the energy efficiency of our substations, as a significant component of our controllable business carbon footprint, it is one of the main ways we can achieve the level of ambition on carbon that customers and stakeholders value, as outlined above. It is also notable that customers have stressed the importance of us “leading by example” and “practising what we preach” with regards to our role in facilitating the transition to Net Zero.

Our plans for RIIO-ED2

Prior to RIIO-ED2 we will complete the survey and assessments for the meter modelling and then:

1. Meter 10% to 20% of the UMS in RIIO-ED1 to assess performance and check assumptions.
2. Based on the outcome of (ii) we will then meter up to 100% of the UMS.
3. Implement Monitoring and Targeting (M&T) on the metered supplies.
4. Implement efficiency measures where M&T analysis indicates it is necessary.
5. Ensure all supplies remain on zero carbon REGO backed renewable tariffs.

We are not immediately proposing to meter all UMS because there are some circumstances where this would not necessarily deliver proportional benefit. For example:

- Where the load is of a predictable nature.
- The cost of metering is significantly higher than the load and the benefits that are delivered.
- If there are technical difficulties in providing a meter.

With metering and monitoring and targeting, we will be better able to identify failed equipment (thermostats, lighting controls, timers for fans etc.) that result in wasted energy consumption. We will also be able to model plant improvements and better determine the savings and paybacks that can be achieved.

Costs and Benefits

The estimated cost for implementing a full metering system across the UMS would be in the region of £1.75m with an annual uplift in costs of approximately £100k for metering charges. We estimate that the annual savings could be as high as £1.8m resulting from being charged for the energy we consume and not the estimated volumes.

These actions will reduce our electricity consumption, help reduce non-technical losses on the network and contribute a 5% to our target for scope 1 and 2 emissions, excluding losses.

11.6. Action 6: Sulphur Hexafluoride (SF6)

Summary – At a glance

Decarbonisation

Carbon equivalent SF6 emissions account for 4% of scope 1 and 2 emissions (excluding losses). Our actions will reduce leakage to 0.1% of the installed bank of SF6 by the end of RIIO-ED2, a reduction of 9% against current performance.

During the RIIO-ED2 period, we plan to install SF6-free switchgear for our highest voltage installations where viable alternatives exist. We will also continue to explore alternatives for lower voltages and will adopt these where possible. These measures, in addition to improving our response to leaks that are detected, means we will aim to make sure no more than 0.1% of SF6 on our network leaks to the atmosphere by the end of the RIIO-ED2 period, which is a 1% contribution towards our carbon reduction target at the current bank.

Why is reducing SF6 emissions important?

Sulphur hexafluoride (SF6) is a colourless, odourless, non-toxic, non-flammable gas. We deploy it in circuit breakers and switchgear to quench arcs and stop short-circuits. It is an excellent electrical insulator and very effective at stopping short circuits in medium and high voltage equipment. SF6 was introduced to replace oil-filled circuit breakers that contained polychlorinated biphenyls (PCBs), which are harmful and bio accumulate in the food chain. However, SF6 is a long-lived, potent greenhouse gas which is 22,800 times more warming than carbon dioxide. It makes up 4% of our scope 1 and 2 emissions, excluding losses.

What did we achieve in RIIO-ED1?

We are committed to minimising any adverse impact of our operational activities on the environment. As a result, we committed to an SF6 maximum emissions target of 0.2% of SF6 in service during RIIO-ED1 and have consistently managed leaks below this level.

In order to accomplish this goal, a combination of leak monitoring, detection and interventions to eliminate the leak have been implemented. These interventions have taken the form of leak repairs, equipment refurbishment or equipment replacement as required.

Looking forward, our strategy will include phasing out SF6 insulated equipment on our network. To achieve this, we have been working with manufacturers to develop alternatives and identify assets replacement schemes to install this industry leading technology. These developments bring us closer to all new equipment going into the network being SF6-free which is a key pillar of our strategy for reducing the impact of SF6 from our network. In RIIO-ED1 we are already planning or delivering three such schemes:

- **Brimsgate** – we have commenced the installation of 2 new 132kV circuit breakers using an SF6 alternative.
- **Lewes** - we are planning the installation of 3 new 132kV circuit breakers using an SF6 alternative.
- **Hastings** - we have commenced the installation of 9 new 132kV circuit breakers using an SF6 alternative.

Customer and stakeholder engagement

While we do not have any specific customer feedback on SF6 emissions, as a potent greenhouse gas, emission reductions play a key part in realising our science-based targets to mitigate climate change. As we outlined earlier in this document, the importance of the environment, and specifically achieving Net Zero, is recognised by customers and stakeholders alike.

Our plans for RIIO-ED2

During RIIO-ED2, we will implement our strategy to efficiently reduce leakage and manage our overall SF6 asset base, in line with our Net Zero targets to achieve a reduction in SF6 leakage, by:

1. Continuing with our focused and effective operational response

- Improving our leak detection, monitoring and management for major assets.
- Improving the speed of leak repair implementation.

2. Installing no new SF6 gear on the network at 132kV and EHV voltages

- SF6 free alternatives are available from manufacturers for equipment that operates at the higher voltages on our network.
- We have already starting installing this equipment on our network as described above.
- In RIIO-ED2, we will use these alternatives so that we do not have to install any new SF6 insulated equipment on the network operating above 20KV.
- As a tangible expression of our commitment, we plan to invest approximately £6m extra to allow us to slow down the rate of increase of our SF6 bank in RIIO-ED2 and reduce the risk of SF6 emissions. The expenditure per licence area will be £1.26m, £4.37m and £0.36m in EPN, LPN and SPN respectively across a total of 12 schemes involving the installation of 108 pieces of SF6 free equipment.

3. Supporting equipment manufacturer efforts to develop acceptable solutions at lower voltages with a view to installation when commercially available.

- There is currently no reliable, safe alternative to SF6 insulated equipment for the lower voltages we operate on our network that is available at scale.
- We will continue our support of the equipment manufacturers to develop these alternatives and bring them to market at scale with a view to having reliable alternatives which will mean we can stop installing SF6 insulated equipment on the network.
- We will update on our progress towards this goal and its impact on our programmes of work through our annual review of our Environmental Action Plan.

Ultimately, these measures are designed to reduce the amount of SF6 that leaks to the atmosphere as we manage our asset base in the future. We are targeting an improvement in our current industry-leading performance to ensure that, by the end of the RIIO-ED2 period, no more than 0.1% of the SF6 contained in our assets will leak into the atmosphere; a reduction of 9%. As we move toward this goal by the end of the period, we will ramp our target down from 0.15% which will maintain our industry leading performance. The costs of replacing equipment we detect is leaking are included in our baseline forecast. The additional cost of installing SF6-free equipment at higher voltages is also included in our baseline forecast and covered in Appendix 10a: Non load overarching investment framework.

We believe that this strikes an appropriate balance between protecting customers and the environment, and what is deliverable. We do not currently expect our SF6 emissions to form part of the environmental balanced scorecard incentive, given Ofgem's stated position that financial incentive to manage leakage would be disproportionate.

To track our progress, we will report on our total SF6 bank and leakage reduction rates using a common DNO methodology.

11.7. Action 7: Supply chain and scope 3

Summary – At a glance

Decarbonisation

Scope 3 emissions account for 84% of our carbon footprint (excluding losses) and 24% with losses included. Our Well Below 2 Degree target for all scopes including losses will see a 25% reduction in Scope 3 emissions (121,389 tCO₂e).

Under the Science Based Targets Initiative (SBTi) participants can choose to exclude scope 3 emissions if they represent less than 40% of the organisation’s overall carbon footprint. Our scope 3 emissions make up 24% of our entire footprint.

When selecting targets for scope 3 emissions under the SBTi rules, organisations can opt for a 2 degree target which equates to a 12% reduction, a Well Below 2 Degree (WB2D) target, which is 25% or a 1.5 degree target, which is 42%.

The greater target flexibility around scope 3 emissions is in recognition of the fact that the data is harder to come by, relying on a greater volume of proxy data such as financial spend figures. It also recognises that organisations will not always have a directly controlling influence over some parts of the supply chain.

Why are scope 3 emissions important?

For the vast majority of organisations, their scope 3 emissions are by the far the largest proportion of their footprint. If network losses were excluded from our footprint, then scope 3 emissions would equate to 84% of our total footprint. As a result, we do not believe that it is credible to exclude scope 3 emissions from our SBT.

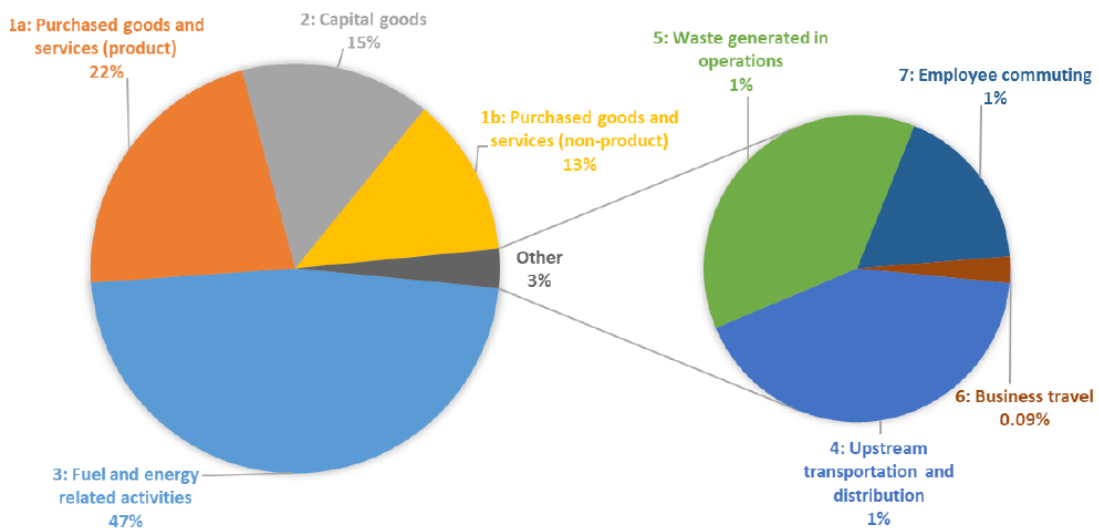
Addressing scope 3 emissions has wider benefits as there are links with ethical concerns around conflict minerals, labour and human rights. Importantly, it is also entwined with biodiversity impacts, embodied carbon and circular economy principles. Circular economy principles have a very significant influence on scope 3 emissions and embodied carbon and vice versa as outlined in Action 11.

What did we achieve in RIIO-ED1?

Scope 3 Benchmarking

During RIIO-ED1, we worked with the Carbon Trust to benchmark our scope 3 emissions and understand carbon hotspots.

Figure 10: Breakdown of UK Power Networks’ Scope 3 Emissions (with losses) by Category



Of the more than one thousand vendors included in the assessment, 30 accounted for 50% of our emissions by spend. The detailed analysis provided by this benchmarking will enable us to focus our efforts where we can have the biggest impact and to target the most material suppliers first.

Supply chain and procurement initiatives

During RIIO-ED1, our procurement team achieved the Chartered Institute of Procurement and Supply (CIPS) ethical standard. We have also externally benchmarked ourselves and achieved a CIPS Platinum award.

We established a tender document “Working with UK Power Networks” so that our suppliers can understand the environment and social standards that they should adhere to, and we developed sustainability questions to be incorporated into relevant tenders. We also communicated our Green Action Plan to critical suppliers to start the journey to achieving Net Zero.

We have sought pricing and tender offerings for sustainable alternatives within relevant tenders, we:

- Reduced emissions from our stationery supplier by 11% by optimising deliveries.
- Changed the packaging for our power tools from plastic cases to cardboard boxes.
- Moved to recycled plastic water bottles.

In addition, we facilitated a number of environmental initiatives across the business, we:

- Procured our first set of electric vehicles (EVs) including installation of EV chargers.
- Procured sustainability analysis of our estates.
- Replaced our two-stroke petrol power chainsaws which emit 299 times the pollutants of a pickup truck with battery equivalents.
- Moved to 100% renewable electricity supply contracts.

Customer and stakeholder engagement

Whilst we have not engaged extensively with our customers specifically on our scope 3 emissions, as a significant component of our carbon footprint, it is one of the main ways we can achieve the level of ambition on carbon that customers and stakeholders value, as outlined above. It is also notable that customers have stressed the importance of us “leading by example” and “practising what we preach” with regards to our role in facilitating the transition to Net Zero.

For our stakeholders, their strong support for decarbonisation means that excluding our scope 3 emissions is not an option. Our subject matter expert stakeholders were also of the opinion that the interdependent nature of these emissions with the wider sustainable business objectives require any organisation to adequately address their scope 3 emissions. The specific supply chain representatives we engaged with as part of our stakeholder co-creation work, noted that partnership working was essential to achieve common decarbonisation goals, as well as a clear supplier code of conduct to ensure that companies’ values are aligned.

Stakeholders support a focus on, and engagement with, suppliers to address the environmental impact of our procurement and suppliers.

Key insight I-EAP10

Understanding best practice

We have considered the practices employed by companies in related and unrelated sectors both at home and internationally in order to understand best practice. For example, we note that Apple conducts energy audits and trains suppliers to uncover opportunities for energy efficiency and have created a fund to reduce the investment barrier for suppliers.

Best performing companies:

- Understand the scale and nature of their scope 3 emissions.
- Build a strong case for action so that the objective has company-wide buy-in.
- Collaborate: across departments within their business; throughout their supply chain and across their industry.

Options analysis

As part of developing our plans for RIIO-ED2, alternative options were worked up for the initiatives under consideration to guide our strategy development. The options considered for managing our supply chain emissions are provided below in Table 6.

Table 6: Options considered for managing our supply chain emissions

	Option 1	Option 2	Option 3
Activity description	<ul style="list-style-type: none"> • Code of practice developed • Procurement policy aligned with sustainability targets • SBTi incorporated into activities (qualitative by spend only) • 80% of all suppliers in line with our code of practice 	As Option 1, but: <ul style="list-style-type: none"> • All high carbon suppliers to have an SBTi approved plan • SBTi used to identify quantitative carbon hotspots in supply chain • Start to incorporate sustainability marking criteria into tenders 	As Option 2, but: <ul style="list-style-type: none"> • Focused benchmark of all suppliers against code of conduct and targeted outcomes • Incorporate social value for specific suppliers

	Option 1	Option 2	Option 3
	<ul style="list-style-type: none"> Annual report of compliance and progress 	<ul style="list-style-type: none"> Incorporate embedded carbon values for key parts of supply chain Hold regular supplier workshops Become partner of the supply chain school 	<ul style="list-style-type: none"> Report annually on sustainability, social value and carbon Accurately measure carbon value in supply chain Reduce mileage of supply chain

Our plans for RIIO-ED2

We have decided to include our scope 3 emissions in our official SBTi approved targets and have opted for a WB2D target requiring a 25% reduction by 2028 (as opposed to a 12% reduction target that would be associated with a 2 degree target).

Following consideration of the different levels of ambition that we could apply to addressing our scope 3 emissions, we have decided to adopt the most ambitious approach, as exemplified by Option 3 above. We hope that these actions will put us in a good position to achieve the 25% reduction in our scope 3 emissions that we have targeted. However, the scale and scope of reductions is difficult to predict with certainty at this stage. As such, we will keep this target under review and adjust it, if necessary, as part of the annual review of this Environmental Action Plan. If we achieve a 25% reduction, we will continue to push for greater savings in this area and review our targets accordingly.

The activities we propose during RIIO-ED2 include:

- Aligning our procurement policy with sustainability targets.
- Using the SBTi to measure carbon and identify quantitative carbon hot-spots in the supply chain.
- Externally benchmarking ourselves and incorporating a new supplier code of conduct with targeted outcomes for each supplier to sign up to and setting requirements for public disclosure of metrics and cascading the code of practice to their suppliers where they are material to our inputs.
- Ensuring all high carbon suppliers have an SBTi approved plan.
- Holding regular supplier workshops.
- Ensuring that at least 80% of suppliers (by value) sign up to the code of practice by 2026 and reporting annually on the percentage of suppliers (by value) meeting our code (See Appendix 22: Procurement code of conduct).
- Mapping the social value of specific suppliers/projects.
- Developing an annual report for customers on sustainability, social value and carbon.
- Measuring our supply chain’s embodied carbon actuals based on materials, construction and works/services delivery.
- Inputting carbon calculators and social value marking models alongside tenders.
- Exploring options for end-of-life in reusing, redesigning or repurposing materials for a circular/semi-circular economy.
- Applying targeted supply chain mapping to reduce unnecessary journeys across tier 2 and 3 suppliers.
- Proposing, through the Energy Networks Association (ENA) or another industrial working group, a common methodology for calculating sustainability impacts in contracts, across DNOs, making the data directly comparable.
- Developing an incentive mechanism that can be improved and measured year on year for carbon/environmental impact.
- At project mandate, setting the cost, programme and embodied carbon baseline, and a target for outperformance, which could be generic or specific to the type and nature of the project.
- Becoming a partner of the Supply Chain School.
- Targeting and incentivising the supply chain to supply lower embodied carbon materials and reduce waste etc.
- Working in partnership with our suppliers to upskill staff such that they have the necessary skills and experience to achieve our environmental goals.
- Partnering with external groups such as the Infrastructure Client Group and the Construction Leadership Council to understand best practice.

The cost of these initiatives will be part of our business as usual costs, and therefore we are not requesting specific funding during RIIO-ED2.

11.8. Action 8: Embodied Carbon

Summary – At a glance

Decarbonisation

We will build a tool to measure our embodied carbon for significant projects and use this to inform our decision making process and design standards to reduce embodied carbon.

We will build a tool to measure our embodied carbon. The key purpose of this tool will be to enable us and our suppliers to make better informed choices for the design, replacement, operation and end disposal of equipment. It will ensure a more holistic approach is taken with decision making on major new projects, so that carbon impacts are considered alongside cost and performance concerns.

Why is embodied carbon important?

Embodied carbon, particularly in the materials we use and consume is a significant, but hidden, carbon cost. It is the carbon emissions associated with the mining, manufacturing and transportation of materials and their end-of-life disposal. This is often poorly understood and is intrinsically linked with scope 3 emissions and resource use. Therefore, it is important we develop a tool to benchmark common project designs so we can pinpoint the carbon and material hotspots and make informed choices that lead to improvements.

13.8.1. What did we achieve in RIIO-ED1?

During RIIO-ED1, in order to reduce embodied carbon, we have:

- Adopted the use of lower carbon concrete on new build projects.
- Made changes to the design and type of concrete we use in the plinths for our ground mounted transformers: we use low carbon precast concrete that has a high content of blast furnace ash, resulting in embodied carbon reductions of up to 70%, when combined with reduced material use, time and labour.

We are currently completing the design of a new substation in Kent, which considered embodied carbon as part of the optioneering process and structural design.

Before RIIO-ED2, we plan to:

- Develop a carbon baselining tool to establish carbon budgets.
- Include carbon efficiency and sustainability benefits from project mandate and set effective carbon budgets for projects, requiring the use of low carbon concrete where technically acceptable.
- Engage with our supply chain to source lower carbon materials, where possible.

13.8.2. Customer and stakeholder engagement

We do not have any specific customer feedback on embodied carbon. However, it is important that we address the carbon footprint of the materials we use. As we outlined earlier in this document, the environment, and specifically achieving Net Zero, are high and growing priorities for customers and stakeholders alike.

However, stakeholders that we engaged as part of our co-creation work in November and December 2020 have stressed the importance of considering embodied carbon in the supply chain. The use of a carbon tool for embodied carbon was supported noting that it is essential for whole life costing and refurbishment and hence informing long term business plan and investment decisions. It was noted that the tool didn't have to have unnecessarily granular accuracy but indicate orders of magnitude. To be effective, you need ownership of carbon across the entire business and supply chain, with senior leadership driving this.

Stakeholders think that we should measure embodied carbon and that it should inform our long-term business planning and investment decisions.

Key insight I-EAP7

13.8.3. Understanding best practice

Consistent with the conclusions of the Infrastructure Carbon Review⁸, best practice companies:

- Challenge the scope to identify no build solutions.
- Look for opportunities to build less new infrastructure, utilising and refurbishing structures where possible.
- Look for innovative products and processes which offer reduced embodied carbon and cost.

⁸ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/260710/infrastructure_carbon_review_251113.pdf

13.8.4. Options analysis

As part of developing our plans for RIIO-ED2, alternative options were worked up for the initiatives under consideration to guide our strategy development. The options considered for reducing embodied carbon are provided below in Table 7.

Table 7: Options considered for reducing embodied carbon

	Option 1	Option 2	Option 3
Activity description	Align with Ofgem minimum requirement <ul style="list-style-type: none"> Simple carbon baselining and reporting for new projects only over a significant threshold. Collaborate across the supply chain with DNOs. Commit to establishing baseline and target during RIIO-ED2. 	As Option 1, but: <ul style="list-style-type: none"> Strongly linked to SBTi. Budgets and targets created for key materials/projects. Focus on key significant projects and material parts of supply chain. Address carbon emissions in the key contractor services (e.g. alliance partners). 	As Option 2, but: <ul style="list-style-type: none"> Consider full PAS 2080 accreditation Full carbon management framework Full life cycle carbon management for all infrastructure.

13.8.5. Our plans for RIIO-ED2

Following consideration of the different levels of ambition that we could apply to addressing our embodied carbon, we have decided to adopt the most ambitious approach, as exemplified by Option 3 above. We hope that these actions will put us in a good position to achieve the greatest possible embodied carbon savings during RIIO-ED2.

Our aim is to have an embodied carbon tool scoped, completed and in place by the commencement of RIIO-ED2. We will then use this tool to baseline generic project types to identify improvements in design, materials and life span. This tool will also help inform our circular economy principles and scope 3 emission reduction plans.

The tool will initially address the areas outlined below, but we will expand on this once these assessments have bedded in.

- Develop the model so it can deal with three common scenarios:
 - Brand new installation.
 - Reinforcement of site.
 - Refurbishment/replacement of existing equipment.
- Types of development work to initially target:
 - Grid and Primary sites (132kv, 66kv).
 - Sub stations 11kv and below.
 - Pole Mounted Transformers.
 - Cable laying.

Embodied carbon is a significant part of our scope 3 emissions, particularly for the categories Purchased Goods and Services (product) and Capital Goods, making up about 68% of our scope 3 emissions (excluding those associated with losses).

We have not yet set specific targets for embodied carbon, as our intention is to set individual targets for the key categories described above. Each will have different options and possibilities, so setting an arbitrary target now risks setting one that is too low for some categories and unachievable for others. Fundamentally, we do have an overarching target for our scope 3 emissions of a 25% reduction by 2028, so the targets set for the embodied carbon categories will contribute to this.

During RIIO-ED2, we will:

- Formalise the carbon baselining tool within our project governance process, setting baseline budgets and out-performance targets for embodied carbon across our portfolio of projects.
- Incorporate the corporate ownership for the embodied carbon process within our Asset Management Systems.
- Derive base and stretch targets from our work with the Carbon Trust on Science Based Targets to support our targets on our scope 3 emissions.
- Collaborate, at an early stage, with our supply chain to facilitate innovation and commitment to the delivery of lower embodied carbon solutions.
- Consider PAS 2080 accreditation of our carbon management framework for full life cycle carbon management for all infrastructure as part of this process.

- Report on embodied carbon across our portfolio of new projects to improve the accuracy of the scope 3 reporting.
- Partner with external groups such as the Infrastructure Client Group and the Construction Leadership Council to understand best practice.

Alongside our supply chain we will ensure that we are able to source the required material, plant and equipment to underpin the solutions that we develop or that are mandated.

The cost of these initiatives will be part of our business as usual costs, and therefore we are not requesting specific funding during RIIO-ED2.

11.9. Action 9: Carbon offsetting

Summary – At a glance

Decarbonisation

Our current view of actions will reduce our scope 1 and 2 emissions (excluding losses) by 62% (31,295 tCO₂e). We will continue to explore new solutions and offset what remains to achieve Net Zero by 2028.

During the RIIO-ED1 period to date we have reduced our scope 1 and 2 emissions (excluding losses) by 10,482 tCO₂e (18.9%). Using 2018/19 as our baseline year, in line with our Science Based Targets, we will further reduce emissions by 31,295 tCO₂e (62%) by the end of the RIIO-ED2 period.

Our work with the Carbon Trust has identified viable actions, based on existing solutions, which will mean we can reduce our carbon emissions by 62% by the end of the RIIO-ED2 period (relative to 2018/19). We are committed to exceeding a science-based target of 1.5°C for our scope 1 and 2 emissions (excluding losses) through our own actions. To achieve our ambition to be a Net Zero company by the end of the period, we will explore how we can offset the remaining emissions (excluding losses) through a combination of our own activities and working with partners on projects which reduce or lock up carbon. Based on our current view of carbon reduction from our own activities and the cost of offsetting, we expect this to cost approximately £700k over the RIIO-ED2 period.

Why is carbon offsetting important?

Not all emissions can be abated effectively now so companies, Governments or individuals can purchase carbon offsets that ensure that carbon emissions are reduced on their behalf to “offset” their emissions.

The importance of urgently addressing climate change is addressed earlier in this document. Carbon offsetting can be a useful way of addressing greenhouse gas emissions that cannot be directly abated. It can also be a way of reducing the cost of carbon abatement by funding those with lower marginal abatement costs to reduce greenhouse gas emissions.

Customer and stakeholder engagement

As part of our qualitative phase 4 business options testing, there was some debate about the principle of offsetting business emissions, and whether this should be charged to the customer. Customers were willing to pay for offsetting if it helped us to achieve our more ambitious decarbonisation targets. However, some participants thought that offsetting is neutralising a business failure, and it should therefore come out of our profits instead of the customer purse. In general, customers didn't have much knowledge of offsetting and even those that did associated it with tree planting. Some customers felt that offsetting was quite reactive and they'd prefer us to focus on reducing or eliminating emissions. However, these customers could see that offsetting provided a good temporary solution to neutralise emissions that cannot currently be eliminated, if used as a last resort.

Customers and stakeholders agree that carbon offsetting can play a role in reaching Net Zero, but should be a last resort.

Key insight I-EAP8

As part of our stakeholder co-creation work in November and December 2020, and subsequent stakeholder engagement in September 2021, there was strong support for developing an internal or shadow cost of carbon, noting that it is a fundamental part of developing the embodied carbon calculator tool. It was agreed that offsetting is a valid last resort when trying to hit a Net Zero target after all viable technical and financial options have been exhausted. We were also urged to look at inssetting. It was suggested that we should start to offset small amounts as soon as possible; to support the market and to future-proof ourselves for a scenario when we must purchase carbon offsets.

Understanding best practice

It is accepted best practice that the use of offsetting is limited to balancing the impact of residual emissions. For a Net Zero strategy to have integrity, offsetting should be one of the final options considered and only applied to emissions that have no zero-carbon alternative.

Oxford University has published principles for Net Zero aligned carbon offsetting⁹ and companies such as Google provide examples of best practice, applying the following criteria to their carbon offsets:

- **Additionality:** using offsetting projects to reduce greenhouse gas emissions that would not be reduced through other incentives.
- **Leakage prevention:** ensuring that a reduction of greenhouse gas emissions through one project does not shift, or leak, to another location or activity.
- **Permanence:** ensuring that the projects it invests in are permanent sources of carbon reduction or sequestration.
- **Verifiability:** obtaining verification from an objective third party to confirm the carbon reductions are real and credible.

Our plans for RIIO-ED2

We are targeting Net Zero for our controllable carbon emissions by 2028. Whilst we have already developed plans to achieve a 62% reduction in our scope 1 and 2 emissions (excluding losses) relative to 2018/19, any such emissions that we are unable to eliminate by 2028, will be offset through work with partners on projects which reduce or lock up carbon and / or the purchase of appropriate, verifiable, UK based carbon offsets, consistent with the advice of the Climate Change Committee¹⁰.

We hope to stretch ourselves to reduce our business carbon footprint beyond the initiatives currently identified. Indeed, by making a Net Zero commitment, the business will implicitly face an internal price of carbon dictated by the cost of such offsets for emissions that are not abated. This, in and of itself, will increase the focus on our carbon emissions and enable us to stretch ourselves further. Learning from other leading organisations, we are exploring the option to formally apply an internal price of carbon to embed carbon impacts in our decision-making and promote continuous improvement in our approach to reducing them.

However, if we assume that the business achieves the 62% reduction in our scope 1 and 2 emissions (excluding losses), requiring us to offset 38.2% of our current emissions, this will mean offsetting 19,340 tonnes of carbon dioxide equivalent emissions. Assuming an offset cost per tonne of £28 implies a total cost of such offsetting of approximately £540k in the final year of RIIO-ED2. However, we have also budgeted for the purchase of offsets in the third and fourth years of the RIIO-ED2 period, of £60k and £100k respectively, so that we can gain experience in the offset market before our target date and stimulate the market. Our total expenditure on offsets during RIIO-ED2 will therefore be £700k.

We will also explore the potential to develop community-based carbon offsets linked to energy efficiency schemes that address fuel poverty. For example, we could pay to upgrade insulation or install heat pumps as part of a validated carbon offset scheme. We will also consider links to biodiversity net gain credits and the use of natural capital carbon sinks (e.g. reforestation, peat land restoration and marine biodiversity recovery programmes for important habitats that are significant carbon sinks such as seagrass).

11.10. Action 10: Losses

Summary – At a glance

Decarbonisation

As the generation on the electricity system continues to decarbonise, the carbon impact of our losses will reduce. Our actions will accelerate this reduction by 1,952 tCO₂e annually by the end of RIIO-ED2.

Throughout RIIO-ED1, we have continued to identify new ways in which we can reduce losses on our network. We have updated our wider Losses Strategy to reflect our ambition for the RIIO-ED2 period. Our Losses Strategy can be found on our website here and this section describes how we have translated this strategy into a programme of work for our RIIO-ED2 Business Plan. Where the initiatives we identify throughout the period demonstrate a long-term benefit to customers, we will adopt them to achieve further reduction in losses. Below we describe the solutions we will deploy to reduce Losses by 10,460 MWh annually by the end of the period at a total incremental cost of £6.26m. The majority of our solutions involve using lower-loss assets which will continue to deliver benefits throughout their useful life, assumed to be 45 years. Over the full lifetime of the lower-loss assets we deploy over the RIIO-ED2 period, they will reduce Losses by an estimated 470,679 MWh.

Why is addressing losses important?

Distribution network losses are the difference between the electrical energy that enters our distribution network and the energy that is delivered to our customers. As such, losses can be sub-divided into two categories:

- Technical network losses, which are inherent to the distribution of electricity and cannot be completely eliminated (as energy passes through our network a small proportion of this is lost as heat).

⁹ <https://www.ox.ac.uk/news/2020-09-29-oxford-launches-new-principles-credible-carbon-offsetting>

¹⁰ Letter: Advice on the use of international emissions credits to Rt Hon Kwasi Kwarteng MP - Climate Change Committee (theccc.org.uk)

- Non-technical losses, which arise where electricity is delivered and consumed but that usage is not properly measured and accounted for, and therefore includes electricity theft and data issues caused by unmetered supplies.

Technical losses are the unavoidable consequence of transferring electricity across the network; however, they can be minimised using appropriate strategies, assets, and systems. Non-technical losses account for only 3.7% of our total losses. In this section, we focus on initiatives to address technical losses. We discuss non-technical losses associated with unmetered supplies at substations in section 11.5 above.

The electricity distribution network, taken as a whole, represents one of the largest consumers of energy in the country.

We have a social responsibility to reduce the financial cost of these losses to our customers and a moral duty to reduce the impact that losses have on the wider environment. We have legal obligations imposed by legislation (such as section 9 of the Electricity Act) and licence conditions set by Ofgem, our regulator. We also need to anticipate the likely impact of the transition to a low carbon economy. The environmental and financial impact of losses are as follows:

- **Environmental:** Carbon emissions attributed to losses from distribution networks across the UK represent approximately 2% of the national total¹¹. Losses account for 74% of our entire carbon footprint. Reducing losses to the most economic level reduces the amount of generation required purely to supply network losses. A disproportionate level of less efficient (and generally higher carbon footprint) generation will be called upon to compensate for variable losses at times of peak demand. Reducing this reliance on fossil-fuelled power stations therefore has a direct carbon benefit. Beyond carbon emissions, there is an environmental impact of installing generation to feed losses such as visual amenity, or preventing land being used for other purposes and the avoidance of material extraction, manufacturing and construction.
- **Financial:** The financial impact extends beyond the additional generation required to feed losses. Reducing losses to the most economic level maximises the available capacity of plant and equipment to deliver useful energy (i.e. rather than supply losses) so keeping costs to our existing and future customers low. If losses are minimised then lower levels of capital and operational expenditure will be incurred in providing, maintaining and reinforcing generation, transmission and distribution assets. We estimate that the energy required to compensate for losses in our networks costs approximately £300m every year. Unnecessary additional costs adversely affect customers with that burden being felt more greatly by those in fuel poverty.

Opportunities and challenges

As losses are the unavoidable consequence of transferring electricity across the network, they are not fully within our control. The main drivers of the levels of losses are independent of our business operations:

- Network load growth.
- The rate of decarbonisation of the grid.

Cost benefit analyses in support of loss reduction activities assume that we will spend incrementally to improve losses when we renew equipment, reinforce the network or repair faults. As a result, our assumptions in this section are based upon a forecast trajectory for load growth, which is the key driver for our network reinforcement. Deviations in the numbers of assets installed or renewed from the levels that we have assumed will affect opportunities to invest and minimise losses accordingly.

The accelerated uptake of low carbon technologies to aid our national transition to a zero carbon economy will influence the quantity of electrical energy transmitted through our networks. One possible outcome of this increase is that we could end up reinforcing more, or alternatively, using increased levels of flexibility to sustain loads. Relying on flexibility will generally increase losses, since older equipment will be kept in service for longer. We note at this point that we consider losses as part of our investment appraisals when we test the merits of using flexibility to defer network investments. In this manner, we continue to balance social and environmental considerations.

As stated above, as the grid decarbonises, so do losses as the carbon intensity of electricity transported across our network falls. Once the power sector becomes net negative, losses will no longer be a source of carbon emissions, but rather an opportunity to increase efficiency across the network from an environmental perspective. Therefore, the decarbonisation benefits of any investment to reduce losses are time-limited and decreasing. In developing our plan, we have sought to focus on those investments that represent value for money for our customers in this context.

During RIIO-ED2, we will work with Ofgem and other DNOs to contribute to the evidence base on the proportion of losses that network companies can influence/control.

What did we achieve in RIIO-ED1?

Our Distribution Losses Strategy sets out our vision and objectives for energy loss management:

- Maximise the amount of energy we save every year for our customers.

¹¹ In 2017 losses represented 7.5% (26.5 TWh of the total 353 TWh) of total annual consumption according to the Digest of UK Energy Statistics:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/736152/Ch5.pdf

26.5 TWh equates to 9.32 MtCO₂e of a UK total of 460.2 MtCO₂e or 2%. See

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/695929/2017_Provisional_e

[missions_statistics_one_page_summary__1_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/695929/2017_Provisional_e_missions_statistics_one_page_summary__1_.pdf) and <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2017>

- Integrate losses management into all our existing processes and systems
- Engage with stakeholders to promote loss-inclusive design, collaborate, share knowledge, and in this manner, enable other DNOs to produce similar benefits for their customers.

Over RIIO-ED1 we have already delivered tangible loss reductions for customers. Initiatives already implemented include:

- Upgrading LV and HV cables by installing larger cross-section conductors in underground feeders, with a cost benefit approach driving a focus on main lines given the higher currents involved yield higher benefits in terms of losses reduced.
- Installing amorphous steel pole-mounted transformers (50 kVA), with a cost benefit approach to target a reduction in constant losses.
- Optimising distribution transformer sizes to benefit losses using a cost benefit approach.
- Normal Open Point optimisation (HV).

We anticipate that the following initiatives will also be implemented before the end of RIIO-ED1:

- Upgrading 33kV and 132kV EHV Cables with a cost benefit approach driving significant benefits as the current does not diminish over the length of the line as is the case with LV and HV distribution feeders.
- Installing amorphous steel pole-mounted transformers (25-200 kVA) with a cost benefit approach to target a reduction in constant losses.

Customer and stakeholder engagement

While we do not have any specific customer feedback on losses, as the largest component of our business carbon footprint, it is one of the main ways we can achieve the carbon reduction ambition level customers and stakeholders value.

At the 3 November 2020 Sustainability Critical Friends Panel, there was significant disagreement amongst stakeholders over the amount of control we have with respect to losses. However, it was noted that we can, and should, do more on controllable losses such as unmetered supplies in substations (which are considered separately). It also noted that forecast reductions in carbon emissions are largely driven by the decarbonisation of the grid and that the associated losses reductions should not count towards our work to reduce losses.

Stakeholders note the impact of losses on our business carbon footprint and agree that we should do more to address controllable losses where possible.

Key insight I-EAP9

We recognise that effective engagement is a two-way dialogue with mutual benefits. As such, we continuously seek input from our stakeholders to inform our decisions and evaluate our performance, while encouraging the sharing of knowledge to help shape industry-wide understanding of best practice for managing electricity losses with the aim of helping the UK meet its carbon objectives. Key elements of our ongoing stakeholder engagement consist of:

- **Building best practice:** Over the course of RIIO-ED1 we have collaborated with our peers internationally and nationally to understand actual and best practice in other networks. We have also formed productive partnerships with top universities and consultancies to discover, research and validate new and emerging ideas, technologies and strategies for reducing losses on our and others' networks. We actively participate in bi-monthly meetings at the ENA20 technical losses task group comprising other DNOs, TOs and the TSO. This task group seeks to encourage discussion, sharing of knowledge and to help build consensus around best practice for the benefit of customers. It has played an important role in helping us decide to follow a CBA-driven approach for losses in RIIO-ED2. We will continue to collaborate with our peers at this forum to develop an Engineering Recommendation for Losses.
- **Knowledge sharing:** We have created an interactive losses website¹² that aims to explain distribution losses to a wider audience. On this website we also publish the reports we have produced or commissioned so we can share our learning with others. We continue to work with academia, equipment manufacturers, suppliers, customers and the wider industry at every opportunity.

Understanding best practice

We actively seek to learn from the good work that our peers are doing, either through industry groups or from targeted collaboration. For example:

- We have learned from SSEN's Low Energy Automated Networks project (LEAN), which considered the feasibility of switching parallel power transformers in primary and grid substations out of service to reduce losses when low levels of utilisation warrant the action.

¹² <https://www.ukpowernetworks.co.uk/losses/index.html>

- We collaborated with Toshiba on amorphous steel and with Northern Powergrid (NPG) on pole and ground-mounted transformers.
- We also share our learning and acquire new learning at events which engage a wider audience, such as the Low Carbon Networks and Innovation Conference and the Council of European Energy Regulators (CEER).
- We have compared our national performance to figures across the EU and determined that there is room to improve energy losses in our networks.

Our plans for RIIO-ED2

Our plans for RIIO-ED2 are designed to deliver our Distribution Losses Strategy objectives, as outlined above, however, the following key themes form a common thread:

- Exploiting new sources of data including smart meters and new ways of analysing it.
- Dynamic management and control of networks based on the granularity that smart meter data brings.
- Holistic approach to understanding and managing losses. We endeavour to stretch the influence of our strategies and actions across the boundaries of our networks to benefit the wider interests of the UK and its people.
- Optimising our physical networks and the efficiency of individual assets embedded in these networks.
- Maximising the loss reduction opportunities from using flexible distributed generation and in moving to a distribution system operation model.
- Effective collaboration with our peers, across the energy system and internationally.
- Continuous learning and collaboration.
- Robust processes and better decision-making tools to deliver benefits in the shortest time possible.
- Work driven by a genuine concern for society and the environment.

Historically, we predominantly designed the network with thermal and voltage considerations in mind to deliver the lowest-cost solutions to customers. Following LDR-driven research, we now understand that we can achieve the lowest long-term cost by designing for losses instead. In our proposed arrangement, customers pay more upfront, but receive better value for money in the longer term.

A cost-benefit driven approach informs our decisions to help us achieve an optimised balance between flexibility solutions and network strengthening, thus helping us to limit expenditure. Optimised designs for losses typically introduce excess capacity in an economical manner in the network to reduce energy wastage. At the same time, the excess capacity reduces the risk of assets becoming stranded prematurely due to concentrated load growth. Flexible distributed generation increasingly drives network utilisation to the detriment of losses. The cost-benefit-driven approach informs our network design standards, so we can minimise these losses overall. In considering losses amongst our flexibility drivers, we ensure that we provide solutions that balance social and environmental considerations. The result of the above approach are the following proposed actions for the RIIO-ED2 period:

Table 8: Proposed actions for losses over the RIIO-ED2 period

Activity	Incremental cost in RIIO-ED2 (£m)	Losses reduction by end of RIIO-ED2 (MWh)	Equivalent carbon reduction by end of RIIO-ED2 (tCO ₂ e)
Increasing the standard size of LV cables	1.02	2,112	394
Increasing the standard size of HV cables	1.48	2,525	471
Increasing the standard size of smaller transformers	2.14	4,037	753
Increasing the standard size of 33kV Cables	0.87	638	119
Increasing the standard size of 132kV Cables	0.49	384	72
Adopting amorphous steel PMTs (25-200kVA)	0.27	764	143
Total	6.26	10,460	1,952

The total cost over the RIIO-ED2 period to deliver these initiatives is £6.26m. We will report annually on our progress on implementing our losses strategy and associated performance measures. As stated above, we will also work with Ofgem and other DNOs to contribute to the evidence base on the proportion of losses that network companies can influence/control. As our work continues in this area we will provide updates through published revisions to our Losses Strategy and summarised in our Annual Environment Report.

Non-technical Losses

We are determined to mitigate non-technical losses so far as is practicable. In particular we actively tackle the theft of electricity from our network and aid suppliers in meeting their theft obligations. Our actions help ensure that we operate efficiently and avoid honest customers 'picking up the tab'. Reducing theft also helps lessen the incidence of dangerous situations and serves to promote the efficient use of energy. Our Losses Strategy has details on how we will continue to act to reduce non-technical Losses in the following areas:

- Theft from suppliers.
- Theft in conveyance.
- Under-declaration of unmetered supplies.
- Supplier data issues.

12. Reducing our impact on the world's limited resources

12.1. Action 11: Circular Economy Resource Use, Waste and Water

Summary – At a glance

Responsible Use of Resources

Develop a circular economy framework and embed it into our business. Recycle 80% of office, depot and network waste and 99.5% of street works material by the end of RIIO-ED2. No recoverable waste to landfill by 2025. Manage and monitor water use to reduce consumption by 10%.

We will develop a circular economy tool that will map and identify where the circular economy opportunities are in our value chain. This will enable us to develop strong partnerships in our supply chain, improving material use, recovery of materials, environmental impact and costs. This links directly to other parts of our plan, in particular supply chain management, scope 3 emissions and embodied carbon.

Commitment EAP5

We will develop and implement a circular economy tool to address our high impact materials by the start of RIIO-ED2. We will subsequently set and monitor our reduction targets through our Annual Environmental Report.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex.	Included in baseline allowances.	We will reduce the amount of single-use packaging produced and also reduce the amount of plastic waste at risk of entering the wider environment, which would otherwise cause harm.	Stakeholders support a focus on, and engagement with, suppliers to address the environmental impact of our procurement and suppliers. (See key insights: I-EAP1, I-EAP4, I-EAP10, I-EAP14 in our Line of Sight – EAP document)

Commitment EAP6 We will recycle 80% of office, depot and network waste and 99.5% of street works material by the end of RIIO-ED2, with no recoverable waste to landfill by 2025.			
Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex.	Included in baseline allowances.	By recycling we will reduce the demand on natural resources and simultaneously reduce waste being handled through landfill.	The majority of our customers feel strongly that we should be ambitious in reducing the impact of our day-to-day operations on the environment. (See key insights: I-EAP1, I-EAP4, I-EAP10, I-EAP14 in our Line of Sight – EAP document)

Why is a circular economy approach important?

A circular economy is a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the **'take-make-waste'** linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources. It is based on three principles:

1. **Design out waste and pollution:** view waste as a design flaw and harness new materials and technologies to ensure waste and pollution are not created in the first place.
2. **Keep products and materials in use:** maintain / prolong and share, reuse, refurbish, repair, remanufacture (disassemble to the component level and rebuild as new) or recycle where possible.
3. **Regenerate natural systems:** enhance our natural resources by returning valuable nutrients to the soil and other ecosystems.

The World Building Council for Sustainable Development (WBSCD) estimates that only 9% of the global economy is circular, meaning there a 91% opportunity to improve on this position. WBSCD estimates that a truly circular economy could cut global Green House Gases (GHGs) by 60%. Similarly, the Ellen Macarthur Foundation notes that, for Europe a circular economy development path could halve carbon dioxide emissions by 2030.

What did we achieve in RIIO-ED1?

The focus in this area during RIIO-ED1 has been on the recovery and recycling of waste with an emphasis on avoiding landfill. For RIIO-ED1, we set ourselves a target to divert 70% of our waste away from landfill and then under our Green Action Plan increased this target to 90%.

However, we have continued to strive to improve in this area; we have been working with the Carbon Trust to achieve certification to their waste reduction standard. This work has enabled us examine our individual waste streams in more detail, revealing areas of good practice, pockets of poor performance, and where we could make more of the value in our waste streams.

As part of our Green Action Plan, we set an objective of achieving the Carbon Trust Water Standard by December 2021. This standard has now been withdrawn but we have completed our gap analysis on this which revealed data accuracy was a significant issue and work to remedy this is already identifying leaks and failed meters. We have also installed water saving devices in our key buildings.

While we have yet to commence work on embedding circular economy principles in a holistic manner, we have started to implement measures such as:

- Developing value chains for the disposal of pallets, transformers, old cables and meters so they are now a valuable resource and non-virgin feedstock for manufacturing and re-use.
- Equipping our new Borehamwood site with high-grade second-hand furniture.
- Removing single-use packaging and/or introducing packaging with recycled content.

Customer and stakeholder engagement

Our stakeholder engagement showed us that the management of waste was high on their agendas. The expectation was that we should already be maximising our recovery and recycling rates and aim for 80% or more. Our critical friends panel with

environmental stakeholders and experts recognised the importance of circular economy principles and ambition and highlighted the need for strong partnership working across our value and supply chain.

As part of our quantitative phase 4 business options testing, we presented domestic and business customers with three alternative options for a sustainable business:

- Option 1: upgrade 30% of generators to clean fuels, continue to recycle 40% of recoverable waste, and improve biodiversity at 100 UK Power Networks sites (+£0.01 on annual bill).
- Option 2: upgrade 80% of generators to clean fuels, recycle 70% of recoverable waste, and improve biodiversity at 125 UK Power Networks sites (+£0.03 on annual bill).
- Option 3: upgrade 100% of generators to clean fuels, recycle 80% of recoverable waste, and improve biodiversity at 150 UK Power Networks sites (+£0.06 on annual bill).

The majority of customers feel strongly that we should be ambitious in reducing the impact of our day-to-day operations on the environment, for example, by reducing pollution through generator upgrades, improving biodiversity and recycling waste.

Key insight I-EAP14

Option 3 (our most ambitious option) was chosen by the majority of both consumers and businesses, being chosen by 51% of consumers and 66% of businesses. Not only was option 3 the most popular amongst consumers and businesses, but those who chose option 3 felt most passionately about it with very high strength of preference scores of 8.2 and 8.3 for consumers and businesses respectively. The strength of preference shown for option 3 was the highest shown for any of the questions we asked across all areas of our business options testing.

Understanding best practice

As stated above, we have worked with the Carbon Trust to understand areas where our waste management could be improved. We have also considered practices adopted by companies in related and unrelated sectors, both at home and internationally in order to gain an understanding of best practice.

The best performing companies:

- Understand their resources and how they flow through each key business area.
- Develop a comprehensive waste policy and waste reduction targets.
- Communicate policy and targets internally and externally.
- Embed circular economy principles into their business.
- Monitor and audit their waste contractors regularly.
- Engage with their suppliers' waste management, producing hotspot analyses to aid waste reduction.

Our Plans for RIIO-ED2

Our key commitments are:

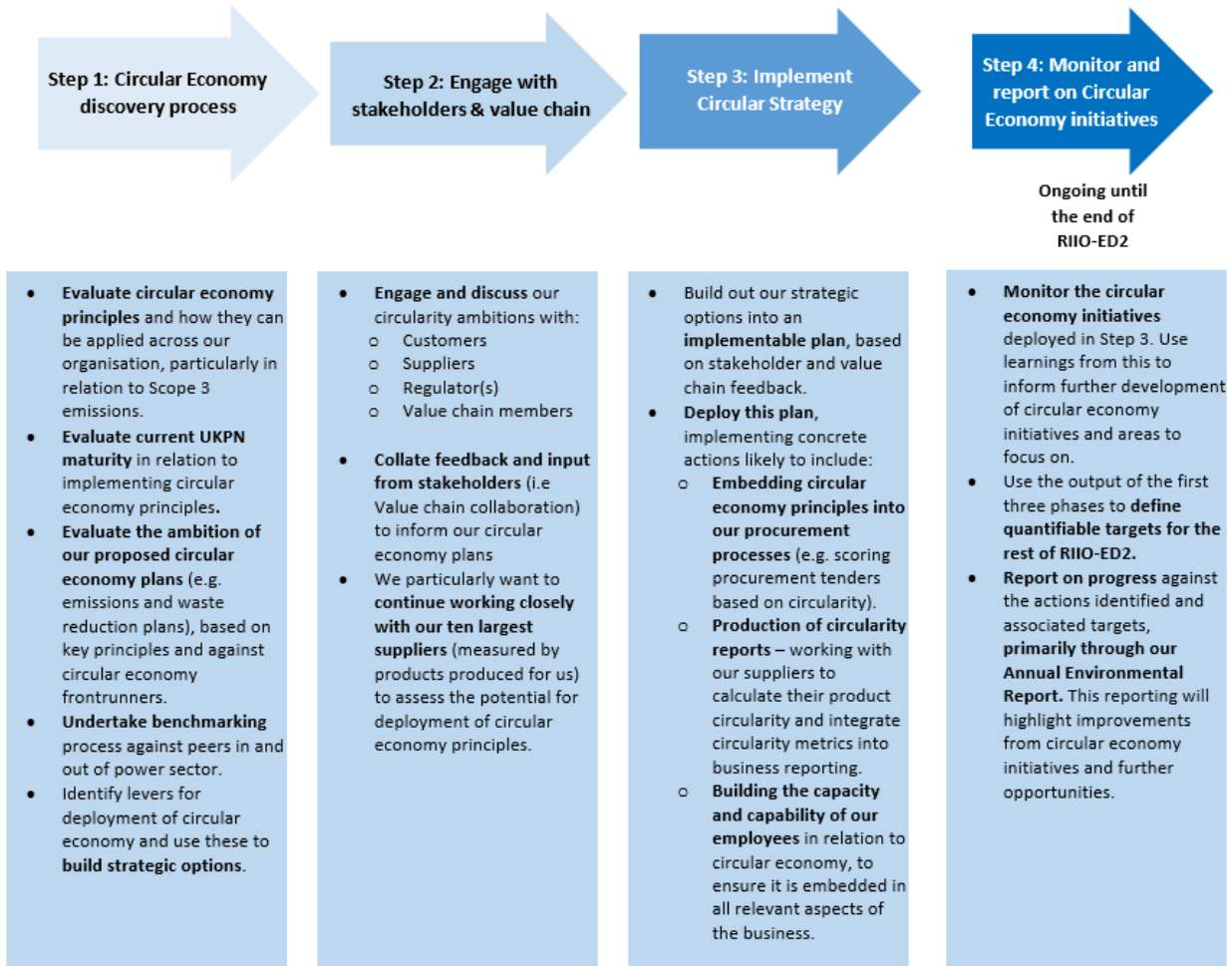
- Deploy a leading framework to evaluate and embed circular economy principles where relevant throughout our business by the start of RIIO-ED2. We will subsequently set and monitor our reduction targets, committing to the recommendations of this baselining exercise once complete, in our Annual Environmental Report.
- We will assess where we can make further recycling savings in relation to our office, depot and network waste, with a target of recycling 80% of this by the end of RIIO-ED2.
- We will continue our strong performance in relation to recycling street works material (spoil). We are already recycling over 99% of this but have set ourselves a stretch target of 99.5% in RIIO-ED2.
- We will ensure no recoverable waste to landfill by 2025.
- We will improve the monitoring of our water consumption, leak detection and metering so we can target our water saving actions to reduce consumption by 10% over the RIIO-ED2 period.

We believe that a target for recycling should be included in Ofgem's specification for the balanced scorecard financial incentive on the environment, which we discuss further in Annex 2.

The key focus in this area will be to establish the circular economy framework utilising a system that has been proven to work well and deliver measurable results for companies such as Alliander, an energy network operators based in the Netherlands.

Following a recognised, tried and tested framework will allow us to create a benchmark in a similar fashion to our scope 3 carbon emissions work. Allowing us to create credible targets backed by our stakeholders that is feasible for the supply chain, maximises value and targets the high environmental impact and carbon dense materials. We will deliver this through a four step-circular economy framework as outlined below.

Figure 11: Our Circular Economy Framework



The deployment of this framework will be in parallel with our scope 3 and embodied carbon initiatives because these are, as already stated, intrinsically linked in their activities and success. The roll out and implementation will help inform our actions on our supply chain management and the development of additional targets around waste, water and scope 3 carbon. There are no additional funding requests directly associated with this action and KPIs will be reviewed annually. We will partner with external groups such as the Infrastructure Client Group and the Construction Leadership Council to understand best practice in this area.

13. Increasing natural diversity

13.1. Action 12: Biodiversity Net Gain

Summary – At a glance

Increase Natural Diversity

We will increase the biodiversity of new major substation developments by a net-gain of 10-20% and at 100 existing sites by a net-gain of 30% overall, as measured by the DEFRA biodiversity tool.

During RIIO-ED2, we will set a biodiversity net gain target of 30% for 100 existing sites overall and of 10-20% at all new major substation developments. Where possible, we will go above and beyond these biodiversity net-gain targets, to create a biodiversity ‘bank’ for use against future projects, where a negative biodiversity impact cannot be avoided or mitigated. We will adopt an appropriate tool to assess net changes in natural capital from different options for new connections and network projects and use a tool to monitor the provision of ecosystem services from network sites and report annually. We will also work with Wildlife Trusts to ensure that biodiversity benefits are maximised.

Commitment EAP7

We will increase the biodiversity of new major substation developments by a net-gain of 10-20% and at 100 existing sites by a net-gain of 30% overall over the RIIO-ED2 period, compared to the beginning of the period, as measured by the DEFRA biodiversity tool.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
£0.50m	Expenditure included in baseline forecast.	Improved biodiversity increases the resilience of nature at our substation developments to external shocks. We will quantify benefits using the DEFRA tool to increase biodiversity by at least twice the legal requirements.	Increasing biodiversity at our sites is seen as important by customers. Stakeholders agree and believe that our proposed approach to biodiversity net gain across 100 sites is appropriate. (See key insights: I-EAP1, I-EAP5, I-EAP12, I-EAP14 in our Line of Sight – EAP document)

Why is biodiversity important?

Biodiversity is the variety of all life on Earth, including animals and plants. The importance of biodiversity is emphasised by the recent Dasgupta Review of the Economics of Biodiversity¹³, which notes that: “Biodiversity enables Nature to be productive, resilient and adaptable. Just as diversity within a portfolio of financial assets reduces risk and uncertainty, so diversity within a portfolio of natural assets increases Nature’s resilience to shocks, reducing the risks to Nature’s services. Reduce biodiversity and Nature and humanity suffer.” However, biodiversity continues to decline at significant rates; species are declining globally at the fastest ever rate due to human actions, with around a million species threatened with extinction¹⁴.

We have a large but dispersed land footprint, which varies in size and suitability for biodiversity opportunities. We also carry out a significant amount of vegetation management along our power lines. There are a number of opportunities to improve biodiversity across our rural and urban locations.

What did we achieve in RIIO-ED1?

During RIIO-ED1, we have:

- Supported the nine Wildlife Trusts in our region, both financially and by providing volunteers.
- Engaged with Trees for Cities, funding the planting of 2,669 trees in deprived urban areas.
- Identified 100 grid and primary sites to be assessed for their biodiversity potential; we have already surveyed 90 sites and are preparing a baseline assessment using the Defra Biodiversity Net Gain tool.
- Trialled a specially selected grass and wildflower seed mix at three sites in Suffolk.
- Enhanced site biodiversity through installing bat and bird boxes and planting.

¹³ <https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review>

¹⁴ <https://ipbes.net/global-assessment>

Before the RIIO-ED2 period, we will complete the final surveys and consider other sites for inclusion in the scheme. We are also looking at changes to our grounds maintenance team contracts to support our new management practices.

Customer and stakeholder engagement

Our phase 3 willingness to pay research found that customers have a strong aversion to conservation work being cancelled and place a significant value on improving our offering in this area.

Furthermore, as part of our phase 4 business options testing, we presented domestic and business customers with three alternative options for a sustainable business:

- Option 1: upgrade 30% of generators to clean fuels, continue to recycle 40% of recoverable waste, and improve biodiversity at 100 UK Power Networks sites (+£0.01 on annual bill).
- Option 2: upgrade 80% of generators to clean fuels, recycle 70% of recoverable waste, and improve biodiversity at 125 UK Power Networks sites (+£0.03 on annual bill).
- Option 3: upgrade 100% of generators to clean fuels, recycle 80% of recoverable waste, and improve biodiversity at 150 UK Power Networks sites (+£0.06 on annual bill).

Increasing biodiversity at our sites is seen as important by customers: they have a strong aversion to conservation work being cancelled entirely and place a significant value on improving our offering in this area.

Key insight I-EAP5

Option 3 (our most ambitious option) was chosen by the majority of consumers (51%) and businesses (66%). Not only was option 3 the most popular, but those who chose option 3 felt most passionately about it: the strength of preference was the highest of any of our phase 4 research questions.

Our stakeholders also agree that improving biodiversity should be a priority area:

- At our Critical Friends Panel, there was broad agreement that improving biodiversity by 20-30% at 100 sites is a sensible short-term target. Participants also generally agreed that continuing to monitor, invest and improve the biodiversity at more sites within our footprint was important.
- Natural England noted the potential of our Biodiversity Net Gain Project.
- As part of our stakeholder co-creation work in November and December 2020, it was agreed that the proposed focus on 100 sites is appropriate, that biodiversity targets for net gain should be ambitious, and that strong partnerships with organisations such as the Wildlife Trust were key. There was also support for the concept of a biodiversity bank but it was noted that “the devil is in the detail” and it is very new as a concept. It was suggested that more public visibility of what is being done on biodiversity is needed as well as clear communication regarding tree trimming policies and drivers.

The majority of customers feel strongly that we should be ambitious in reducing the impact of our day-to-day operations on the environment, for example, by reducing pollution through generator upgrades, improving biodiversity and recycling waste.

Key insight I-EAP14

Stakeholders agree with our proposed approach to biodiversity net gain across 100 sites.

Key insight I-EAP12

Understanding best practice

We have considered best practice, drawing on insights from organisations such as CIRIA¹⁵, CIEEM, IEMA and the UN Environment Programme¹⁶, and concluded that best performing companies:

- Identify the impacts and dependencies of their business on biodiversity and ecosystem services.
- Develop information systems, set targets, measure and value performance, and report their results.
- Take action to avoid, minimise and mitigate risks, including ‘offsets’ where appropriate.
- Engage with business peers / stakeholders such as government and NGOs to improve biodiversity.

¹⁵ <https://cieem.net/wp-content/uploads/2019/02/C776a-Biodiversity-net-gain.-Good-practice-principles-for-development.-A-practical-guide-web.pdf>

¹⁶ https://www.unepfi.org/fileadmin/biodiversity/TEEBforBusiness_summary.pdf

Our plans for RIIO-ED2

During RIIO-ED2, we will set a biodiversity net gain target of 30% for 100 existing sites overall and of 10-20% at all new major substation developments. We will go above and beyond these biodiversity net-gain targets, where possible, to create a biodiversity 'bank' for use against future projects, where a negative biodiversity impact cannot be avoided or mitigated. We will adopt an appropriate tool to assess net changes in natural capital from different options for new connections and network projects and use a tool to monitor the provision of ecosystem services from network sites and report annually. We will work in partnership with the Wildlife Trusts, increasing our volunteer days, creating wildlife corridors with existing land where relevant and identifying opportunities for expansion of biodiversity sites.

We will align our grounds maintenance contracts with our commitments. We will also continue to work with charities such as Trees for Cities and improve our engagement in urban areas.

In addition, we will engage with all the Wildlife Trusts in our area to establish what is regionally important to them from a biodiversity and conservation perspective. As part of this, we will also explore whether opportunities exist to work with them on Biodiversity Net Gain and Carbon offsetting projects.

Furthermore, we will identify and survey an additional 100 sites to build the next biodiversity investment bank for RIIO-ED3.

We believe that it is appropriate, and consistent with the ambition that our customers and stakeholder wish to see, for us to target substantial improvements of 30% at 100 sites, rather than lesser improvements at a greater number of sites. This approach has stakeholder support and our consideration of best practice tells us that such a scale of improvement is stretching. Consistent with our commitment to review the Environmental Action Plan annually, we will keep our targets under review and revise them accordingly if we find that they are not sufficiently stretching.

The cost of these initiatives will be £0.5m in RIIO-ED2. We anticipate that a target biodiversity net-gain may be included in Ofgem's specification for the balanced scorecard financial incentive on the environment, which we discuss further in Annex 2.

Regional aspects of our RIIO-ED2 plans

In selecting sites for biodiversity net gain, we have considered a number of factors including the potential for partnerships with Wildlife Trusts, choice of habitats with high conservation value. As such, our biodiversity net gain activities will be focused on our EPN and SPN regions.

However, our Trees for Cities programme allows us to focus on more urban areas, including those in the LPN region.

14. Reducing pollution produced by our business operations and network activity

We are making the following commitments for RIIO-ED2 to reduce pollution produced by our business operations and network activity:

- **Air quality:** We will reduce NOx emissions by 33% over the RIIO-ED2 period, compared to the beginning of the period (Action 13 details how we plan to achieve this).
- **Leakage from fluid filled cables:** We will reduce leaks from Fluid Filled Cables by 15% over the RIIO-ED2 period (Action 14 details how we plan to achieve this).
- **Visual amenity:** We will continue to facilitate the undergrounding of nominated schemes to remove overhead lines within AONB and National Parks, working closely with all relevant stakeholders to ensure that the full allowance is spent to maximise the benefits of works within our protected landscapes. (Action 17 details how we plan to achieve this).

We provide further details of each of these commitments, and the actions we propose to achieve these commitments, in turn below.

We also provide details of further actions that we will undertake during the RIIO-ED2 period to minimise our environmental impact. Whilst these do not have explicit commitments included within our core business plan narrative, they are important areas that our legal and licence obligations require us to continue to address. These are:

- Action 15: noise.
- Action 16: PCBs.

14.1. Action 13: Addressing air quality

Summary – At a glance

Reduce Pollution

Through our efforts to decarbonise our vehicle fleet and generation assets, we will reduce NOx emissions by 33% over the RIIO-ED2 period, compared to the beginning of the period.

Our work to decarbonise our vehicle fleet and generation assets will also deliver improvements to air quality through reduced pollution:

- Our fleet currently contributes 66% to our overall NOx emissions and therefore plays a key role in our efforts to improve air quality. Our strategy includes reduced journeys and migrating approximately 60% of our fleet to electric vehicles. Our actions will reduce our total NOx emissions by 25%.
- Our generators account for 34% of our NOx emissions. We are proposing to move a significant proportion of our generators to HVO fuels (hydrotreated vegetable oils). We will also explore the use of hybrid generators which make use of integrated batteries to improve fuel efficiency and reduce NOx. These initiatives will reduce our total NOx emissions by 8% overall.

Combined, these activities will reduce NOx pollution by 33% (measured by fuel burnt). Our work to facilitate the transition to Net Zero will also help our customers to switch to vehicles and other technologies which reduce air pollution.

Commitment EAP8			
We will reduce NOx emissions by 33% over the RIIO-ED2 period compared to the beginning of the period, improving air quality for our customers.			
Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
Costs associated with fleet and generators included in commitment EAP2.	N/A	Reduced NOx emissions will improve air quality across our networks for our customers. We have calculated the social value of the improved health of the communities we serve to be £6.53m (undiscounted) from this commitment.	Air quality is a concern for members of the public and our stakeholders. (See key insights: I-EAP1, I-EAP4, I-EAP11, I-EAP14 in our Line of Sight – EAP document)

Why is improving air quality important?

Public Health England (PHE) describes air pollution as the biggest environmental threat to health in the UK¹⁷. Nitrogen oxide (NOx) is an irritant gas, which is created during the combustion of fossil fuels. Short-term exposure to concentrations of nitrogen oxide can cause inflammation of the airways and increase susceptibility to respiratory infections and to allergens. It exacerbates the symptoms of those who are already suffering from lung or heart conditions, shortening their lives.

What did we achieve in RIIO-ED1?

Full details of the our RIIO-ED1 initiatives to decarbonise our vehicle fleet and modernise our generators are provided in the relevant section of our plan above.

¹⁷ <https://www.gov.uk/government/news/public-health-england-publishes-air-pollution-evidence-review#:~:text=Air%20pollution%20is%20the%20biggest,lung%20cancer%2C%20and%20exacerbates%20asthma.>

Customer and stakeholder engagement

A May 2018 Defra research report to understand public attitudes to air quality¹⁸ found that respondents were more likely to be concerned about air quality if they: lived in an urban area; or were a member of an ethnic minority group. Those that had, or cared for someone with a lung condition, were more likely to be concerned about air quality. Air pollution was selected by 57% of respondents as an environmental issue that they were concerned about, the third most frequently mentioned behind litter/plastics and pollution of the oceans, and in line with other environmental issues such as fresh-water pollution and global warming.

Air quality is a concern for members of the public, particularly those living in urban areas, those from ethnic minority groups or those who have, or care for someone with, a lung condition. Stakeholders also share air quality concerns.

Key insight I-EAP11

Social Value Research conducted for all DNOs found that customers were willing to pay improve air quality by moving to 10% of the entire vehicle fleet being electric. Furthermore, as part of our quantitative phase 4 business options testing, we presented domestic and business customers with three options for a sustainable business:

- Option 1: upgrade 30% of generators to clean fuels, continue to recycle 40% of recoverable waste, and improve biodiversity at 100 UK Power Networks sites (+£0.01 on annual bill).
- Option 2: upgrade 80% of generators to clean fuels, recycle 70% of recoverable waste, and improve biodiversity at 125 UK Power Networks sites (+£0.03 on annual bill).
- Option 3: upgrade 100% of generators to clean fuels, recycle 80% of recoverable waste, and improve biodiversity at 150 UK Power Networks sites (+£0.06 on annual bill).

The majority of customers feel strongly that we should be ambitious in reducing the impact of our day-to-day operations on the environment, for example, by reducing pollution through generator upgrades, improving biodiversity and recycling waste.

Key insight I-EAP14

Option 3 (our most ambitious option) was chosen by the majority of consumers (51%) and businesses (66%). Not only was option 3 the most popular, but those who chose option 3 felt most passionately about it: the strength of preference was the highest of any of our phase 4 research questions.

Our stakeholders also think air quality is important:

- As part of our November 2020 co-creation work with stakeholders, they agreed that we should be looking to replace our diesel generators, particularly given associated air quality issues.
- As part of the September 2019, CEO Panel, the panel of stakeholders, including charities, trade associations and suppliers voted on our top environmental priorities: reducing carbon was the top priority, followed by improving air quality and then improving our energy efficiency.

Understanding best practice

We have considered best practice, drawing on insights from our stakeholders and concluded that best performing companies:

- Understand the scale, source, location and locational impact of their NOx emissions.
- Communicate the issues across the company to achieve company-wide buy in.
- Set targets to reduce the overall scale of emissions.
- Identify hot-spots for NOx emissions and seek to prioritise addressing those, deploying assets to minimise the exacerbation of local air quality issues.

Our plans for RIIO-ED2

Two of the environmental initiatives that we have already outlined in our plan in the sections above, will have material benefits for air quality:

- **Decarbonising our business transport.** We will reduce journeys and migrate approximately 60% of our fleet to electric vehicles. This will lead to a 25% reduction in our total NOx emissions.
- **Modernising our generators.** We will upgrade a minimum of 45% to a maximum of 95% of our generators to clean fuels (dependent on fuel availability) as well as increasing the number of hybrid generators. This will lead to an 8% reduction in our total NOx emissions.

We recognise that customers favoured 100% of our generators migrating to clean fuels as part of our quantitative and qualitative business options testing, and we will work to minimise our generator emissions as much as possible during RIIO-

¹⁸ <http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=20106>

ED2. However, we may face constraints in terms of our, and our contractors', ability to source sufficient volumes of fuel in an ethical, environmentally sustainable manner. Nonetheless, irrespective of such constraints, we are unwavering in our commitment to meet our high-level air quality commitments.

As well as reducing NOx, these initiatives will also reduce other air pollutants such as primary particulate matter, volatile organic compounds and sulphur dioxide.

The RIIO-ED2 costs and benefits associated with these initiatives are detailed in the fleet and generator sections of this EAP.

As our first commitment demonstrates, we will keep our targets under review and revise them accordingly if we find that they are not sufficiently stretching.

Furthermore, consistent with best practice, we will also be cognisant of the local impact of our vehicle and generator deployment on air quality and will seek to deploy low emission alternatives in the places where they will have the greatest benefit. For example, we are using GPS data to target vehicles with the biggest impact on air quality for replacement.

14.2. Action 14: Reducing leakage from fluid filled cables

Summary – At a glance

Reduce Pollution
We will reduce fluid leaking from our fluid-filled cables by 15% over the RIIO-ED2 period.

Our plan for RIIO-ED2 is to continue with our phased replacement of FFCs removing 173km of these cables over the period. By targeting the highest risk cables this will reduce fluid leakage by 15% by the end of the period. In addition to this, we will continue to explore innovative solutions to avoid, reduce and detect leaks as well as improving our operational response to minimise the damage. The cost of this asset replacement programme will be £155m.

Commitment EAP9			
We will reduce annual leakage from Fluid Filled Cables by 15% by the end of the RIIO-ED2 period compared to the beginning of the period.			
Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
£155.0m	Expenditure included in baseline forecast.	Reductions in fluid leaks from our cables will reduce the negative impact of such events on the environment within our local area.	In general, customers show a willingness to pay for environmental improvements. (See key insights: I-EAP1 and I-EAP4 in our Line of Sight – EAP document)

Why is reducing leakage from fluid filled cables important?

Underground electricity cables transfer power from location to location. At higher voltages, traditionally these cables have been insulated with a mineral oil. Over time, the cable sheath can deteriorate and this oil can leak into the surrounding area.

Fluid filled cables (FFCs) account for 35% of all cables running at 33kV, 66kV and 132kV in our three licence areas by length. Leaks from FFCs occur for various reasons, including the failure of ancillary oil equipment (e.g. pipe work, monitoring gauges and oil tanks), cable joint failure, cable damage due to third party excavations and incorrect installations.

Key reasons to reduce cable fluid loss are:

- **Environmental:** The lost fluid has the potential to impact the environment including land, surface water and groundwater. Reducing leakage from fluid filled cables therefore helps to prevent the pollution of waterways and the resulting environmental damage.
- **Financial:** Ensuring the network operates as efficiently as possible by reducing the cost to customers of cleaning up oil leakages.
- **Regulatory:** Complying with environmental legislation where the operating code states that the DNO “will take all reasonably practicable steps to prevent pollution of controlled waters, taking advice from the Environment Agency as required”.
- **Performance:** Ensuring a continuous supply to customers by reducing instances of power loss caused by leaking cables.

What did we achieve in RIIO-ED1?

Using established inspection and maintenance routines, we collect condition and performance data from these assets and use this, together with engineering decision making techniques, to determine the most efficient time to replace or refurbish these cables. Replacing and repairing cables is however a very expensive exercise and thus we need to balance proactive replacement with maximising the useful lives of these ageing assets. When incidents of leaks do occur we work to recover spilled oil and we comply with environmental regulations to ensure we do this in a responsible way.

Over the course of RIIO-ED1 we set ourselves the target to reduce the leakage from fluid filled cables by 2% per annum and we are on course to meet this commitment.

There is also an ongoing innovation project looking at self-healing pipes which prevents small leaks from becoming fast leaks – currently in phase 3 and will proceed to validation then potential roll-out during RIIO-ED2.

Customer and stakeholder engagement

Through our engagement programme, both through our Phase 3 willingness to pay research and Phase 4 Business Options Testing, we tried to uncover insight to help inform our ambition levels for reducing leakage over the course of RIIO-ED2. This was a particularly challenging area to research with our customers as it was clearly a low awareness subject area. In some ways, low awareness led customers to consider that oil leakage from these cables cannot be a significant problem. On the other hand, with the environment being seen as such a priority, there were questions raised whether even our highest ambition was stretching enough. Our CEG noted the challenges on engaging on this topic area, without providing sufficient context they questioned the validity of the insight gained in this area.

Our phase 3 willingness to pay research found that customers from all regions are willing to pay to reduce oil leakage. Further details are provided in our Engagement Summary - EAP.

As part of our phase 4 business options testing, we presented domestic and business customers with three options for the replacement of fluid filled cables:

- **Option 1:** maintain the same reliability of service as provided today and reducing oil leakage by 10% over 5 years (+£3.60 on annual bill);
- **Option 2:** maintain at least the same reliability of service as provided today and reduce oil leakage by 18% over 5 years (+£3.91 on annual bill); and
- **Option 3:** improve network reliability of service and reduce unplanned power cuts and reduce oil leakage by 24% over 5 years (+£5.63 on annual bill).

Option 1 (our least ambitious option) was the preferred option for both consumers and businesses, being chosen by 42% of consumers and 39% of businesses. Those remaining showed a preference for option 2 over option 3: 37% of consumers and 34% of businesses chose option 2. However, for both consumers and businesses, the strength of preference increased as the options became more ambitious, from option 1 through to option 3.

There is generally little demand to improve reliability in our regions as current levels are seen as good. As a result, customers we talked to as part of our qualitative engagement think that option 1 is good enough. Some feel that option 2 presents good “value for money”, relative to options 1 and 3. However, in the context of other initiatives, where a few pence was seen as achieving a lot of good, addressing oil leakage feels less cost-effective and so the least ambitious option is favoured. Awareness of oil leakage as an issue is very low, leading some customers to conclude that it can't be a big threat to the environment. Those that believe that every effort should be taken to protect the environment prefer option 3, but see a 24% reduction as insufficient.

This was also a difficult area to test with customers given that the options presented varied with respect to both reliability and environmental impact. In hindsight, conflating the replacement of our overall asset base with that of a specific asset class such as fluid filled cables made it difficult to analyse customer sentiment on these two issues quantitatively. However, the weight of evidence from our quantitative and qualitative insights suggests that we should be replacing our fluid filled cables at a level to maintain asset performance and reduce oil leakage by between 10% and 18% over the RIIO-ED2 period.

As part of our co-creation work with stakeholders in November and December 2020, there was general agreement with our approach to the management of fluid filled cables given the high costs. It was agreed that a pragmatic, strategic approach was needed.

Understanding best practice

It is imperative that the environmental impacts of cable fluid loss are managed effectively. We work with key stakeholders to share best practice and target the poorest performing circuits in our network. We:

- Have ongoing engagement with the Environment Agency at six-monthly meetings of the ENA Fluid Filled Cable Liaison Group where performance is reviewed and best practice is shared with the other DNOs.
- Provide regular updates to the Environment Agency on the mitigation in place on specific projects and on the progress of capital replacement and refurbishment of FFCs more generally.
- Are part of enduring consultation/knowledge sharing with other DNOs, on a six-monthly basis or as required, focusing on the delivery of specific projects where there are opportunities to share learning.
- Discuss individual poor performing circuits with local stakeholders including the Canal and River Trust and local authorities (as required).

Our plans for RIIO-ED2

On reflection, taking into consideration all our information sources, we concluded that engineering judgements regarding asset condition and network health and legislative requirements provided the weight of evidence to drive our strategy and ambition in this area. Customer insight has instead been used to cross reference our strategy to ensure we are not departing widely from their views. As expressed earlier, cost plays a significant factor in the replacement and refurbishment of these cables, and thus pressures on keeping customer bills low also provides useful framing.

The determination of this target has been an evolving process where we have continued to challenge ourselves at each stage of the development of our business plan. Since issuing our Initial Business Plan in July 2021, further consideration of environmental drivers alongside the overall network risk, has led us to identify further schemes to remove Fluid Filled Cables. As a result, we have revised our leakage reduction target up from 10%, to 15% over RIIO-ED2.

In making the trade-off between doing additional cable replacement which will improve resilience and reduce harmful environmental impacts against the additional investment and cost to customers, we have considered several factors. In summary, our strategy to target an improved 15% reduction in annual leaks by replacing 173km of fluid filled cables enables us to:

- Manage network risk within our accepted tolerance – our aim is to keep overall increase to network risk below 5% by the end of RIIO-ED2. Cable replacements are a key part of achieving this target, particularly in our LPN and SPN regions (accounting for 42% and 31% of the risk reduction respectively). Our plans also enable us to deliver work over multiple price controls rather than back-end loading volumes into RIIO-ED3 and beyond at the expense of future customers.
- Set a target that is ambitious compared to prior performance and in line with industry proposals put forward by other DNOs.
- Deliver the investment of £155m.
- Ensure we can still deliver the overall programme of investment needed given the wider context of Net Zero. Our workforce resilience planning has given us confidence that we can increase our resources (both directly and through our supply chain) to flex up to deliver the scale of potential investment.
- Deliver on customer priorities. Our engagement with customers taught us that our customers care about the environment and the proposed investment will deliver on this along with their view that a reliable supply is seen as a base requirement.

In determining which of our cables warrant replacement, we will take a number of factors into account including the:

- Rate of leakage.
- Environmental sensitivity of the location.

Our proposed business plan actions include a programme of efficient replacement and sharper operational response to reduce fluid leaking from cables, targeting the replacement of cables that will be most effective at reducing environmental impact. Furthermore, we will seek to deploy innovations as appropriate.

As well as reducing the leakage of oil into the environment, this programme will also maintain network reliability and provide climate resilience benefits as the risk of failure of our fluid filled cables increases with the ground temperature changes/ground movement associated with climate change¹⁹.

The investment of £155m is included in our Asset Replacement cost forecast. Further information is provided in the relevant Engineering Justification Papers²⁰.

¹⁹ Further details are provided in Appendix 14: Climate change adaptation strategy.

²⁰ For Fluid Filled Cables: 12 EJPs: ED2-EJP-AS-037, ED2-EJP-AS-038, ED2-EJP-AS-039, ED2-EJP-AS-040, ED2-EJP-AS-042, ED2-EJP-AS-043, ED2-EJP-AS-046, ED2-EJP-AS-047, ED2-EJP-AS-050, ED2-EJP-AS-074, ED2-EJP-AS-095, ED2-EJP-AS-095: FFC Replacement Programme Paper.

14.3. Action 15: Reducing noise pollution for our customers

Summary – At a glance

Reduce Pollution

Our proactive approach and quick response to noise complaints will reduce noise pollution for our customers.

We take a proactive, preventative, approach to noise mitigation while also reviewing all noise complaints as they arise to determine if our equipment and operations are the source of noise pollution.

We will continue our work to engage local authority Environmental Health Officers and other interested parties to improve understanding of the operational requirements of our substations and to identify suitable substation noise mitigation measures. This includes proactive identification of areas in proximity to our substations that are earmarked for residential development. This enables us to engage local authorities to ensure the ‘agent of change’ implements appropriate mitigation measures.

Why is reducing noise pollution important?

Exposure to prolonged or excessive noise has been shown to cause a range of health problems ranging from stress, poor concentration, productivity losses in the workplace, communication difficulties and fatigue from lack of sleep. In 2011, the World Health Organisation published a report on the burden of disease from environmental noise that quantified the healthy years of life lost in Western European countries as a result of environmental noise²¹. Available assessments place the burden of disease from environmental noise as the second highest after air pollution, with implications for heart disease, sleep disturbance and annoyance.

What did we achieve in RIIO-ED1?

Throughout RIIO-ED1, we investigated all noise complaints related to our substations to establish whether a statutory nuisance exists as defined by the Environmental Protection Act Part III Section 79 (g).

Low frequency noise cannot be adequately assessed against the standards commonly used to evaluate environmental noise (BS 4142). Instead, we use the criterion curves in the procedure for the assessment of low frequency noise complaints (NANR45). Salford University were commissioned by Defra to produce this guidance for use by Environmental Health practitioners in the UK.

We take every opportunity to positively engage local authorities and offer to deliver presentations to their Environmental Health Officers covering low frequency noise and other relevant topics. These are generally well received; particularly as low frequency noise is a specialised area of which most environmental health officers have limited experience. We aim to continue and develop this engagement into RIIO-ED2.

In February 2019, the National Planning Policy Framework was revised and there is now an expectation that developers will take responsibility for mitigating the impact of noise arising from existing businesses on the residents of new developments.

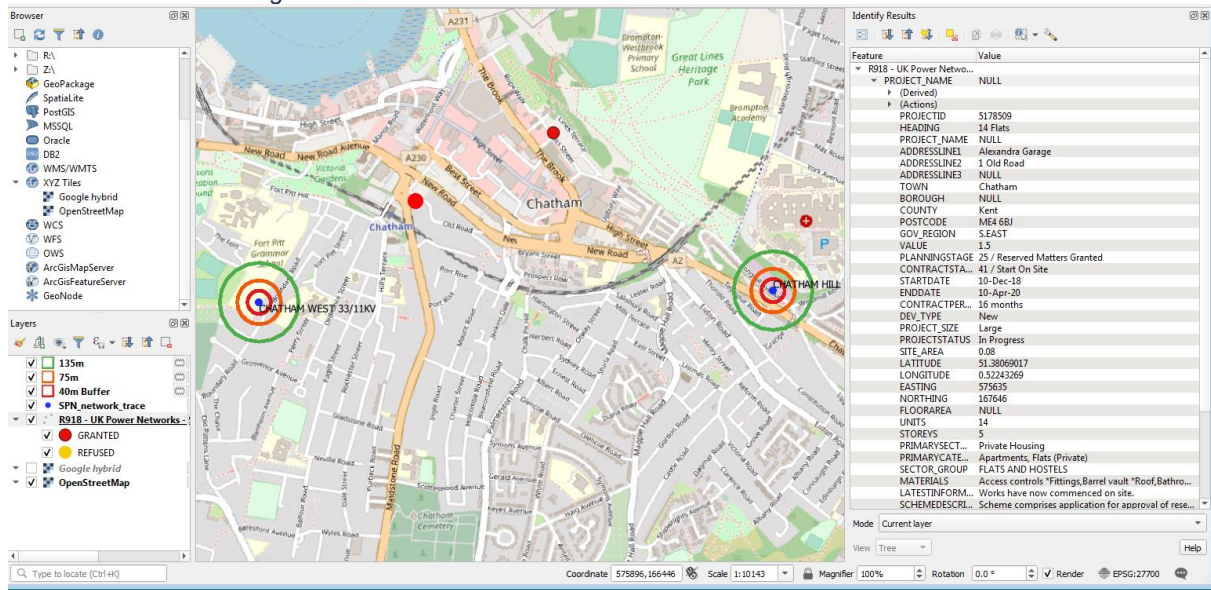
“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

We always aim to engage with Local Authorities and developers and work with them to identify a workable solution and, where appropriate, facilitate installation of mitigation as near to the source as possible.

We have a project to identify sites in local authorities’ Strategic Housing Land Availability Assessments (SHLAA) that are close to existing grid or primary substations. We are utilising a geospatial application to overlay main substations and SHLAA data, as in the example below, to identify sites that may require further acoustic investigation. This will enable us to engage with local authorities before planning decisions are made and recommend appropriate planning conditions for future developments.

²¹ https://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf

Figure 12: Example output from a geospatial application that overlays substation and SHLAA data to identify sites that may require further acoustic investigation

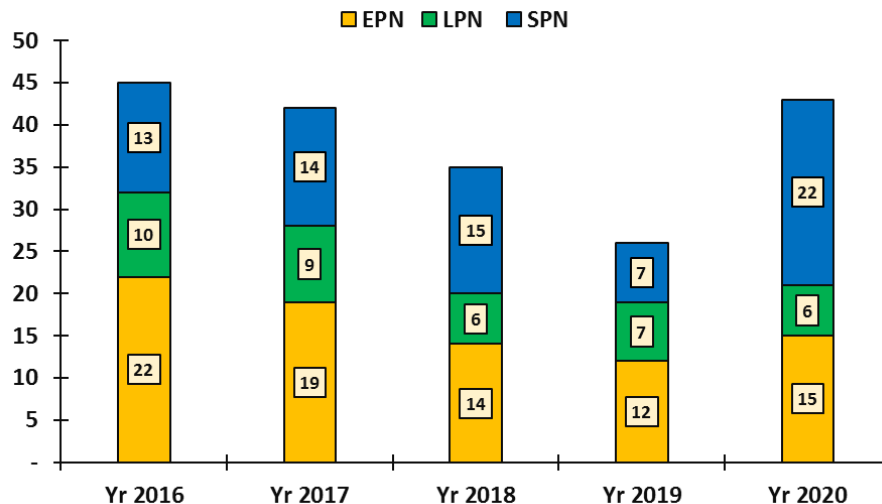


The National Planning Policy Framework confirms that noise mitigation is to be completed by the developer. We will ensure that these costs are not indirectly passed on to our customers.

Customer and stakeholder engagement

We have over 130,000 substations ranging from 132kv to 11kv across the three regions our licence covers. On average, we receive approximately 35 to 40 complaints a year directly related to noise concerns. Of these a handful require an intervention after investigation. This is normally 4 to incidences 7 per annum. As Figure 13 below demonstrates, this level is fairly consistent. However, we have experienced an increase in 2020/21 which we attribute to the recent rise in the number of people working from home.

Figure 13: Noise complaints received by UK Power Networks



Our plans for RIIO-ED2

While our historical data demonstrates that we receive a very low number of noise complaints, we are committed to a proactive approach to tackling noise pollution.

Key to our proactive approach is the identification and avoidance of potential issues arising from house building and development, that we forecast to continue apace in our region.

However, there will be cases where preventative measures have not been possible, our equipment is the cause of the low frequency noise, and the noise exceeds the NANR45 limits outlined above. In these cases, we will assess whether transformer replacement, the installation of acoustic screens for primary substations or anti-vibration pads for secondary substations would make a measurable difference to noise levels.

Determining that a measurable difference will result is particularly important for the deployment of acoustic screens and enclosing substations. This is because they are not always the optimum solution given they require plant to provide cooling, heating, fans and dehumidification. Additionally, this ancillary equipment can itself cause noise issues. Additionally, prior to the implementation of these mitigants, consideration must be given to the high levels of embodied carbon and operational carbon emissions that result from these mitigation measures.

The third, and preferred, option is transformer replacement where such replacement is viable as replacement eliminates the noise problem.

As transformers have a long asset life, the feasibility of replacement is based on consideration of factors including age, performance, need and noise complaints. Feasibility is assessed through review of our network asset management plan and consideration of the health indices of the transformer. Where we can replace aging transformers with more efficient, low loss transformers that are less likely to result in low level noise issues we will do so.

Finally, it is also important to note that our proposed generator modernisation programme, will have the indirect benefit of reducing the noise emitted by our suite of generators.

We will report annually on our actions to reduce noise pollution via our generator modernisation programme, noise mitigation measures, and proactive engagement approaches.

The cost of these initiatives will be part of our business as usual costs, and therefore we are not requesting specific funding during RIIO-ED2.

Regional aspects of our RIIO-ED2 plans

As Figure 13 above shows, we typically receive fewer noise complaints from customers in our LPN region. We expect this trend to continue into RIIO-ED2, and as such, anticipate fewer sites requiring mitigation in the LPN region.

14.4. Action 16: Reducing PCB pollution

Summary – At a glance

Reduce Pollution

We will work in partnership with our supply chain and waste carriers to remove/decontaminate all equipment containing PCBs before the statutory deadline.

Polychlorinated Biphenyls (PCBs) are persistent organic pollutants (POPs) that accumulate in ecosystems, entering the food chain. EU and domestic regulation mean that equipment which contains PCBs at a concentration greater than 0.005% must be decontaminated and removed from the electricity network by the end of 2025.

To meet this regulatory deadline we have sampled most of the ground mounted transformers on our network and are using a statistical model to identify contaminated pole mounted transformers. We are working with our supply chain partners to remove these units by the end of 2024.

Why is reducing PCBs important?

PCBs have been in use since 1929 and have been used in transformers, capacitors, plasticisers, inks, adhesives, paints and flame-retardant materials. PCBs are resistant to heat, acids and bases and do not easily break down in the environment. Consequently, they persist in aquatic environments, soils, and sediments. This means they enter the food chain, accumulating in the fatty tissues and organs of animals and humans. For this reason, they are classed as POPs.

PCBs have been shown to have a negative impact on human health with people exposed to high levels of PCBs often developing rashes or other skin conditions such as Chloracne. PCBs are classed as carcinogenic and long-term, low level exposure to PCBs has been shown to damage the liver, impair the immune system, and have mutagenic effects by interfering with hormones in the body.

The impact on aquatic and terrestrial organisms is similar to the impact on humans. As a result, the bio-accumulation of PCBs in the food chain is of significant concern as ingestion is the main source of exposure for humans.

In the UK, the sale of equipment and products containing PCBs was progressively reduced and in 1972 discontinued for open applications, with the sales of UK manufactured materials ceasing in 1977. PCBs were eventually banned under the Stockholm Convention in 1987.

The Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances) (England and Wales) (Amendment) Regulations 2000 (SI 2000/1043) place specific duties on us to:

- Identify PCBs in our network apparatus.

- Test for PCB concentration.
- Label equipment containing PCBs.
- Create and maintain a register of the equipment containing PCBs.
- Specify when we intend to have disposed of PCBs or decontaminated equipment.
- Report regularly to the Environment Agency on progress in removing PCBs.

In addition, these regulations were amended in 2020 (SI 2020/489) requiring holders to remove all PCB contaminated equipment containing more than 0.005% PCBs by the end of 2025. Prior to this, DNOs could register items contaminated with PCBs (50 to 500ppm) on their network until they were removed. The changes to the legislation bring forward the removal or decontamination of thousands of units within a very short timeframe.

What did we achieve in RIIO-ED1?

We have taken a systematic approach to dealing with PCB contaminated equipment on our network. We have begun to address PCB use in:

- Ground mounted transformers.
- Pole mounted transformers.
- Circuit breakers, switchgear and associated voltage transformers.
- Capacitors and capacitor voltage transformers.

Our register of PCB contaminated equipment contains: the type of equipment; a unique equipment reference number or serial number; and the item's location. All equipment for which test results indicate PCB contamination greater than 500ppm is removed from the network by our licensed hazardous waste contractors. Items containing concentrations between 50 and 500ppm are placed on the register until such time as they are removed.

All grid and primary transformers have been tested for PCB contamination and the results are held on our Asset Management Database.

We have adopted a statistical modelling method to determine the likelihood and concentration of PCBs in all pole mounted transformers on our network. This assessment, which has categorised results into cohorts, is based on the equipment age and manufacturer.

The development of our plans to remove or decontaminate the units that sit within the 50 to 500ppm range is ongoing. Our aim is to remove them all from the network by the end of 2024.

We will continue to work with the Energy Networks Association and the Environment Agency to monitor progress as our removal timeframe is subject to the relevant funding mechanisms and the capacity and capability of UK supply chains to meet the challenge of removing the estimated 300,000 units that still contain PCBs nationwide.

This asset replacement programme will cost £45.2m (note total does not match sum of parts due to rounding), which is included in our Environmental Reporting cost forecast. We are also proposing that this expenditure is subject to a Price Control Deliverable (PCD) to manage the risk that fewer asset replacements are required once more detailed testing data is available.

Further details are provided in our Engineering Justification Paper: ED2-EJP-AS-093 – PCB Removal Programme.

Regional aspects of our RIIO-ED2 plans

Our proposed regional PCB investment is:

- LPN: £2.7m
- EPN: £30.6m
- SPN: £12.0m

14.5. Action 17: Improving visual amenity

Reduce Pollution

We will continue to facilitate the undergrounding of nominated schemes to remove overhead lines with AONB and National Parks.

Commitment EAP10

We will continue to facilitate the undergrounding of nominated schemes to remove overhead lines within AONB and National Parks, working closely with all relevant stakeholders to ensure that the full allowance is spent to maximise the benefits of works within our protected landscapes.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
£14.3m	Use it or lose it allowance	We will remove overhead lines that have the highest impact on natural spaces.	Scheme assessments are performed by stakeholders: a Steering Group of AONBs and National Parks, chaired by Natural England.

Our footprint covers an area with a rich diversity of landscapes from the urban landscapes of London through to the rolling chalk ridges of the South Downs and the idyllic wetland areas of the Broads. In the East of England there are 1894km of overhead lines in national parks and AONBs (4.51% of the national total)²². In the South East there are 5,079km of overhead lines in national parks and AONBs (11.62% of the national total).

Since 2005, Ofgem has granted distribution network operators (DNOs) a special allowance to replace overhead lines with underground cables in Areas of Outstanding Natural Beauty (AONB) and national parks. The allowance, assumed for RIIO-ED2 to be £14.3m for UK Power Networks²³, encourages electricity distribution companies to underground power lines to enhance the appearance of protected landscapes.

We have been an industry leader in establishing an effective method of working with the officers of the relevant protected landscapes to deliver such projects. Since 2005, officers from The Broads; Chilterns; Dedham Vale; Norfolk Coast; Suffolk Coast and Heaths (in the East of England) and High Weald; Kent Downs; Surrey Hills and the South Downs (in the South East) have worked closely with us to deliver the selected projects. This long-established Steering Group of AONBs and National Parks in the EPN and SPN licence areas, is chaired and facilitated by Natural England who has a national remit to advise on the management of designated landscapes. The group meets every three months.

We hold the position of a non-voting member in this group, providing technical support and guidance for scheme assessments as well as costings for completing the work. The level of support we provide varies from scheme to scheme but will always include the provision of a route for the new cable network and the estimated cost of carrying out the work. Voting arrangements have been expanded to enable Steering Group members to vote on schemes outside of their respective DNO areas, and schemes are passed by an overall voting majority.

All new schemes proposed by Steering Group members must undergo a two-stage approval process:

- Stage 1: This is an outline of the scheme which includes indicative routes and budget costs for consultation with stakeholders. The scheme budget is ring-fenced.
- Stage 2: This is triggered once stakeholders have been consulted, the final cable route/extent of the scheme has been determined, and the scheme has been assessed in terms of applicable scoring criteria and costs.

Approved schemes (those that have completed Stage 2) are referred to us so that we can acquire the necessary consents to deliver the works. During the consenting and delivery phases we work closely with each scheme's proposer on any material issues that arise, such as the re-routing of a proposed cable or the relocation of a substation.

Projects are assessed against a range of scoring criteria before they can be considered for selection. During this process, factors such as the impact on a landscape's character, the impact on visual amenity and the potential impact of undergrounding on features in the landscape (either biodiversity or heritage) are taken into account. To be eligible for selection, a scheme must attain a minimum score of nine points out of a maximum of 48.

²² In 2020, the Suffolk Coast and Heaths AONB was expanded by approximately 38 square km.

²³ To be confirmed by Ofgem – subject to revision to reflect expansion of Suffolk Coast and Heaths AONB.

Schemes are nominally capped at a cost of £200k per kilometre. However, some schemes, through the technicalities of delivering the work, may represent a value greater than the upper limit and the Steering Group has the discretion to exceed the cap should the scheme warrant it.

Scores, feedback and supporting evidence are recorded. Throughout the scoring process the Steering Group members debate whether all relevant factors have been taken into account and any related issues resolved. A related issue could be whether or not the removal of the overhead line is being carried out in conjunction with other work, such as improvements to facilities to increase visitor numbers to a heritage site.

Charge Restriction Condition (CRC) 3J of the Distribution Licence allows DNOs to spend up to 10% of their allocated expenditure on undergrounding lines which extend beyond the boundaries of Designated Areas.

Options analysis

As part of developing our plans for RIIO-ED2, alternative options were worked up to guide our strategy development. The options considered for undergrounding in AONBs and national parks are provided below in Table 9. Further details are provided in our Engineering Justification Paper: ED2-EJP-NP-009 – AONB network undergrounding.

Table 9: Options considered for undergrounding in AONB and national parks

	Option 1	Option 2	Option 3
Activity description	Projects selected by Steering Group - This option looks to underground overhead lines situated in AONBs and national parks selected and prioritised through the steering group.	Projects selected by Steering Group but 10% budget ring fenced - This options looks to underground overhead lines situated in AONBs and national parks with 10% of the budget 'ring fenced' to take advantage of opportunities that will arise from routine activities taking place within the boundary of a NP or AONB.	Projects selected unilaterally by UK Power Networks - This option looks to underground overhead lines situated in AONBs and national parks selected unilaterally by UK Power Networks prioritised based on CI/CML and optimising cost/span.
Costs	Investing the full allowance of £14.3m over the RIIO-ED2 period.	Investing the full allowance of £14.3m over the RIIO-ED2 period.	Investing the full allowance of £14.3m over the RIIO-ED2 period.
Benefits	<ul style="list-style-type: none"> Improved visual amenity Increased resilience 	<ul style="list-style-type: none"> Improved visual amenity Increased resilience Greater cost effectiveness – 10% ring-fence allows synergies with routine activities. 	<ul style="list-style-type: none"> Improved visual amenity Increased resilience

Our plans for RIIO-ED2

We will continue to facilitate the undergrounding of nominated schemes to remove overhead lines within AONB and National Parks, working closely with all relevant stakeholders to ensure that the full allowance is spent to maximise the benefits of works within our protected landscapes.

We will do this by:

- Meeting quarterly with our dedicated under-grounding Steering Group, chaired and facilitated by Natural England.
- Applying our learning from RIIO-ED1 to produce a smoother process of delivering schemes.
- Working now to identify those areas that would deliver the greatest visual amenity benefit.

Adopting this process will mean we can hit the ground running at the start of RIIO-ED2. Additionally, if unforeseen circumstances should delay these works, any unspent allowances will be returned to customers, protecting them from unnecessary costs.

Consistent with option 2 above, we are proposing an investment of £14.3m (our use-it-or-lose-it allowance) to remove overhead lines with 10% of the total investment 'ring fenced' to take advantage of opportunities that may arise by either extending undergrounding or undergrounding instead of replacing/re-aligning an overhead line.

Works involving either undergrounding of lines or where an exemption from Section 37(1) Electricity Act 1989 for the replacement/re-alignment of an overhead line has been sought, will be brought to the attention of the relevant national park or AONB in order to see if there would be any merit in extending works. In order to fast track these decisions, other than the individual national park / AONB, the steering group would not be consulted.

The Steering Group decisions will drive the projects being delivered in the RIIO-ED2 period. Consequently, the volumes will be dependent upon the voltage level of assets being undergrounded and the complexity of the individual projects.

Regional aspects of our RIIO-ED2 plans

There are no AONBs or national parks in our LPN area.

In our EPN area, there are 1894km of overhead lines in National parks and AONBs (4.51% of the national total).

In our SPN area, there are 5,079km of overhead lines in national parks and AONBs (11.62% of the national total).

We anticipate that our RIIO-ED2 proposals would involve spend of £6.9m and £7.4m in EPN and SPN respectively.

15. Links to the rest of our RIIO-ED2 business plan

We have not developed our Environmental Action Plan in isolation. This strategy has been developed in coordination with every area of our business. The actions within our Environmental Action Plan will have implications across our business. For example:

- Our proposed actions on Fluid Filled Cables and SF6 have links to the NARMS framework for asset replacement.
- Our fleet and generator proposals will affect our ways of working across the business.

Furthermore, we are embedding environmental considerations into our decision-making processes. For example, we have considered carbon in our cost benefit analysis tools to inform our business planning.

Learning from other leading organisations, we are exploring the option to apply an internal price of carbon across the business to ensure that all business decisions reflect our carbon impact and that we promote continuous improvement in our approach to mitigating this impact.

The following chapters of our plan build upon the content of our Environmental Action Plan, or further explain our role in relation to the environment:

- Section 12.1 Whole Systems, and the associated appendix: detail our strategy for facilitating the transition to Net Zero.
- Chapter 10: Maintaining a safe and resilient network explains how we plan to ensure that our business is resilient to the consequences of climate change and provides an overview of the NARMS framework. In this chapter (section 10.6: Workforce resilience), we also explain how we will ensure that our staff have the skills to understand and embrace new environmental requirements.

The conclusions that we have reached in this plan build upon analysis which is presented in the following supporting documents:

- Engagement Summary - EAP
- Line of Sight - EAP
- Engineering Justification Papers:
 - For decarbonising our business transport: ED2-IJP-05-Fleet
 - For modernising our generators: ED2-CBA-EAP
 - For losses: ED2-EJP-SG-012
 - For Fluid Filled Cables: 12 EJPs: ED2-EJP-AS-037, ED2-EJP-AS-038, ED2-EJP-AS-039, ED2-EJP-AS-040, ED2-EJP-AS-042, ED2-EJP-AS-043, ED2-EJP-AS-046, ED2-EJP-AS-047, ED2-EJP-AS-050, ED2-EJP-AS-074, ED2-EJP-AS-095, ED2-EJP-AS-095: FFC Replacement Programme Paper.
 - PCB removal programme: ED2-EJP-AS-093.
 - For improving visual amenity: ED2-EJP-NP-009.

Further details of our asset replacement programme are provided in Appendix 10a: Non load overarching investment framework.

In addition to the carbon emission related activities detailed in this Environmental Action Plan, we also outline in the table below where Cost Benefit Analyses from the wider Business Plan have considered the impact on carbon emissions in the options analysis.

ID	EJP title	Source of carbon savings
ED2-EJP-AS-002	Dartford Grid A - Replace GT1A/2A/3A/4A	Losses
ED2-EJP-AS-003	Beddington - Replace GT1A/GT2A	Losses
ED2-EJP-AS-004	Sydenham Park 33kV - Replace GT1B/GT2B	Losses
ED2-EJP-AS-006	Back Hill A - Replace GT1A/2A/3A/4A	Losses
ED2-EJP-AS-007	Kings Lynn Grid - Replace GT1/GT2	Losses
ED2-EJP-AS-008	Bulwer St - Replace GT1/GT2/GT3/GT4	Losses
ED2-EJP-AS-013	Southend 132/33kV - Repl GT1B/GT2B	Losses
ED2-EJP-EP-002	Portland House Primary (new site)	Losses
ED2-EJP-LP-014	Moscow Road	Losses
ED2-EJP-SP-009	Brighton Town 11kv SWG	Losses
ED2-EJP-SP-011	Grain 132kV circuit from NG site	Losses
ED2-EJP-NP-102	Off gas grid	EVs and HPs
ED2-IJP-SG-008	DSO	Faster DG connections

Note that the consideration of Losses in the schemes outlined above were not used to justify a different approach, instead they quantify the consequential reduction in Losses from schemes justified by different drivers. For this reason they are not included in the Losses action described earlier in this document.

Annex 1: Summary table of key actions and metrics

Deliverables										
Impact Area	DNO Deliverables/Initiatives	ED1		ED2				Environmental Action Plan		
		ED1 to date	ED1 forecast	ED2 Target	ED2 Delivery Date	Relevant performance measure (units)	Costs (£)	Consumer and environmental benefits	Page/section reference	Relevant annex
BCF	Decarbonisation Action 1 - Setting our targets for decarbonisation	N/A	N/A	28.00%	2028	% reduction in tCO2e	£0	Customers will benefit from an overall reduction in our environmental impact, alongside improved air quality and associated health impacts. Our target will deliver a combined reduction of 28% (equivalent to 565,550t/CO2) compared to 2018/19 levels. This is the equivalent of taking 211,223 medium diesel cars off the road.	Section 11.1 Page 30	
	Decarbonisation Action 2 Decarbonising our business transport	20,212	17,095	10,840	2028	tCO2e	£17,890,000		Section 11.2 Page 34	ED2-IJP-05-Fleet
	Decarbonisation Action 3 -Modernising our generators	8,564	9,540	7,092	2028	tCO2e	£200,000		Section 11.3 Page 37	
	Decarbonisation Action 4 - Increasing the energy efficiency of our occupied buildings	2,565	2,252	1,022	2028	tCO2e	£0		Section 11.4 Page 38	
	Decarbonisation Action 5 - Improving energy efficiency at our substations	10,733	9,862	5,099	2028	tCO2e	£0		Section 11.5 Page 40	
	Decarbonisation Action 6 - Sulphur Hexafluoride (SF6)	2,645	1,817	1,409	2028	tCO2e	£5,987,595		Section 11.6 Page 41	
	Decarbonisation Action 7 - Supply chain and scope 3	N/A	437,001	364,168	2028	tCO2e	£0		Section 11.7 Page 43	
	Decarbonisation Action 9 - Carbon offsetting	N/A	N/A	19,340	2028	tCO2e	£700,000		Section 11.9 Page 48	
Losses	Decarbonisation Action 10 - Losses	16,394	23,129	10,460	2028	MWh	£6,264,749	Section 11.10 Page 49		
Embodied Carbon	Decarbonisation Action 8 - Embodied Carbon	N/A	N/A	TBC	TBC	TBC	£0	Section 11.8 Page 46		
Supply Chain	See Decarbonisation Action 7 and Action 11	See above			N/A	N/A	£0	Section 11.7 and 12.1 Pages 43 and 53		

Resource use/waste	Action 11 - Circular Economy Resource Use, Waste & Water	N/A	60%	80%	2028	% recycled	£0	We will reduce the amount of single-use packaging produced and also reduce the amount of plastic waste at risk of entering the wider environment, which would otherwise cause harm. By recycling we will reduce the demand on natural resources and simultaneously reduce waste being handled through landfill.	Section 12.1 Page 53	
Biodiversity and Natural Capital	Action 12- Biodiversity Net Gain	100 sites identified, 5 sites complete	100 sites identified, 8 sites complete	Biodiversity increased at 100 sites and 100 additional sites identified	2028	No. Sites	£500,000	Improved biodiversity increases the resilience of nature at our substation developments to external shocks. We will quantify benefits using the DEFRA tool to increase biodiversity by at least twice the legal requirements.	Section 13.1 Page 57	
Fluid-filled cables	Action 14: Reducing leakage from fluid filled cables	213,553	176,108	149,692	2028	litres	£155,042,524	Reductions in fluid leaks from our cables will reduce the negative impact of such events on the environment within our local area.	Section 14.2 Page 62	Multiple EJPs. See page 71
SF6	See Decarbonisation Action 6	See above			2028	N/A	£0	See BCF benefits above.	Section 11.6 Page 41	Appendix 10a: Non load overarching investment framework
Noise pollution	Action 15: Reducing noise pollution for our customers	N/A			N/A	N/A	£0	Our proactive approach and quick response to noise complaints will reduce noise pollution for our customers.	Section 14.3 Page 65	

PCBs	Action 16: Reducing PCB pollution	Meeting legislative deadline			2025	Meeting legislative deadline	£45,241,436	We will work in partnership with our supply chain and waste carriers to remove/decontaminate all equipment containing PCBs before the statutory deadline to reduce contamination of the environment.	Section 14.4 Page 67	ED2-EJP-AS-093
Visual Amenity	Action 17: Improving visual amenity	26	N/A	N/A	2028	km	£14,300,000	We will remove overhead lines that have the highest impact on natural spaces, improving the visual amenity for our customers and the wider population visiting AONBs and National Parks across our footprint.	Section 14.5 Page 69	ED2-EJP-NP-009
Air Quality	Action -13 Addressing air quality	N/A	N/A	33% reduction	2028	% reduction	£0	Reduced NOx emissions will improve air quality across our networks for our customers. We have calculated the social value of the improved health of the communities we serve to be £6.53m (undiscounted) from this commitment.	Section 14.1 Page 60	

The values in this table have been provided on the basis of the template. However, many of our actions and commitments will not directly correlate with the values provided here as they may have baselines other than the starting point of RIIO-ED2. For example our actions and commitments related to carbon reduction use our Science Based Target baseline year of 2018/19.

Annex 2: Consideration of a balanced scorecard financial incentive

In its RIIO-ED2 Methodology Decision, Ofgem confirmed its intention to introduce a financial environmental incentive (ODI-F), in the form of a scorecard, for activities in scope where performance is controllable and measurable and where there is sufficient data to enable robust targets to be set.

The scope and nature of such an incentive has been the subject of preliminary discussions between DNOs and Ofgem at the Decarbonisation and Environment Working Group. Key questions that Ofgem is seeking answers to are:

- How can the ODI-F be designed to be meaningful and proportionate to drive ambitious action across the impact areas?
- How can the issues outlined by DNOs be overcome to develop a common ODI-F?

We have therefore considered which metrics might be appropriate for inclusion in an environmental scorecard financial incentive, by considering whether the metric to be incentivised is:

- **Proportionate:** How material are the costs associated with the metric? Are the costs being incentivised too low to justify the complexity of an incentive? Conversely, are the costs of improving performance so high that an incentive is unlikely to change behaviour?
- **Controllable:** Are DNOs able to directly control their performance in this area?
- **Symmetrical:** Is there scope for both upside and downside performance around the specified targets, such that a symmetrical incentive could be implemented?
- **Necessary:** Is it necessary to implement an incentive in this area to achieve an improvement in performance, or are DNOs already incentivised to improve as a result of cost savings?
- **Measurable / practical:** Is it possible to reliably measure the relevant metric to enable comparability across all DNOs?

Following consideration of each of these factors, we believe that a narrowly defined scorecard should be implemented that focuses on the following metrics in the first instance:

- Reduction in operational transport emissions (CO₂, NO_x and particulates) from road vehicle fleet.
- Reduction in temporary generation emissions (CO₂, NO_x and particulates).
- Operational (network and depot) and office waste recycling.
- Increase in “biodiversity units” at existing sites.

We do not believe that incentivisation of occupied building, substation and depot energy use or water use is necessary as improving performance in these areas will yield cost savings for the DNO. Furthermore, water use is not sufficiently material to justify an incentive and nor is reduction in business mileage emissions. We also agree that many of the areas that require capital investment, such as improvement in performance with respect to SF₆, PCBs, oil leakage from fluid filled cables or losses, would not benefit from inclusion in a balanced scorecard incentive given the scale of costs involved.

We do believe that incentivisation of scope 3 emissions and embodied carbon is desirable, but it is not clear that there is sufficient capability to ensure measurable and comparable data collection in these areas across the industry at this time. However, we believe that DNOs should work together to ensure robust data in these areas to facilitate incentivisation as soon as practicable.

The table below details our 2028 targets for the metrics that we are proposing for immediate inclusion in the scorecard.

Targets for possible scorecard metrics

	2028 target	Commentary
% reduction in operational transport emissions from road vehicle fleet (relative to 2018/19 baseline)	49%	Incentive rate based on emissions of CO ₂ , NO _x and particulates. Out of scope: contractor business emissions.
% reduction in generator emissions (relative to 2018/19 baseline)	36%	Incentive rate based on emissions of CO ₂ , NO _x and particulates. Out of scope: emissions from fixed generation, generators used for extreme weather events and fuel-drive tools.
Recycling rate for office, depot and network waste	80%	Out of scope: streetworks, waste sent for incineration.
Biodiversity units	135 Biodiversity units (BUs) [#]	Average value per BU based on Defra valuations (£1395 / BU p.a.) over a 30 year period.

[#] Our target to increase biodiversity net gain at 100 existing sites by an overall net-gain of 30% is equivalent to 135 biodiversity units.

Annex 3: Ofgem Business Plan Guidance and Baseline Requirements

The table below details the requirements for this Environmental Action Plan (EAP) as set out by Ofgem in its business plan guidance, as published in April 2021. For each requirement, we provide a page reference and link to facilitate navigation of the EAP.

Delivering an environmentally sustainable network: Business Plan Guidance, Section 3 (3.32 – 3.34)	Section reference
Submitting an Environmental Action Plan (EAP) is a minimum requirement under Stage 1 of the BPI. An EAP in the Business Plan should encompass activities DNOs intend to undertake in RIIO-ED2 to decarbonise the electricity distribution network and to reduce the wider impact of network activity on the environment. As a minimum requirement under Stage 1 of the BPI, a DNO's EAP must:	
include a methodology that has been used to assess the environmental impacts of the company's network and Business Plan in RIIO-ED2. The assessment methodology must set out: <ul style="list-style-type: none"> o a review of the significant environmental impacts arising from its network activity. o the opportunities and challenges for addressing material impact areas. o an options analysis to identify the value for money of initiatives to reduce its environmental impact. o evidence that consideration of impacts was coordinated with the company's wider business planning processes and decisions. o evidence that wider stakeholders have been involved in the assessment. 	8. How we have developed our strategy for RIIO-ED2
clarify the DNO's long-term overall targets/objectives for the network's environmental impacts, beyond the RIIO-ED2 period.	7.6 Our long-term environmental objectives
include an assessment of the network's potential environmental impacts in RIIO-ED2 without intervention, in comparison to its current impacts.	8.1 The need for action: environmental impact without intervention
set out the role the company envisages playing in supporting the low carbon energy transition.	3. Our position and role as a DNO
set out the deliverables, outputs and environmental benefits the company proposes to deliver from implementing the EAP.	10. Our commitments
set out clear links between the impact areas it has prioritised in the EAP, the deliverables and targets in RIIO-ED2, and how these are linked to the company's long-term environmental targets/objectives.	8. How we have developed our strategy for RIIO-ED2
We expect that EAPs will draw together the direct carbon impacts claimed in any relevant Engineering Justification Papers (EJPs) and Cost Benefit Analysis (CBA) submissions (for example losses, Electric Vehicle fleet) and will include a list of all such submissions where:	8. How we have developed our strategy for RIIO-ED2; and
carbon reduction is the main driver of the proposal.	15. Links to the rest of our RIIO-ED2 business plan
carbon reduction contributes to a substantial part of the benefits claimed by the projects.	
In developing their EAPs to meet the minimum requirement of Stage 1 of the BPI, companies must ensure their actions to address the specific activities in scope of the EAP demonstrate a level of ambition in line with the respective baseline expectation. The activities in scope and baseline expectations are outlined in Appendix 3.	See below.
Environmental Action Plan: baseline expectations (Appendix 3)	Section reference
DNOs' EAPs should be aligned to the baseline expectations set out below. The baseline expectations reflect the level of ambition we expect companies to demonstrate for individual areas.	-
Where a DNO considers the baseline expectation is not appropriate, the DNO should provide clear justification as to why this is the case. Where relevant, this should be supported by stakeholders and the DNO's CEG.	

Business carbon footprint (BCF)	
Adopt a science-based target for the company to reduce its scope 1 and 2 BCF by 20xx, without relying on international GHG offsetting, that is in line with Net Zero.	11. Decarbonisation in line with a science-based target to avoid irreversible damage to the environment
Commit to efficient and economic actions to reduce controllable BCF in RIIO-ED2.	
Identify metrics, and associated targets, for RIIO-ED2 to track the impact of implementing actions and the overall progress towards the science-based target and Net Zero.	
Commit to reporting on BCF reduction and progress towards science-based target and Net Zero using a common BCF methodology. Reporting should include progress in reducing scope 3 emissions.	
Sulphur Hexafluoride (SF6)	
Commit to implementing a strategy in RIIO-ED2 to manage SF6 on their network. This should include economic and efficient actions to reduce leakage rates and where appropriate, economic and efficient SF6 asset replacement.	11.6 Action 6: Sulphur Hexafluoride (SF6)
Adopt a target for SF6 leakage reduction.	
Commit to reporting on total SF6 bank and leakage reduction rates using a common DNO methodology.	
Losses	
Develop and commit to implementing a strategy to efficiently manage both technical and non-technical losses on the DNO's network over the long term. This should include specific actions and performance measures to track the impact of actions in RIIO-ED2.	11.10 Action 10: Losses
Commit to reporting on the progress of implementing the losses strategy and associated performance measures.	
Contribute to the evidence base on the proportion of losses that network companies can influence/control.	
Embodied carbon	
Commit to monitoring and reporting on embodied carbon in new projects	11.8 Action 8: Embodied carbon
Commit to collaborating with DNO's supply chain on addressing challenges to reduce embodied carbon in the network.	
Commit to establishing baseline and a target to reduce embodied carbon on new projects during RIIO-ED2.	
Supply chain management	
Adopt high standards of environmental management in supplier code, including requirements for public disclosure of metrics and cascading code to their suppliers that are material to company's inputs.	11.7 Action 7: Supply chain and scope 3 Appendix 22: Procurement code of conduct
Adopt target of more than 80% of suppliers (by value) meeting code in RIIO-ED2.	
Commit to reporting on actual percentage of suppliers (by value) meeting code.	
Resource use and waste	
Update procurement processes to embed Circular Economy principles.	12.1 Action 11: Circular economy, resource use, waste and water
Adopt a target for: o Zero waste to landfill by 20XX. o Recycled and reused materials as a percentage of total materials by 20XX.	
Commit to reporting on actual waste to landfill, recycling and reuse as a percentage of total.	
Biodiversity/natural capital	
Adopt appropriate tool to assess net changes in natural capital from different options for new connections and network projects.	13.1 Action 12: Biodiversity Net Gain
Adopt appropriate tool to monitor the provision of ecosystem services from network sites and report annually.	
Fluid-filled cables	
Adopt a target for reductions in the volume of fluid (oil) used to top up cables.	14.2 Reducing leakage from fluid filled cables
Noise pollution	
Commit to reporting on actions taken to reduce noise pollution.	14.3 Reducing noise pollution for our customers

Polychlorinated Biphenyls (PCBs)	
Commit to reporting on the volume of PCB-contaminated equipment on the network.	14.4 Action 16: Reducing PCB pollution

Annex 4: Assessing our impacts and progress to date (ISO 14001)

UK Power Networks has certified its Environmental Management System (EMS) to the international standard ISO 14001:2015 and has held this certification since 2003. This EMS is audited and assessed by DNV who are an independent UKAS certification body.

An integral part of this standard (clause 6.1.2) covers 'environmental aspects' whereby an organisation must identify those activities, products and services it can control and those that it can have influence on. An assessment must then be completed to determine what the impact is on the environment and its significance, both under normal and abnormal operations.

UK Power Networks has assessed its core activities against the key environmental aspects outlined below:

Aspects (how you interact with the Environment)	
Resource use (including energy, water, raw materials, Carbon/GHGs)	Waste (including solid and liquid)
Emissions to air	Statutory Nuisance (<i>Noise, vibration, dust, odour, EMF, visual impact and lighting</i>)
Emissions to water	Ecology (flora and fauna)
Emissions to land (contaminated land)	Archaeology, Cultural Heritage and Planning

When determining significance a standard 1 x 5 matrix has been utilised with the Likelihood of activity or incidents occurring compared against the Severity of negative impact providing a significance rating. Activities against the environmental aspects have then either been ranked as:

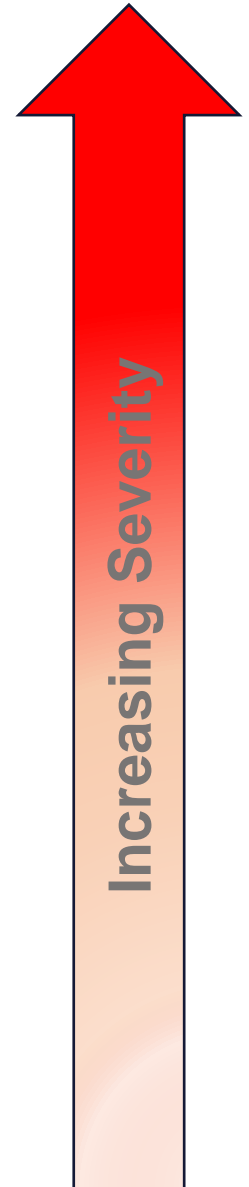
Rank	Rating
Very Significant	15-25
Significant	8-12
Not Significant	1-6

The most significant negative impacts our operational activity has is related to resource use (depletion of natural resources) and carbon emissions (see Carbon section). Followed by the subsequent generation of waste (hazardous and non-hazardous), then emissions to water (primarily from oil leaks) and emissions to air in terms of NOx and particulates from vehicle fleet and temporary generators, as well as SF6 leaks from switchgear. All aspects are addressed in our EMS and environmental action plan regardless of significant rating but those of higher significance are prioritised. There are also a number of positive impacts identified which relate to:

- Service provision of UK Power Networks as a DNO facilitating net zero for our customers and society.
- Street works recovery of spoil, screening and reuse as back fill.
- Road vehicle fleet and introduction of low emissions vehicles.
- Substations and provision of ecological features to improve biodiversity value.
- Recycling and recovery services, especially for transformers, switch gear and non-hazardous wastes.
- Undergrounding Overhead Lines (OHLs) to improve visual amenity

A summary of the environmental aspects, activities and impacts is outlined below.

Rank	Aspect	Core Activity: Significant Impact
1	Resource use (including energy, water, raw materials, Carbon/GHGs)	Substations maintenance, Distribution & network Losses Road vehicle fleet Street works and excavations Procurement/supply chain and Deliveries Fluid Filled Cables Connections & temporary generators Asset management & network design Buildings and Depots
2	Waste (Solid & Liquid)	Buildings and FM (hard\soft services) Depots Logistics Sites Street works Asset management, network design & equipment specification Substations maintenance Network Protection (vegetation clearance) Construction & Demolition
3	Emissions to Water	Fluid Filled Cables Substations maintenance\leaks Asset management, network design & equipment specification Protection of network (Transformer theft, damage)
4	Emissions to Air	Road Vehicle Fleet (NOx, PM10s\2.5s) Substations maintenance, distribution of power (SF6) Connections & temporary generators Procurement (Supply Chain) Deliveries\collection of waste vehicle movements
5	Emissions to Land	Fluid Filled Cables Substations maintenance\leaks Asset Management, Network Design & Equipment
6	Ecology	Landscape and Groundworks Street works (tree roots) Protection of Network (vegetation) Overhead Line Network (bird strike)
7	Statutory Nuisance	Protection of Network (fly tipping) Construction & Demolition Street works (noise/dust) Overhead Line Network (visual Amenity) Connections & temporary generators (noise) Buildings and depots (deliveries/vehicle movements)
8	Archaeology, Cultural Heritage, Planning	Street works Construction & Demolition Overhead Line Network (amenity)



Key All Impacts Normal Operations										
	VS 25	Very Significant ranked at 25	S	Significant ranked 10-12	NS	Not significant				
	VS	Very Significant ranked at 15-20	S	Significant ranked 8-9	(I/D) (I)	Indirect/Direct Indirect				
Normal Operations - Negative Environmental Impacts										
Aspect Activity	Resource Use (including energy, water, raw materials, carbon/GHG)	Emissions to Air	Emissions to Water	Emissions to Land	Waste (solid/liquid)	Statutory Nuisance	Ecology	Archaeology, Cultural Heritage, Planning	Score	Rank
Buildings - Property FM Hard Services	VS 15-20	S 10-12	S 8-9	S 8-9	VS-25	S 8-9	No	NS 1-6	90	6
Buildings - Property Soft Services	S 8-9	NS 1-6	NS 1-6	S 8-9	VS 15-20	NS 1-6	No	No	56	16
Office, (Call Centres), Support Functions	VS 15-20	S 10-12 (I)	S 8-9	No	S 8-9	No	No	No	50	17
Landscape and Groundworks (all sites)	S 8-9	NS 1-6	S 8-9	NS 1-6	S 8-9	NS 1-6	VS 15-20	NS 1-6	71	13
Road Vehicle Fleet	VS-25	VS-25	NS 1-6	No	NS 1-6 (I/D)	NS 1-6	No	No	68	15
Street works	VS-25 (I/D)	S 8-9 (I/D)	NS 1-6 (I/D)	NS 1-6 (I/D)	VS 15-20 (I/D)	S 8-9 (I/D)	VS 15-20 (I/D)	S 8-9 (I/D)	104	5
Procurement - spares and consumables	VS 15-20 (I/D)	VS 15-20 (I/D)	S 10-12 (I/D)	S 10-12 (I/D)	S 10-12 (I/D)	No	S 10-12 (I/D)	No	88	8
Procurement - services and suppliers	VS-25 (I/D)	S 10-12 (I/D)	S 10-12 (I/D)	S 10-12 (I/D)	S 10-12 (I/D)	No	S 10-12 (I/D)	No	85	9
Asset management, Network Design & Equipment Specification	VS-25	S 10-12	VS-25	VS 15-20	VS 15-20	NS 1-6	NS 1-6	S 8-9	123	2
Substations, Distribution of power, Losses Maintenance & Inspection, GMT	VS-25	VS-25	VS 15-20	VS 15-20	VS 15-20	NS 1-6	S 8-9	NS 1-6	131	1
Overhead Line Network, Distribution of power, Losses, Maintenance, Poles & PMT	VS-25	NS 1-6	S 8-9	S 8-9	S 8-9	NS 1-6	S 8-9	S 8-9	82	10
Fluid Filled Cables, Underground Cables	VS-25	NS 1-6	VS-25	VS-25	S 8-9	NS 1-6	S 8-9	NS 1-6	111	3
Depots & Satellite Sites/Logistics Depots	S 10-12	NS 1-6	S 10-12	S 8-9	VS 15-20	NS 1-6	No	NS 1-6	71	13
Connections (customers), Mobile Generators	VS-25	VS 15-20	S 8-9	NS 1-6	S 8-9	S 8-9	NS 1-6	NS 1-6	90	6
Deliveries of supplies/collection of wastes	VS 15-20 (I/D)	S 10-12 (I/D)	S 8-9 (I/D)	S 8-9 (I/D)	NS 1-6 (I/D)	NS 1-6 (I/D)	NS 1-6 (I/D)	NS 1-6 (I/D)	74	12
Car Parks	NS 1-6	NS 1-6	NS 1-6	No	No	NS 1-6	No	No	24	18
Protection of Network (Vegetation, fly tipping, Asset protection, noise and visual screens)	S 10-12 (I/D)	NS 1-6 (I/D)	VS 15-20 (I/D)	S 10-12 (I/D)	S 10-12 (I/D)	VS 15-20 (I/D)	VS 15-20 (I/D)	NS 1-6 (I/D)	108	4
Construction & Demolition general	S 8-9 (I/D)	S 8-9 (I/D)	NS 1-6 (I/D)	S 8-9	S 10-12 (I/D)	S 10-12 (I/D)	S 8-9 (I/D)	S 8-9 (I/D)	75	11
Score	337	210	210	173	230	119	138	84		
Rank	1	4	3	5	2	7	6	8		