



SSEN Distribution Response to ED2 Draft Determination - Annex 8: Environmental



**Scottish & Southern
Electricity Networks**

Powering our
community

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1. Executive Summary

This document sets out additional evidence and information in response to the feedback received from Ofgem on a number of our Engineering Justification Papers (EJPs) that formed part of our Environmental Action Plan (EAP), additional requests for information in Ofgem's Draft Determinations and also from our bilateral with Ofgem on the 14th of July 2022.

We believe that our network will become a key enabler of the energy transition, while continuing to provide a vital service to our communities. We need to lead by example in reducing our own environmental impact in a transparent, credible way. Our Environmental Action Plan (EAP) is founded on an ambitious 1.5°C Science Based Target (SBT) that goes beyond minimum requirements and addresses the global biodiversity crisis.

Our EAP is a critical part of our RIIO-ED2 submission. It delivers for stakeholders in our local environments and beyond. We have proposed to do this through targeted business plan outputs that focus on the decarbonisation of our network, and the impact of its operations; enhancing our local environmental performance whilst ensuring a longer-term plan to achieve net zero. Our EAP delivers on current Policy.

Our EAP approach fully supports our Strategic Objective to 'accelerate' net zero for our electricity network and supports Scottish and UK Governments' net zero targets whilst enabling our customers and stakeholders on their own journey. Through targeted intervention, delivering our EAP will create a fair and just decarbonised electricity network which will bring societal value during RIIO-ED2 and be fit to face the challenges that lie ahead. Ofgem asked DNOs to deliver an EAP that both decarbonised our networks whilst also managing, and reducing, the wider environmental impact of our activities. Our EAP does that and we are proud of it.

Unfortunately, Ofgem has proposed to remove key investments from our baseline plan which tackles key priority areas for our stakeholders, such as, SF₆, nature-based solutions (Nbs) for carbon removal, and our approach to fluid-filled cables (FFCs). We disagree with Ofgem's proposals to remove these investments. This is clearly inconsistent with stakeholder feedback, and Ofgem has not considered the potential impact on current and future consumers of its proposals, in terms of reducing carbon emissions and meeting net zero. Taken together with Ofgem's decision to remove any financial incentive in this space, we consider that the resultant framework does not encourage the necessary step-change in behaviour and mindset required in RIIO-ED2 to achieve net zero and mitigate the impact of the climate crisis, which is happening now. **We have provided the further information as requested by Ofgem in detail to support our original submissions. The impact of Ofgem's proposals in draft significantly compromise our ability to deliver on our publicly announced Science based targets and our legally binding targets to reach net zero by 2045 in Scotland and 2050 in England.**

Ofgem's decisions made surrounding FFC and PCBs are a step in the right direction to prevent and manage the pollution risk from our assets. However, we urge Ofgem to give further consideration to our methodology for FFC and the unit rate application for PCBs. We have responded to all our EJP feedback, providing further supporting evidence to support justification where required. **We are not proposing to submit revised EJPs.**

As a result of Ofgem's DD proposals we wanted to re-test our EAP proposals again with stakeholders to see if opinion had changed – especially given the cost-of-living crises. **The support for investments as originally planned remained very strong**, therefore, we have provided additional information to support original investments in the relevant sections below as they continue to be supported by stakeholders, the full stakeholder report can be seen in Appendix 4.

This document sets out our response to the three 'unjustified' EJPs and five 'partially justified' EJPs. The responses address the specific questions raised by Ofgem by providing further details on the submitted plan, but do not alter the cost, benefits, or deliverables of the plan. This is in line with the guidance provided to us by Ofgem. We have received some feedback from Ofgem on these EJPs, through our bilateral on the 14th of July 2022, our response is based on this feedback and also includes the additional information requested, as evidenced in Appendix 1.

We note that while Ofgem considers a number of our EJPs to be either unjustified or only partially justified, this does not appear to have resulted in associated allowances being disallowed. With only two areas having costs disallowed (SF₆ and Nbs). We consider that our original EJPs met the requirements set out in Ofgem's EJP guidance document, by clearly setting out delivery constraints and mitigation.¹ This document should be read in parallel with our response to Core-Q13, Q16, Q89 & Q90 & SSEN Q4.

¹ https://www.ofgem.gov.uk/sites/default/files/docs/2021/02/riio_ed2_engineering_justification_paper_guidance.pdf

2. Unjustified Engineering Justification Papers

The following three EJPs were classed as 'Unjustified' by Ofgem, and our response will run in sequence below.

- 9_SSEPD_ENV_SF6; SBT Delivery – Sulphur Hexafluoride Asset Replacement
- 447_ENV_NATURAL_CAPITAL; Nature Based Solutions for Carbon Removal and Biodiversity
- 8_SSEPD_ENV_CABLE_FFC; Fluid Filled Cables

2.1 Science Based Target Delivery – Sulphur Hexafluoride (SF_6)

Scheme Name	Environment Output
EJP Ref	9_SSEPD_ENV_SF6
BPDT	CV22 - Environmental Reporting
Cost	£5.57m
Ofgem Review Output	Unjustified
Ofgem Review Comment	<i>The need for SF_6 reduction is considered justified. Two options are presented, one targets more leakage reduction than the other. Of the two options, the SSE preferred option has the higher leakage reduction and a cost of circa £62k/kg, the other option has a lower leakage reduction and a cost of circa £45k/kg. With varying costs there is a risk related to which leaks reductions will get delivered and hence we consider the EJP to be unjustified.</i>

2.1.1 Draft Determination Response

As noted in our response to Core Question 13, we welcome Ofgem's recognition for the overall justification of SF_6 reduction but we do not agree with the Ofgem engineering assessment and consultation position on rejecting our proposals for reducing SF_6 emissions from our assets as stated in table 15 (P.20) of the SSEN Annex Document. We consider that Ofgem has not considered the short and longer-term impact of its position on our ability to reduce carbon emissions, and its proposal to reject activities in this space is not in the interest of current and future consumers. However, we do note that positive discussions around SF_6 were held at the bilateral meeting conducted on 14th July 2022. The following paragraphs provide our full response on why we do not support this consultation position alongside additional information requested by Ofgem at the bilateral meeting.

Ofgem request: provide further justification around the asset condition, and how this translates to Health Index

The original Condition Based Risk Management (CBRM) model utilised for our ED2 submission was an industry standard CBRM approach which derives a health score output for each asset which is subsequently mapped to the regulatory asset Health Index bandings. SF_6 leakage rates were not factored into this methodology approach. The CBRM methodology has since been updated following the submission of the ED2 business plan and now factors asset leakage rates into the Health Index scores. The following tables summarise the number of assets in each Health Index banding in the original and updated CBRM approach methodologies:

Health Index based on Original CBRM					
	HI1	HI2	HI3	HI4	HI5
SEPD	25	10	1	1	5
SHEPD	1	0	0	0	2
Total	26	10	1	1	7

Health Index based on Updated CBRM					
	HI1	HI2	HI3	HI4	HI5
SEPD	3	9	2	0	28
SHEPD	0	0	0	0	3
Total	3	9	2	0	31

Table 1: CBRM Approach

Following the update, 24 of the identified assets moved into the HI5 banding resulting a total of 69% of the identified assets falling within the HI5 banding meaning they would be due for replacement in ED2.

The remaining 14 assets fall within HI banding 1, 2 and 3. Only 1 of these assets are within the severe leaker category with the remaining 13 of the 14 assets falling within the poor leaker category, and that is the driver for these particular assets being selected for replacement. Table 2 below outlines the asset leakage categorisation criteria and provides insight on how the condition criteria is determined.

Gas Leaks Condition Criteria	Description	Based on Last 12-month Emission Data	Based on Last 36-month Emission Data
Good	Pressure within acceptable range	N/A	N/A
Poor	Pressure outside of acceptable range	>2kg or 2 or more top ups or >25% total leakage	>4kg or 4 or more top ups or >50% total leakage
Severe Leak	Severe unrepairable leak and/or repeated gas top ups	>6kg or 4 or more top ups or >50% total leakage	>12kg or 8 or more top ups or >100% total leakage

Table 2: Condition Criteria

The further justification for the replacement of these assets is as follows:

Science Based Target

SF₆ is a material factor in our Business Carbon Footprint (BCF). In order to meet net zero, we must align with a 1.5°C trajectory and therefore as a minimum we need to reduce SF₆ emissions by at least 35% by 2028 and 55% by 2033. If the requested funding to replace the assets identified in the SF₆ EJP is not allowed there will be a direct impact on our ability to meet this publicly accredited Science Based Target and, on our ability to meet Ofgem minimum requirements and outputs as they were included in our final business plan submission in 2021.

Change in F-gas regulations

SF₆ legislation is currently being reviewed by the UK and EU as part of the wider F-Gas Legislation reviews to achieve the UK and EU net zero targets. It is expected that a likely outcome of the review will be prohibitions on the installation and replacement of SF₆ containing switchgear with new Regulation expected to come into force during 2024/25. It is therefore extremely important to carry out proactive work in advance of any Regulation coming into force to ensure the business is as prepared as possible to comply with new requirements. Further information on the proposed change to the F-gas Regulations can be found in section 4.5 of this document.

Price of Carbon

Assigning a value to carbon represents a monetary value that society places on one tonne of carbon dioxide equivalent. These values are used to estimate a monetary value of the greenhouse gas impact of policy proposals and improve the transparency and scrutiny of decision making. The Cost Benefit Analysis (CBA) assessments used for the original ED2 business plan submission utilised the BEIS 2018 valuation meaning the CBA's use the central scenario of £72 for 2028. The BEIS valuation was last updated in 2020 and the central scenario for 2028 increased to £272². These values will continue to change and are predicted to rise with each update. Our investments are therefore undervaluing the true cost of carbon. Investing in the replacement of poor and severe leaking assets does therefore not just make environmental sense, it also makes good business and societal sense as this protects SSEN and our consumers from this price increase.

² Valuation of greenhouse gas emissions: for policy appraisal and evaluation - GOV.UK (www.gov.uk)

To demonstrate the impact of the increased price of carbon we have rerun the CBA assessment using the BEIS 2020 carbon prices, all other elements of the CBA remain unchanged from the original CBA assessment as detailed in our original SF₆ EJP submission.

The results of the CBA for both options are summarised in table 3 and 4 below:

Original CBA Results (BEIS 2018 Carbon Price)				
Option	Description	No. assets to be replaced	Capex	45 years NPV
1	Replace Severe Leakers	28	£3,126.0k	£248,309
2	Replace Severe & Poor Leakers	45	£5,569.7k	£258,262

Table 3: Original CBA Results

Updated CBA Results (BEIS 2020 Carbon Price)				
Option	Description	No. assets to be replaced	Capex	45 years NPV
1	Replace Severe Leakers	28	£3,126.0k	£3,967,127
2	Replace Severe & Poor Leakers	45	£5,569.7k	£5,327,610

Table 4: Updated CBA Results

The BEIS 2020 carbon price CBA NPV results indicate that the costs are slightly higher than the benefits for option 2 'severe and poor leaker' whereas the NPV for option 1 'severe leaker' indicate that the benefits outweigh the costs. Both option 1 and 2 NPV results are however significantly higher when compared to the BEIS 2018 CBA assessments carbon price, therefore indicating the importance of assigning an updated carbon valuation to this investment.

This is demonstrated when a comparison of the 45-year period NPV trend is made between the two CBA assessments as illustrated in the following graphs. The CBA utilising the BEIS 2020 carbon prices show a more favourable trend with benefits on both options being achieved far sooner than the CBA utilising the BEIS 2018 carbon prices. The 45-year period NPV trend also illustrates that option 2 'severe and poor leaker' continues to provide increasing benefits over this timeframe.

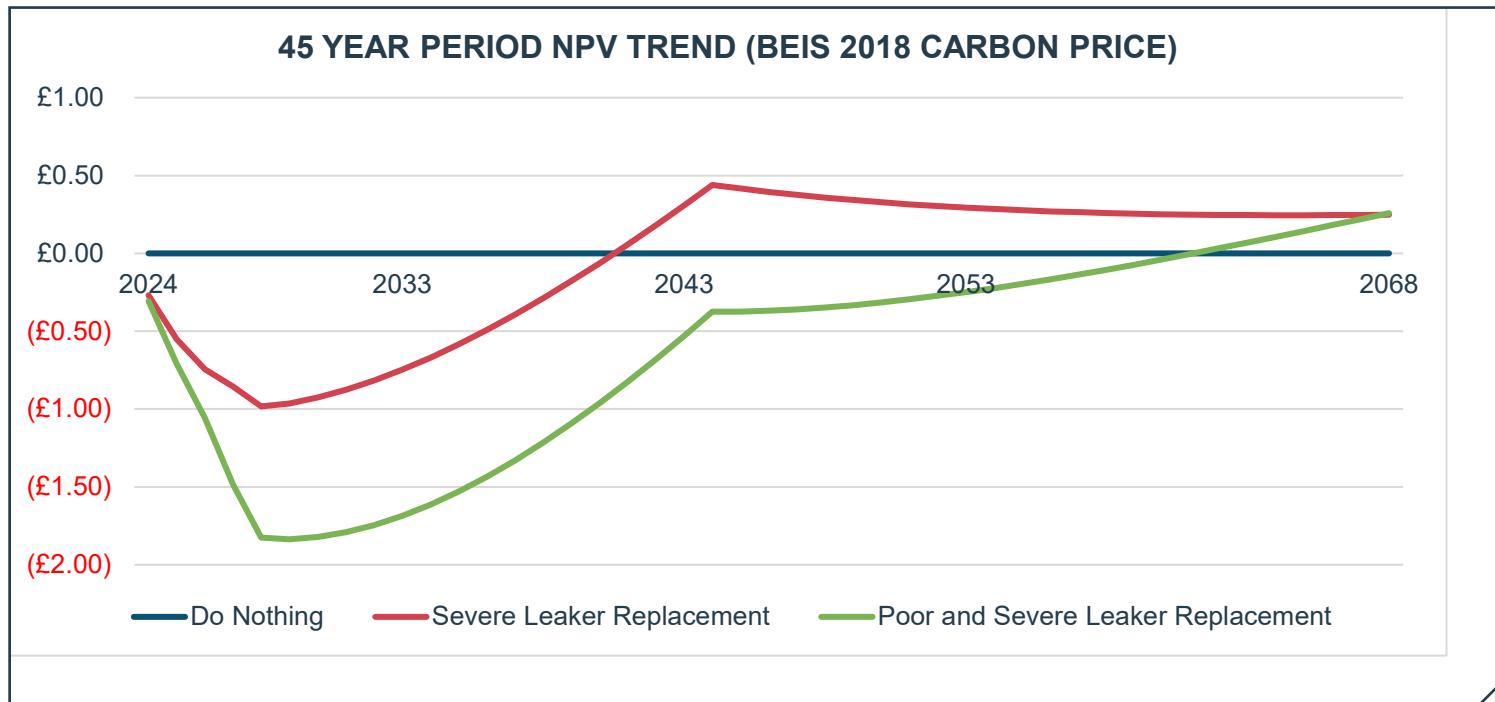


Figure 1: 45 Year Period NPV Trend (BEIS 2018 Carbon Price)

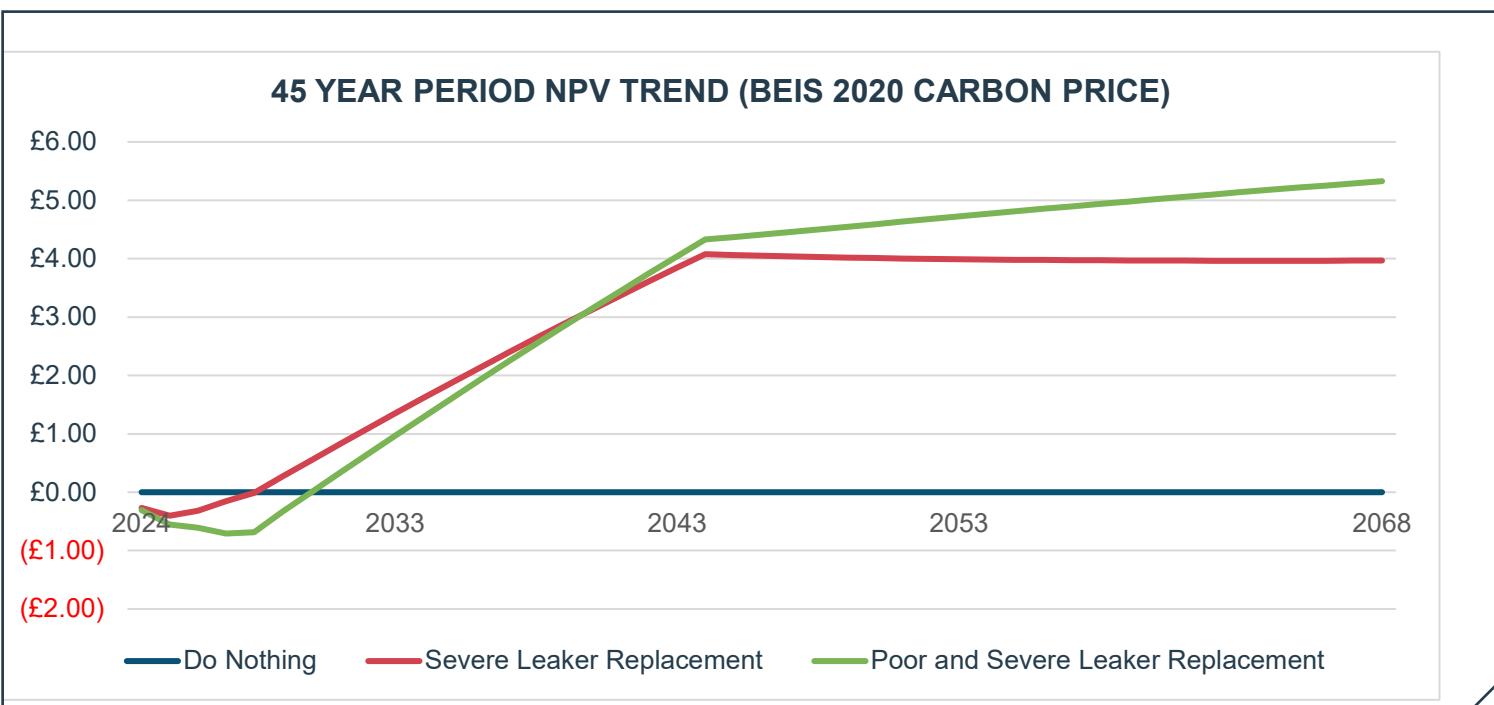


Figure 2: 45 Year Period NPV Trend (BEIS 2020 Carbon Price)

Stakeholder support

In preparation of our RIIO-ED2 business plan a programme of stakeholder engagement exercises were undertaken to better understand what was important to our network customers during RIIO ED2 and to ensure the views of our stakeholders were reflected in the cost and volumes we were proposing for each investment decision. In general, there was broad stakeholder support for requirements to meet targets, science-based targets and to incorporate measures within the RIIO-ED2 business plan which mitigated climate change where possible.

As a result of the Ofgem Draft Determination we decided to retest our approach with our stakeholders again in case there had been a change in position, particularly in relation to the current cost of living crisis. On 27 July 2022, we hosted an online sustainability and environment engagement session to give our stakeholders an opportunity to provide feedback on Ofgem's RIIO-ED2 draft determinations for our environmental and sustainability business plan investments, including SF₆. 93% of our stakeholder participants in attendance agreed with our approach in tackling both severe and poor leakers:

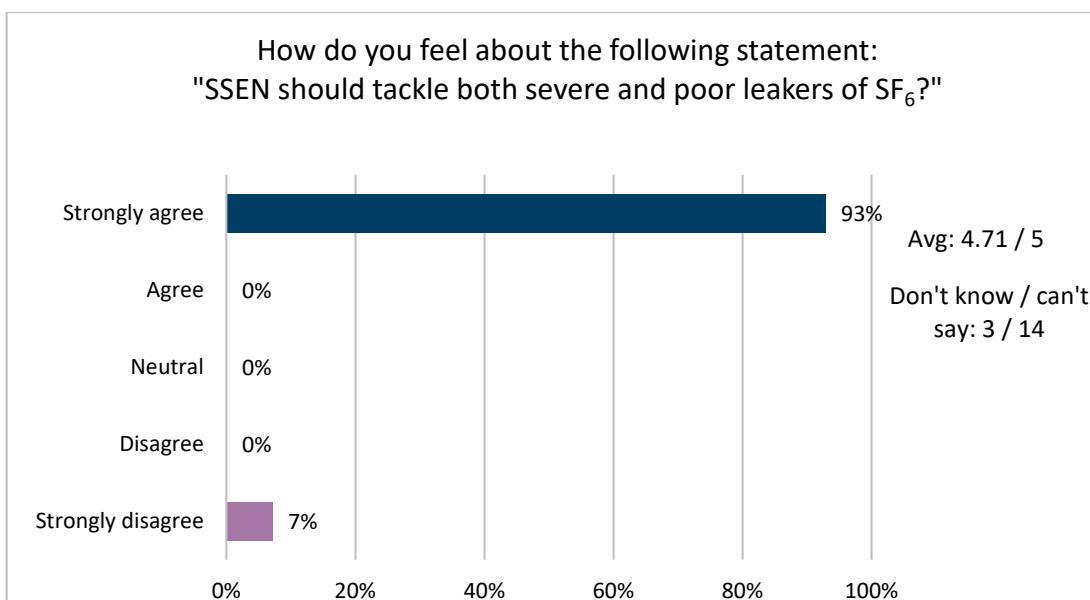


Figure 3: Stakeholder participant feedback

By contrast, 54% of stakeholder participants disagreed with Ofgem's consultation position to remove the SF₆ investment from SSEN with some stakeholder participants providing feedback that they felt our SF₆ costs were considered and justified.

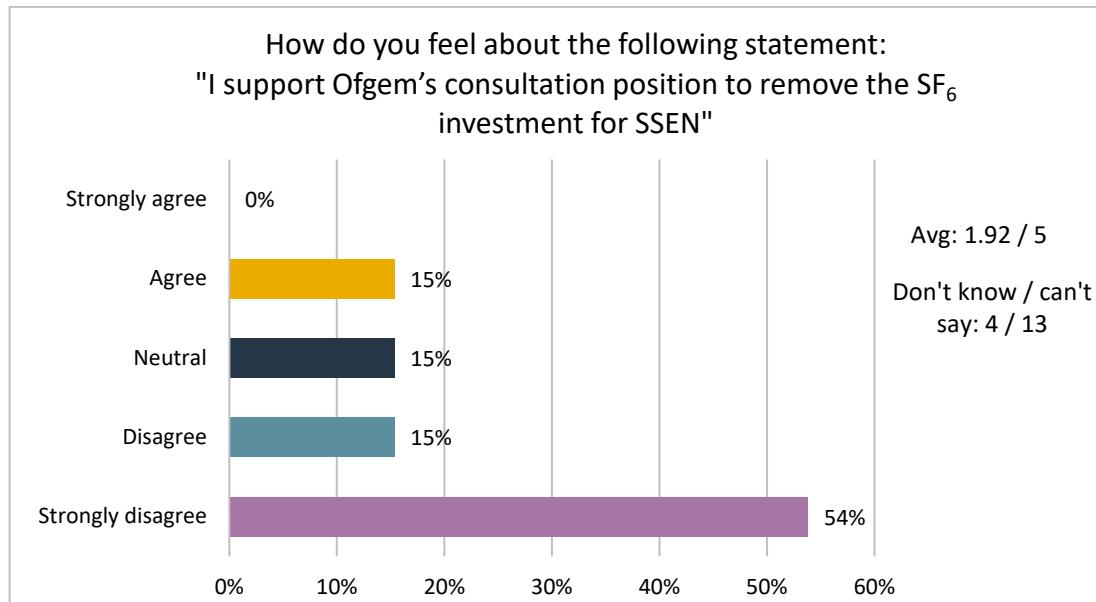


Figure 4: Stakeholder participant feedback

Stakeholders clearly considered moving away from SF₆ to be a priority, giving an average score of 3.94 out of 5 when asked if SSEN should actively look for alternatives to SF₆ to reduce the amount of SF₆ on the network.

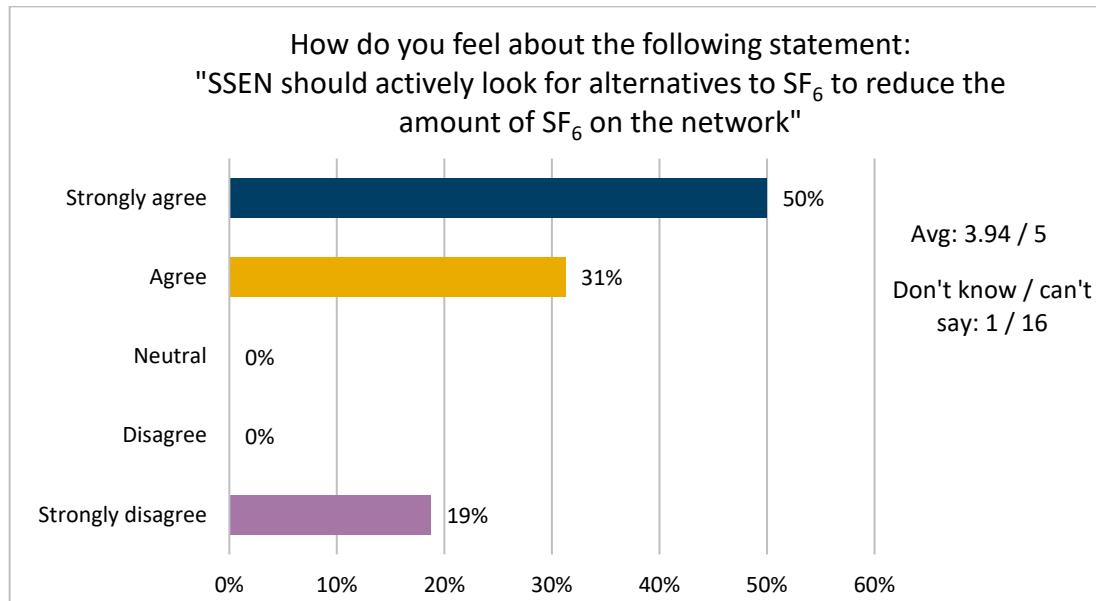


Figure 5: Stakeholder participant feedback

The event was attended by 24 stakeholders, each representing a different organisation as outlined in the following diagram:

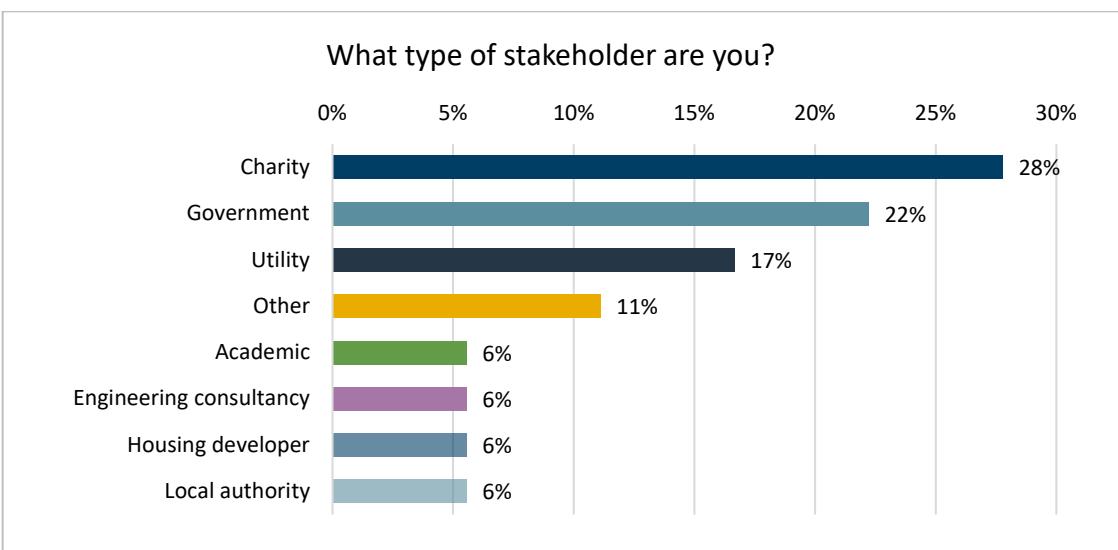


Figure 6: Stakeholder participant feedback

In summary, it is clear that there continues to be strong stakeholder support for our SF₆ strategy despite the current cost of living crisis.

External Reviews of Environmental Action Plan

Various in-depth reviews of DNO Environmental Action Plans were undertaken by external parties including Sustainability First, Citizens Advice, the Challenge Group and the CEG's. It does not appear that Ofgem have taken cognisance of the reviews in their Draft Determinations. For example, in their 'ED2 Business Plans – Ofgem Call for Evidence document', Sustainability First state that our approach towards SF₆ management is "*a considered and detailed process*" and summarise our SF₆ approach as amongst the two "*most comprehensive*" amongst all the DNOs. Sustainability First concluded that three of the DNOs still have "*more to do*". In contrast to this, Ofgem's consultation position in relation to the other 5 DNOs is to "*propose to accept the DNOs' proposals for activities regarding SF₆ without amendment*" which opposes the Sustainability First position.

Ofgem request: provide any wider optioneering done including SF₆ alternatives

We are committed to exploring alternatives to SF₆ and will install alternatives where solutions are available. Our proposed ED2 investment plans include the replacement of both severe and poor leakers in the first 2 years on a like for like basis with newer more efficiently sealed SF₆ equipment. The remainder of the equipment will be replaced with new technologies in the last 3 years of the ED2.

We have identified long lead time plant and commenced procurement to secure delivery for the initial years of RIIO-ED2 and where lead times have exceeded our plans, we have made proactive decisions to secure delivery of our commitment. For example, we have already procured items including 132kV and 33kV transformers, and secondary SF₆ circuit breakers to safeguard our deliverability commitments whilst the supply chain normalises to demand profiles. We have also commenced procurement of a new 5-year framework for 132kV Circuit Breakers with dedicated lots for non- SF₆ plant, expected award in Q1 2023, with units being received in Year 2 of RIIO-ED2 (to allow for manufacturing and Factory Acceptance Testing timescales).

Recent examples of optioneering include our projects for 132kV GIS at Iver and Thatcham which are both currently investigating the deployment of SF₆-free equipment. We are also in the process of transitioning our primary plant catalogue to introduce where possible SF₆-free versions of previously approved SF₆ circuit breakers. We plan to adopt an alternative first approach to all SF₆ replacements in ED2, whereby investment decisions will have to justify why an alternative to SF₆ is not suitable for any particular project. Project teams will have to demonstrate the business case for SF₆ in every case put forward.

We are actively engaging with numerous suppliers to discuss and technically review their alternative gas offerings at lower 11kV and 33kV voltages and will continue this approach throughout ED2. Several non-disclosure agreements have been signed with a variety of switchgear suppliers to share their own developments in HV switchgear at voltage levels across the Distribution arena, in both primary and secondary equipment. We are actively engaging with our framework partners and encouraging new suppliers to discuss possibilities for trialling their alternative-gas offerings on our network with the aim to

accelerate the adoption of SF₆-free equipment and understand some of the potential challenges of managing a multiple-gas asset-base.

We are also committed to better management of our leakage rates and are currently undertaking two innovation projects involving a paint with the potential to reduce the time taken to detect leaks and a flange guard that can potentially be deployed to stop leakage following detection. These projects will continue throughout ED2.

The ENA SF₆ working group was chaired by SSEN from its inception. The group is currently working with Defra on the Power Sector review and also with the manufacturers to encourage them to develop alternatives to SF₆ that work on the UK network and are viable for both reliability and lifecycle costs. We will continue to take an active role in this group and ensure that any learning will be fed back into our strategy work.

[Ofgem request: include Policy context with changing F Gas Regulations and cost of carbon information](#)

SF₆ Legislation is being reviewed by the UK and the EU as part of the wider F-Gas Legislation reviews to achieve the UK and EU net zero targets with new Regulation expected to come into force during 2024/25. Whilst the UK review is separate from the EU review it is important that we consider the implications of the EU proposals as our supply chain will be impacted as most UK equipment comes from the EU. Defra (the devolved administration in Scotland have derogated this work to Defra) is currently consulting with industry on the proposed changes and will be holding further events during 2022. It is looking fairly certain that prohibition of F-gas at certain voltages will come during ED2 as illustrated in table 5 supplied by Defra at a consultation meeting held in May 2022.

Electrical Switchgear	Date of Prohibition	
≤24kV	Gases with GWP ≥ 10 or GWP ≥ 2000, unless evidence is provided	1 January 2026
>24 kV and up to 54kV		1 January 2030
>52kV and up to 145kV		1 January 2028
<50kA short circuit current		
>145kV or > 50kA short circuit current		1 January 2031

Table 5: Prohibition of F-gas Overview

The European Commission recently proposed a revision to the F-gas regulation with measures envisaged to cut down F-gas emissions with proposed measures including prohibitions on the installation and replacement of SF₆ containing switchgear. There are concerns that the measures included in the current proposal could have several negative impacts including:

- Proposals causing significant limitation of competition in switchgear manufacturing in the EU. Currently only one European HV switchgear manufacturer will be able to supply solutions compliant with the requirements in the proposal which could lead to a 'technology monopoly' and supply chain risks
- Proposed transition times for switchgear in the voltage level 12-24 kV leading to supply chain being unable to deliver enough SF₆ free switchgear for up to 24 kV.
- Proposals to revise the Global Warming Potential (GWP) threshold to 10 for voltage levels above 24 kV could exclude the use of meaningful and worthwhile technologies which significantly reduce greenhouse gases in comparison to SF₆. Some technologies with a GWP<10 must be operated at higher pressures and therefore have a bigger footprint, therefore, if DNOs are required to utilise these products, existing housings can't be utilised due to the size of existing installations. This means developing new sites and changing the network topography which will have a detrimental ecological and financial impact and increase the carbon impact of operating the network, conflicting with net zero targets.
- Proposals are currently unclear on the continuation of existing SF₆ based installations until the end of their lifetime and on the procurement and installation of spare parts. If existing functioning switchgear were forced to be decommissioned prematurely because of a prohibition on the purchase of spare parts this would seriously endanger the security of supply. Enabling existing installations to be repaired until the end of their lifetime will bring positive climate effects which will outweigh the effect of SF₆ leakages from existing switchgear until the end of their lifetime.

It is important that regulation does not cause disruption to network operation, security of supply and the EU and UK's decarbonisation process. SSEN are members of the ENA SF₆ working group which engages with Defra on the Power Sector review process for the F-Gas legislation to cover Great Britain and will continue to contribute to this process via participation in the group activities which includes the production of reports to present to the EU.

To summarise, this is a fast-paced area, Defra are consulting on how this will be included in UK legislation and are currently looking to accept the EU stance. As discussed, this includes prohibition as early as 2026 for some voltages. It is our understanding that prohibition will come, and we need to start sensibly phasing SF₆ out now, to minimise the deliverability risk and premiums across the supply chain to avoid what we are currently experiencing with PCB's. We firmly believe that this is in line with the interests of current and future consumers.

132kV Incentivised in SHEPD – Potential Discrimination Against SEPD Customers

The RIIO-T2 Output Delivery Incentive – Financial (ODI-F) for IIG leakage incentivises Transmission Network Companies to reduce SF₆ leakage below annual targets, providing a financial reward/penalty for every tonne below/above the agreed target. This has resulted in SF₆ at 132kV being incentivised in Scotland but not in England due to 132kV being a transmission voltage in Scotland. We know consumers in Scotland are benefiting from this and those in England are not. As there is no incentive for SF₆ across Distribution we have requested investment that includes measures to tackle 132kV in England to address this imbalance and ensure that consumers in England also realise benefits associated with the reduction in emissions caused by leaking SF₆ assets.

Output

As a result of our Business Plan Testing and Acceptance results, we increased ambition across our business plan strategies and outputs to reflect stakeholder and customer feedback. This included SF₆ emissions where we enhanced our output in response to stakeholder expectations for us to manage SF₆ on our network, through our enhanced SF₆ leakage reduction strategy and emission targets which will drive alternatives. This will need to change based on Ofgem's Draft Determination as we will not be able to deliver this at the current costs.

2.2 Nature Based Solutions

Item	Environment Output
EJP Ref	447_ENV_NATURAL_CAPITAL
BPDT	CV22 - Environmental Reporting
Cost	<ul style="list-style-type: none">• SHEPD: £12,468,465• SEPD: £13,158,337
Ofgem Review Output	Unjustified
Ofgem Review Comment	<i>Tree planting for carbon removal is considered justified. However, there is insufficient detail on how specific volumes have been derived. Due to the nature of this investment there is also a risk the full investment will not be delivered and therefore we consider the EJP to be unjustified.</i>

2.2.1 Draft Determination Response

We welcome Ofgem's recognition that **tree planting for carbon removal is considered justified** and note the concerns over how volumes have been derived and over deliverability. We **do not agree** with Ofgem's decision to reject our proposal. Our proposal is the most efficient long-term solution to carbon removal as it protects current, and future consumers from drastic increases in carbon costs to offset residual emissions. It is clear from historic trends, and future trajectories, that the cost of carbon will continue to rise sharply. This cannot be avoided. Failure to recognise this from Ofgem will result in the cost of net zero being pushed onto future generations in an extremely condensed time frame.

Our full business plan is based on a 1.5-degree Science-based Target (SBT). The route to net zero is not delivered by carbon reduction alone: we must abate all that we can through our SBTs and then look at **removals** to manage residual emissions and close the gap to net zero. An effective carbon removal strategy is a requirement under the SBTi Net Zero Standard framework and a key part of our credible, and legally mandatory, pathway to net zero.

Our planting volumes were driven by the amount of carbon sequestration (in tCO₂e) that we need to achieve by 2045 (the latest date we can meet net zero to be compliant with legislation). We estimate that to be 260,000tCO₂e. The level of planting identified in our selected option is based on achieving this level of carbon sequestration by 2045. This is explained in detail in our EJP 447_ENV_NATURAL_CAPITAL. We also understand the deliverability risks Ofgem have raised, however believe we have mitigated those risks through extensive engagement with potential partners, we are already in prefunding discussions with available sites across both of our regions, where we are confident we can achieve our required level of restoration volumes. These potential partners understand the price control process and timings, and we have established an agreed route to enact as quickly as possible should allowances be approved. We are also learning lessons from experts, current industry best practice, and from projects that have failed and succeeded to ensure we build that into our programme.

Our proposed investment for carbon removal and reduction utilising Nature-based Solutions will deliver potential carbon removals and reductions to help us achieve our credible net zero target, whilst also providing vast biodiversity benefits in our license areas. This level of investment will achieve a sequestration rate of at least 260,000 tCO₂e by 2043. Therefore, alongside our own Science Based Targets for carbon reduction, with this investment, we would achieve our net zero in line with current Scottish and English legislation or potentially before.

Planting and restoration activities not sited in appropriate areas can fail and, for that reason, we need to select the most appropriate sites. Additionally, further tree planting next to electricity infrastructure introduces an unacceptable additional safety risk and would result in additional maintenance to manage any tree or vegetation growth at or close to our assets. For that reason, we shall choose sites in the most suitable locations within our license areas, not necessarily close or linked to our project work. We hope this satisfies the concerns raised by Ofgem in Table 15 of the SSEN Annex (P.20) "we do not believe this to be good value for money for consumers as the restoration efforts are not linked to network projects."

Whilst we recognise that this approach is a significant change from previous price controls, we know we must act now. The cost of carbon will rise significantly over the years and know that NbS can take 5-10 years to mature. Once developed

NbS will deliver carbon sequestration over a 100-year span - removing residual carbon from the atmosphere and delivering wider biodiversity benefits as a result. The initial investment needed rises dramatically the sooner you need the result; action now will ensure that the solutions can mature in time for alignment with net zero targets and ensure that costs can be controlled. Nature will bounce back, but our action needs to be now. Investing organically as we are proposing is arguably the only way to ensure longer term cost certainty for our consumers. **However, cost certainty and deliverability will be part of the challenge, hence the proposal of a PCD to protect the consumer from risk of non-delivery.**

Ofgem also commented in Table 15 (P.20) in SSEN Annex that “SSEN have not provided a sufficient methodology for how long-term carbon sequestration will be accounted for within our science-based targets”. Carbon removals cannot contribute to an organisation’s SBT, according to the rules set by the Science Based Target Initiative (SBTi). However, carbon removal is critical to manage residual emissions. This was discussed with Ofgem at a bilateral on 14th of July 2022 and acknowledged as a misunderstanding.

We also discussed providing further information, including to “*provide information on WtP data already produced in support of nature*” and “*Provide view of how we are addressing biodiversity net gain legislation and how credits work when located away from works.*” We have responded to the questions here and in Response Form 3: Networks for Net Zero and hope that this can result in a positive outcome that will allow us to progress our net zero journey as intended.

In the Core Methodology Document, on page 386, Ofgem have asked DNOs to submit the following information as part of their response:

1. *A marginal abatement cost curve for carbon.*
2. *A joint consumer willingness-to-pay study for carbon offsetting and/or carbon removal projects.*
3. *Stakeholder and/or consumer support for offsetting activities.*
4. *A summary of the benefits to network consumers.*
5. *Detail on any carbon offsetting projects or schemes undertaken and/or supported, including expected emissions to be offset per annum in RIIO-ED2.”*

We have detailed our response to the above requests in the following sections.

Requested Item 1, a marginal abatement cost curve for carbon:

The Marginal Abatement Cost (MAC) graph below, Figure 1, allows visualisation of the cost-effectiveness, and carbon reduction impact, of our NbS in a single graphic. It shows the abatement cost per tonne of carbon reduction on the Y-axis - or rather, the financial cost of reducing emissions - against the average annual greenhouse gas (GHG) abatement on the X-axis - or the average yearly GHG reduction impact - over 45 years.

Negative values on the Y-axis represent the carbon units. As the value of the carbon units are greater than the predicted investment of the schemes, the graph indicates that the measure will produce an economic saving over its lifetime. As can be seen in Figure 7, below, English woodland creation is predicted to sequester the most carbon and deliver the best value per tonne of carbon dioxide equivalent (tCO₂-e). This is closely followed by Scottish woodland creation.

Looking at the X-axis, the width of the box indicates the action's potential volume of emissions reduction per year, expressed as tCO₂e. In this case, the NbS measures cumulatively sequesters over 850,000 tCO₂-e over the 45-year period.

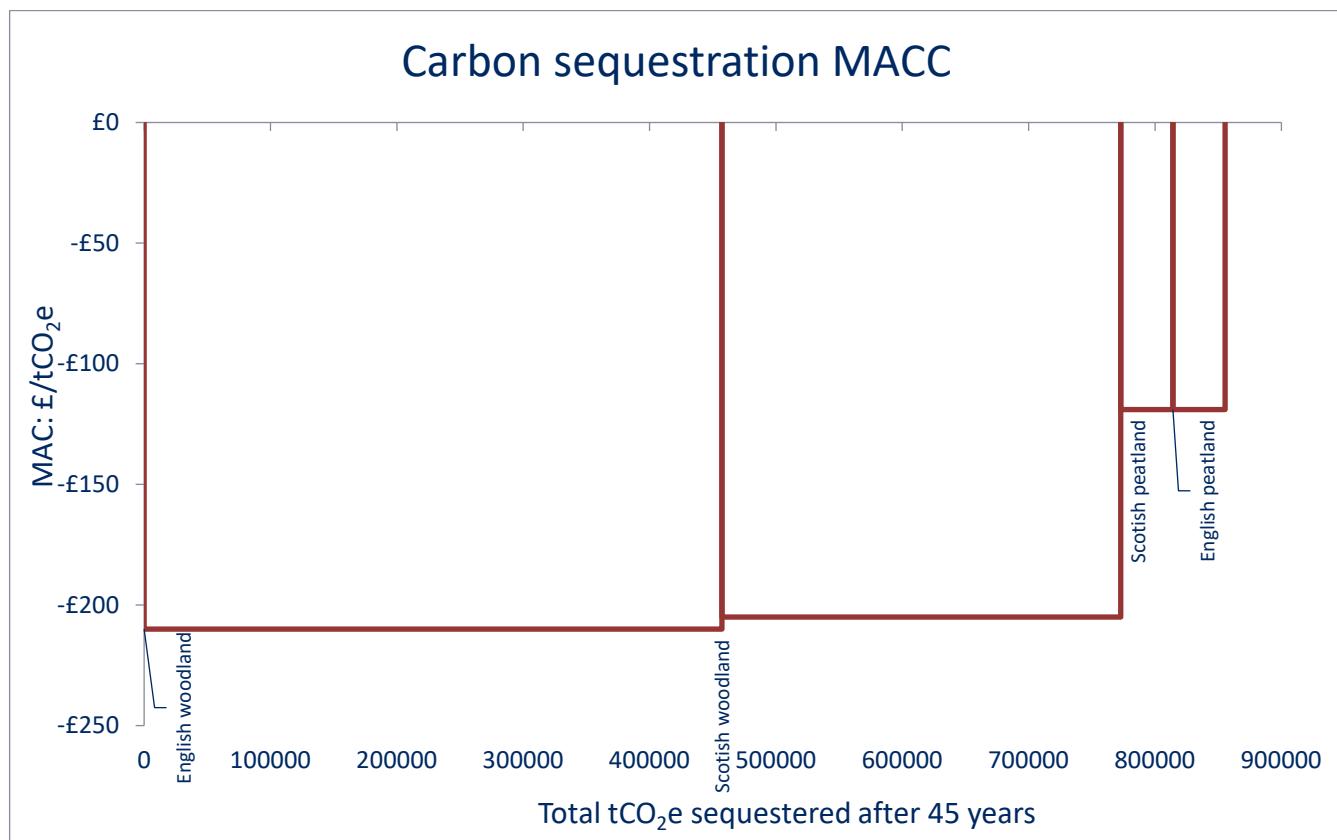


Figure 7: Carbon Sequestration MACC

Requested Item 2, a joint consumer willingness-to-pay study for carbon offsetting and/or carbon removal projects.

As discussed at the bilateral with Ofgem, we disagree with Ofgem's proposal to require DNOs to carry out further joint consumer testing of carbon removal and offsetting proposals. Firstly, our proposals went through rigorous stakeholder and consumer testing as part of our business plan development process, including acceptability and affordability testing, a citizens' jury, and CEG challenge. Further details are available in our original submission 447_ENV_NATURAL_CAPITAL. This is supplemented by existing research in this space, which we provide further information on below and provide a literature review of all existing studies in appendix 2. Secondly, we do not consider that joint testing of carbon removal and carbon offsetting would be appropriate, as these are fundamentally different activities that cannot be compared. Finally, Ofgem have not set out indicative timeframes for this activity, or how any results would factor into its decision-making processes for RIIO-ED2. We do not think it would be in the interests of consumers to delay these activities into RIIO-ED3. However, we would welcome further discussions in this space at industry-level as we prepare for RIIO-ED3 to share best practice and drive consistency where appropriate.

Our approach to WtP & Establishing Consumer Benefit Value

We have taken a layered approach to establishing consumer benefit value, adding qualitative understanding to WtP, and combining these findings with Social Return on Investment (SROI) research, and finding from deliberation our outputs testing with consumers. Our approach can be seen in the below figure.



Figure 8: Our Consumer Benefit Valuation approach

As per page 94 of our EAP, we tested domestic and non-domestic customers' priorities for 15 initiatives separately for the North and South Licence Areas via a robust Willingness to Pay study, which included a qualitative phase to understand the reasons for customers' choices. Environmental initiatives were the highest enhancement priorities for consumers, even being ahead of network and customer service (with the exception of helping fuel-poor households, which was the top priority). This was supported by the qualitative phase which revealed a desire for more ambitious environmental outputs including ensuring the network is ready for a green future, although value for money remained important. Reducing our Business Carbon Footprint further by 2028 is a very high priority for all types of consumers in the south, and a high priority for all consumers in the North. Figure 9 below from pages 47-48 of Annex 3.1 shows the rankings of our environmental initiatives (those in green text).

Initiative	Basic level	Enhanced level	Household		Non-household		Impact on the Business Plan (July)
			South	North	South	North	
Fuel-poor households helped 2023-28 [S]	15,000	35,000	[1 st] 12.2%	[1 st] 13.6%	[2 nd] 10.4%	[2 nd] 12.8%	We will go beyond our original plans for fuel poor customers and increase the number of households we are supporting to 50,000 because of the high priority customers have given this initiative.
SSEN's business carbon footprint by 2028 [E]	28% lower than now	42% lower than now	[2 nd] 10.7%	[4 th] 9.8%	[1 st] 10.9%	[4 th] 10.5%	As consumers demonstrated that the environment is a high priority for them, this lent weight to our decision to adopt a 1.5-degree Science-Based Target.
Average duration of unplanned power cut (large improvement) [N]	North: 75 minutes ⁴ South: 90 minutes	North: 45 minutes South: 54 minutes	[3 rd] 9.9%	[2 nd] 10.0%	[6 th] 7.1%	[5 th] 7.2%	We have proposed targeted investment to reduce the time customers are off supply.
Replacement of oil-filled cables [E]	Replace 52km	Replace 92km	[4 th] 9.0%	[6 th] 7.7%	[4 th] 9.6%	[6 th] 6.6%	Even though there was considerable support for reducing the amount of oil-filled cables by 92km, we have decided to set a reduction target of 78km because of the high costs of this work.
Low carbon heat pump connections by 2028 [E]	235,000	800,000	[5 th] 8.5%	[5 th] 8.3%	[3 rd] 10.3%	[3 rd] 10.5%	These results supported our plan to use the enhanced level targets for heat pump and EV chargepoint connections. For EV connections, qualitative feedback emphasised that it is our role as a DNO to reduce this barrier to take up.
New electric vehicle connections by 2028 [E]	675,000	1,300,000	[6 th] 6.9%	[7 th] 6.4%	[5 th] 8.1%	[7 th] 6.3%	
Number of 'worst served' customers (remaining by 2028) [N]	North: 8,805 South: 4,077	North: 2,935 South: 1,359	[7 th] 6.9%	[3 rd] 9.9%	[7 th] 6.3%	[1 st] 16.9%	These results supported our plan to use the enhanced level targets (75% reduction on 2019/20).
Average duration of unplanned power cut (small improvement) [N]	North: 50 minutes South: 60 minutes	North: 45 minutes South: 54 minutes	[8 th] 5.8%	[12 th] 4.7%	[9 th] 5.9%	[13 th] 2.7%	We have proposed targeted investment to reduce the time customers are off supply.
Number of complaints resolved < 1 day [S]	85%	92%	[9 th] 5.3%	[8 th] 5.0%	[10 th] 5.5%	[10 th] 4.8%	We have chosen a target of 90%, which is slightly below the enhanced level tested, because the results showed that this additional improvement is not a high priority for customers
SSEN's core fleet of vehicles to be electric by 2028 [E]	80%	100%	[10 th] 5.2%	[10 th] 4.7%	[11 th] 5.4%	[9 th] 5.3%	Due to relatively low customer support for this initiative, we will electrify 80% of our core vehicle fleet by 2028, but also reduce our average road mileage by 15% (from pre-Covid-19 levels).

KEY: Median WtP priority scores/values relative to the highest in each segment

Very high	76-100%
High	51-75%
Medium	26-50%
Low	0-25%

Figure 9: Priority scores for environmental initiatives (full table of 15 initiatives on page 47-48 of Annex 3.1)

Other WtP Studies and Economic Reviews

A full literature review of relevant industry studies is included in Appendix 2. In our EJP we used a WtP study on the economics of peatland restoration. In this report published in the Journal of Environmental Economics and Policy, 'The economics of peatland restoration', it was acknowledged that there is a lack of comprehensive valuation encompassing the relevant public benefits of peatland restoration which left policy makers with little guidance with respect to the economic efficiency of restoring this climate-critical ecosystem. To estimate the non-market benefits of peatland restoration they used a choice experiment study in Scotland - these are experiments that are designed to remove inherent biases and find the true stakeholder perception of value. In this study 91% of respondents ($n = 1,795$ respondents) selected a restoration option at least once while 9% always chose the 'no restoration' option³. Assuming high peat concentration, the shift from poor to good condition peatland was valued at around £246/ha/year. The shift from intermediate to good condition peatland was valued at between £127 and £414/ha/year. These values correspond to the average willingness-to-pay of the sample population for this particular level of restoration per year and until 2030. It is therefore an estimated monetary value of the benefits of this level of restoration. Any willingness to pay work should be treated as an indication of priorities, but this clearly demonstrates that this type of investment is supported.

We welcome Ofgem's recognition in CI A1.29 of their Draft Determinations "that many of the parts of the UK's natural environment are in decline, and their reference to the Economics of Biodiversity: The Dasgupta Review⁴ report, recognising that biodiversity is declining faster than at any time in human history and this poses a danger to the prosperity of current and future generations." We fully agree with the value of this report and urge Ofgem to take on board the danger warnings of not acting now, and the need for revolutionary change in every industry.

This review - published in February 2021 - is an independent, global review on the Economics of Biodiversity led by Professor Sir Partha Dasgupta, calling for changes in how we think, act and measure economic success to protect and enhance our prosperity and the natural world. Willingness to pay is recognised within the review as an approach which elicits for change in environmental quality. The headline messages of this review are:

- Our economies, livelihoods and well-being all depend on our most precious asset: Nature.

³ <https://www.tandfonline.com/doi/full/10.1080/21606544.2018.1434562>

⁴ Economics of Biodiversity: The Dasgupta Review: <https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review>

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- We have collectively failed to engage with Nature sustainably, to the extent that our demands far exceed its capacity to supply us with the goods and services we all rely on.
 - Our unsustainable engagement with Nature is **endangering the prosperity of current and future generations**.
 - At the heart of the problem lies deep-rooted, widespread institutional failure.
 - The solution starts with understanding and accepting a simple truth: **our economies are embedded within Nature, not external to it**.
 - **We need to change how we think, act and measure success.**
 - Ensure that our demands on Nature do not exceed its supply, and that we increase Nature's supply relative to its current level.
 - **Change our measures of economic success to guide us on a more sustainable path.**
 - **Transform our institutions and systems** – in particular our finance and education systems – to enable these changes and sustain them for future generations.
 - **Transformative change is possible – we and our descendants deserve nothing less.**

Ultimately, the review highlights the pressing need to take responsibility and change the way we engage with nature to ensure that the path going forward is one of sustainability with a particular focus on nature and ensure our demands on it do not exceed its supply. The UK Government's response to the review was dubbed as "a significant moment" by Green Alliance⁵ as two of the most fundamental arguments of the review: that nature is what ultimately sustains our economies and that reversing biodiversity loss is foundational to achieving a nature positive economy, were accepted. Other recognised bodies such as WWF⁶ and Chartered Institution of Water and Environmental Management (CIWEM)⁷ have welcomed the review and responded positively. Therefore, this further supports our need to adopt a NbS for meeting net zero but as well as this, to ensure nature is restored for the benefit of our consumers and future generations.

⁵ Green Alliance blog: Is the government's response to the Dasgupta review a watershed moment? <https://greenallianceblog.org.uk/2021/06/18/the-governments-response-to-the-dasgupta-review-a-watershed-moment/>

⁶ WWF UK Response to the Dasgupta Review: https://www.wwf.org.uk/sites/default/files/2021-02/WWF_UK_response_Dasgupta%20Review_1_2_21.pdf

⁷ CIWEM news: The Dasgupta Review seven month on: we must act now to save nature: <https://www.ciwem.org/news/the-dasgupta-review>

Requested Item 3, Stakeholder and/or consumer support for offsetting – removal activities.

SSEN Network Customer Engagement

In preparation of SSEN's RIIO-ED2 business plan, several stakeholder engagement exercises have been undertaken to better understand what will be important to SSEN's stakeholders during RIIO-ED2 and to ensure their views are reflected in the cost and volumes proposed.

In total there were 193 attendees with a range of representation from customers, utility companies, developers, environmental representatives, charities and town councils. A summary of the key feedback that was gathered from the stakeholder engagement exercises is presented in table 6 and below.

Stakeholder Event	Date	Relevant Topics	Attending
Distribution Annual Workshop North	24th September 2020 1 October 2020	Sustainability – helping the UK meet its net zero emissions targets Maintaining a reliable and resilient network for the future	84
Distribution Annual Workshop South	23 rd September 2020 30 th September 2020	Sustainability – helping the UK meet its net zero emissions targets Maintaining a reliable and resilient network for the future	109

Table 6: Stakeholder events

Subject 1: SSEN's Sustainability Strategy and Net Zero Targets

Stakeholder Feedback: In both Scotland and England, stakeholders wanted SSEN to be as ambitious as possible with its sustainability strategy and net zero targets. This was reflected in the electronic voting, where 93% opted for either 'accelerating net zero' or 'achieving net zero'. In both licence areas during the 18 discussions, option 4 (accelerate net zero) was advocated as the stretch; or ideal, target and option 3 (achieve net zero) was seen as potentially the more realistic goal. Delegates felt that strong leadership was lacking from central government in this area and urged SSEN to step up, work together with other DNOs and LEPs, and forge the way. Affordability was raised as an issue however, with many calling for transparency in terms of how this level of ambition would affect consumer bills.

Given stakeholder desire to not only achieve but accelerate Net Zero, SSEN's ambitions to offset emissions from some projects through tree planting will help to achieve these targets.

Subject 2: SSEN's Environmental Action Plan

Stakeholder Feedback: During the electronic voting, stakeholders were asked how ambitious SSEN should be with regards to each area of its EAP. Stakeholders wanted the company to be more ambitious across all environmental areas, with even the lowest-ranking area receiving a score of 3.75 out of 5 (Figure 1). As can be seen, stakeholders ranked biodiversity and natural capital higher than, for example reducing SF6 (sulphur hexafluoride) use, emphasising the importance of these topics to stakeholders.

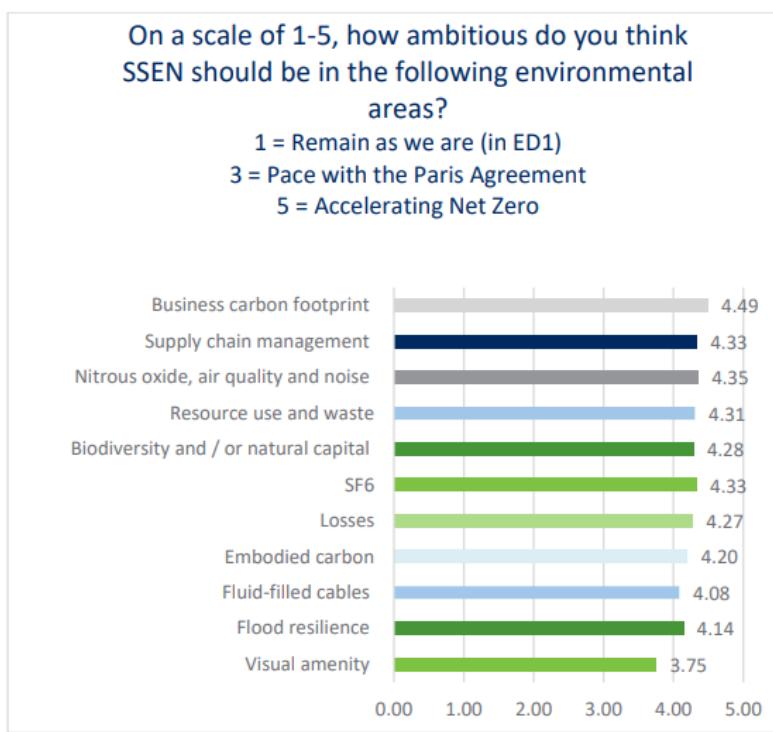


Figure 10: Biodiversity and Natural Capital ranked 5th out of 11 environmental areas.

Our stakeholders told us how much they have come to value natural open spaces, especially throughout Covid where they offered a place to escape and also to meet friends and family – they have now become even more critical to wellbeing.

This engagement was supplemented with Bilaterals with key statutory authorities and recognised consumer bodies and charities across the UK. Our stakeholders have consistently supported our approach to NbS as can be seen in our Stakeholder annex submitted with our original plan. They want us to meet net zero and be as ambitious as possible, recognising that SBTs are only part of the solution; where we can't abate carbon, we must remove it. They support us following a nature-based approach. Our proposals went through rigorous stakeholder and consumer testing as part of our business plan development process, including acceptability and affordability testing, a citizens' jury, and CEG challenge.

Our acceptability testing in this area was very strong at 79% and 79% thought it was affordable. Our approach has been consistently supported by our stakeholders and consumers – in fact we retested this position following Ofgem's DD to see if opinion had changed; During our engagement event on 27th of July 2022, 86% percent of attendees either agreed or strongly agreed with this approach, and 75% of attendees either agreed or strongly agreed that a nature-based approach was a sensible approach to manage the cost of carbon for the future. Further details of the event can be seen in section Appendix 4.

Our CEG noted in their company report on the final plan, published on 17th of January 2022, that we were the only DNO to align to the Net Zero Standard and have a credible delivery plan. The CEG and the Challenge group have expressed concerns over consumers funding offsetting activities but have commended SSEN for taking a nature-based approach. Ofgem acknowledge this in CI A1.42.

Ofgem's decision at draft determinations is clearly inconsistent with stakeholder feedback, and Ofgem has not considered the potential impact on current and future consumers of its proposals in terms of reducing carbon emissions. Taken together with Ofgem's decision to remove any financial incentive in this space, we consider that the resultant framework does not encourage the necessary step-change in behaviour and mindset required in RIIO-ED2 to achieve net zero and mitigate the impact of the climate crisis, which is happening now.



Figure 11: Acceptability Testing Results

Our acceptability testing can be seen in full in Annex 3.3 of our Final Business Plan submission - Business Plan Testing and Acceptance Results⁸.

Since final business plan submission Citizens Advice, working with Sustainability First, another charity, commissioned Baringa Partners to undertake research on the EAPs of the electricity DNO companies.⁹ They reported that there is diversity in scope and rigour of the reported approaches to and performance reporting of biodiversity and natural capital that suggests greater maturity and/or expertise on the subject matter among some DNOs. One example they highlighted in relation to SSEN was the tying of biodiversity measures to net zero initiatives via local insetting or offsetting (for e.g., reforestation and peat restoration) therefore showing support for our proposed nature-based solution and recognising not only our ambition but its importance in our credible journey to net zero. We note that Sust

Our Business Plan Annex 3.1, Enhanced Engagement Strategy, sets out our vision for the role of stakeholder engagement in informing our decisions. We created a four-step triangulation process based upon best practice; gathering evidence (synthesis), assessing the evidence source, and assigning a score, triangulation (which involves using feedback to inform proposals), and finally communicating and testing the findings.

The following insights were derived from the engagement synthesis with direct relevance to our NbS for carbon removal and can be found in our EAP:

"Stakeholders want us to meet net zero and be as ambitious as possible, recognising that SBTs are only part of the solution; where we can't abate carbon, we need to remove it. They support doing this through natural capital and biodiversity investment." – page 11.

"Domestic Customers were positive about building natural capital across the network, particularly where infrastructure works disrupts natural capital, and it is important to convince wider stakeholders of its value and SSEN investment plans. [E149]" – page 87.

"Storage and renewables stakeholder segment were satisfied with the EAP outputs and noted they go beyond network infrastructure to consider suppliers, transport, and biodiversity. [E155]" – page 87.

"Planting trees in landscapes which previously didn't have trees is not value for money and restoration of peatland is preferable. [E151]" – page 88.

"Government suggested restoring woodlands would be preferable to tree planting and collaboration with the Woodland Trust was recommended. [E177]" – page 88.

Carbon Offsetting was not supported as it was thought to be lacking in legitimacy at this time, and there was a strong preference for restoration to take place locally that all stakeholders could enjoy. One set of stakeholders said that "with offsetting you have no guarantee that the tree is planted or where it is planted, with local restoration we can all enjoy it and the wider benefits that come with it."

⁸ [A_3.3_Business_Plan_Testing_And_Acceptance_Results_CLEANFINAL_REDACTED.pdf \(ssenfuture.co.uk\)](#)

⁹ Baringa: Review of DNO Environmental Action Plans for the RIIO-ED2 price control:

<https://www.citizensadvice.org.uk/Global/CitizensAdvice/Energy/DNO%20Environmental%20Action%20Plans%20Review%20Baringa%20Partners.pdf>

Full details can be seen in our Business Plan Annex 3.3, Business Plan Testing and Acceptance Results, however, our Customer Engagement Group (CEG) challenged us to emphasise testing our Business Plan and associated costs and bill impacts with stakeholders. This was also already part of our Enhanced Engagement plans; we carried out acceptability testing in two phases, qualitative and quantitative. The qualitative phase involved a range of customers participating in either workshops or in-depth interviews to answer questions which would help us determine how acceptable customers found our Business Plan. The results of the qualitative phase showed that customers (future, fuel poor and vulnerable) were supportive of environmental outputs and targets for net zero. The quantitative phase involved a large-scale survey of SSEN's customers where an acceptability score of between 70% and 75% was an appropriate threshold of acceptability. A score above 82% is seen as a very positive acceptance. Overall acceptability of our final plan expenditure and outputs based on the strategic outcome areas is 78%. Acceptability of the strategic outcome "accelerated progress towards a net-zero world" was 79%, overall showing that customers viewed our EAP as acceptable. The questions specifically on NbS which was "Plant 2,000 hectares of native trees and restore 1,200 hectares of peatland in our licence areas, which are expected to remove up to 300,000 tonnes of CO₂ equivalent by 2045", as per page 18 of Annex 3.3, scored 79% for the both the acceptability and affordability, further supporting that customers' support this approach. It must be emphasised that the results and feedback from the acceptability testing were used to further improve the plan before it was submitted in December 2021, therefore, each part the Plan has been strengthened and improved to ensure it is in line with our customers' views since the testing took place.

In our EJP for NbS (447_ENV_NATURAL_CAPITAL), on pages 5-6, we discuss how stakeholder engagement in the form of workshops allowed us to understand that stakeholders ranked biodiversity and natural capital highly and we learnt that our stakeholders have come to value natural open spaces, especially throughout Covid where they offered a place to escape and also to meet friends and family – they have now become even more critical to wellbeing.

On a scale of 1-5, how ambitious do you think 'SSEN should be in the following environmental areas?

1 = Remain as we are (in ED1) | 3 = Pace with the Paris Agreement | 5 = Accelerating Net Zero

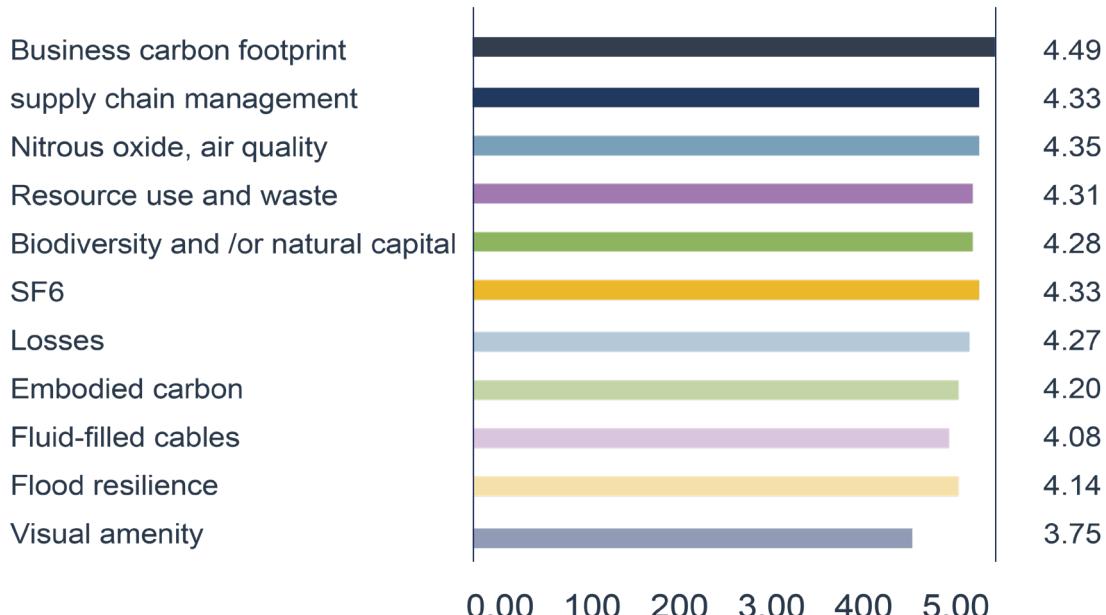


Figure 12: Biodiversity and Natural Capital ranked 5th out of 11 environmental areas.

Requested Item 4, a summary of the benefits to network consumers

Our EJP for NbS (447_ENV_NATURAL_CAPITAL) assessed two options for the removal of carbon: purchasing carbon units and a natural capital approach. The first option involving the purchasing of carbon units was included as the 'do minimal approach'. This approach had the advantage of being able to deliver carbon units immediately however, the CBA showed that this option would not deliver biodiversity units, ecosystem service benefits or natural capital improvements for SSEN customers. The natural capital approach presented in the second option which we have chosen, will provide benefits reaching beyond the obvious of simply removing carbon and into the realm of habitat creation and improvements and a host of natural capital and ecosystem services benefits which will be delivered throughout the entire lifespan of the project.

As per the EJP, natural capital can be defined as the "world's stocks of natural assets which include geology, soil, air, water and all living things"¹⁰. It is these natural capital assets that deliver a flow of significant benefits, often called ecosystem services, which make human life possible. Ecosystem services are defined by the Common International Classification of Ecosystem Services¹¹ (CICES) as:

Provisioning services: food, fresh water, wood, medicinal products, etc.

Regulatory and maintenance services: purification of air and water, climate regulation, pollination, carbon sequestration, natural pest control, etc.

Social and cultural services: tourism and recreation, cultural heritage, and educational opportunities and a sense of wellbeing

A natural capital approach centred on NbS which we are proposing, delivers a range of benefits including the provision of Biodiversity Units (BUs), the maintenance of culturally significant species and increased ecosystem services, such as flood resilience and recreation value, which will be of greater value to customers. These benefits are listed in our EJP on pages 11-14 but have also been included below. Some monetised benefits associated with woodland include:

Biodiversity – tree planting, in appropriate areas, is one of the best means to enhance biodiversity. This is especially true in agricultural land areas of lesser quality with very low levels of baseline biodiversity. This is reflected within Biodiversity Metric (BM) 3.0, with woodland habitat typically scoring highly in distinctiveness (a measure of inter-habitat quality/biodiversity). The BUs (as measured using BM 3.0) were monetised using the range of costs of BUs currently found in the marketplace. The BM is a metric that can calculate the biodiversity net gain of a project or development.

The following benefits were monetised using data from the Office for National Statistics.

Pollution removal – trees have been found to improve air quality through their absorption of polluting gasses into stomata and suspended particulate matter on their leaves; "Forested areas have the ability to trap up to 50% of localised particulate matter" – Maher et al (2013)¹². There are clear public health benefits associated with reduced air pollution, leading to reduced public health costs.

Flood prevention – trees are known to reduce flood flows. This is due in part to the increased water absorption of trees, along with increased hydraulic roughness of woodland habitats. Studies at Pont Bren in Wales found soil-infiltration rates were up to 60 times higher under young native woodland than heavily grazed pasture¹³. Reduced flood flows have clear public good benefit, along with savings in damages costs.

Urban woodland cooling – woodlands can cool urban environments, through a combination of shading and evapotranspiration. This cooling effect can lead to productivity benefits and a reduced requirement for artificial cooling¹⁴.

Noise reduction – woodlands act as a barrier to noise - especially road traffic noise. This reduced disturbance increases sleep quality and reduced annoyance. A study by Ow and Ghosh (2017) demonstrated that on average, vegetative barriers

¹⁰ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/909202/ncc-terminology.pdf

¹¹ <https://cices.eu/>

¹² https://www.researchgate.net/publication/258442913_Impact_of_Roadside_Tree_Lines_on_Indoor_Concentrations_of_Traffic-Derived_Particulate_Matter

¹³ Carroll ZL, Bird SB, Emmett BA, Reynolds B, Sinclair FL (2004) "Can tree shelterbelts on agricultural land reduce flood risk". Soil Use and Management, 20, pp. 357-359

¹⁴ <https://www.forestryresearch.gov.uk/documents/7125/FCRN037.pdf>

(moderate to dense) were able to reduce traffic noise by 9–11 dB. A 10m depth of trees was found to be the upper threshold for effective noise attenuation. The results showed that the traffic noise was reduced by 50%¹⁵. Quantifiable health benefits are associated with this.

Recreation – Hundreds of millions of visits are taken to woodland in the UK each year. This recreational resource has a clear financial benefit for local economies

Monetised benefits associated with peatland include:

Biodiversity – Peatlands are important for biodiversity, supporting a unique assemblage of wildlife. They therefore support an important component of the biodiversity within the UK. Many rare species of flora and fauna can be found in healthy peatland habitats (such as round-leaved sundew, cotton grass, the curlew and golden plover). However, degraded peatland supports significantly less biodiversity due to the loss of unique character. For example, peatland that is significantly dried and/or used for arable crops supports a much less diverse and rare assemblage of species. The BUs (as measures using BM 3.0) were monetised using the range of costs of BUs currently found in the marketplace.

ONS data for peatland were limited to recreation and grants provided for science (other than extracted peat value), therefore a different approach was used.

Willingness to pay – In a report published in the Journal of Environmental Economics and Policy ‘The economics of peatland restoration’ it was acknowledged that there is a lack of comprehensive valuation encompassing the relevant public benefits of peatland restoration, leaving policy makers with little guidance with respect to the economic efficiency of restoring this climate-critical ecosystem. To estimate the non-market benefits of peatland restoration they used a choice experiment study in Scotland, these are experiments are designed to remove inherent biases and find the true stakeholder perception of value. In this study 91% of respondents (n = 1,795 respondents) selected a restoration option at least once while 9% always chose the ‘no restoration’ option¹⁶. Assuming high peat concentration, the shift from poor to good condition peatland was valued at around £246/ha/year. The shift from intermediate to good condition peatland was valued at between £127 and £414/ha/year. These values correspond to the average willingness-to-pay of the sample population for this particular level of restoration per year and until 2030. It is therefore an estimated monetary value of the benefits of this level of restoration.

Any willingness to pay work should be used as an indication of priorities and evidence that this type of investment is supported.

When monetising the wider environmental benefits of this approach (excluding carbon), the Benefit Cost Ratio (BCR) ranges between 2.70 for woodland in England and 5.36 for peatland after 5 years. Approximately 4,674 Biodiversity Units could be used to offset SSEN’s operational impacts and will help to contribute towards the target of achieving biodiversity net gain from 2025.

Intervention	Region	Area (ha)	Cost	Biodiversity Units	Biodiversity valuation	ES/WTP	Total	BCR*
Woodland	SHEPD	1200	£9,966,926	1,272	£35,616,000	£2,012,938	£37,628,938	3.78
	SEPD	866	£10,656,798	918	£25,702,880	£3,084,658	£28,787,538	2.70
Peatland	SHEPD	600	£2,501,539	1,242	£12,720,000	£689,746	£13,409,746	5.36
	SEPD	600	£2,501,539	1,242	£12,720,000	£689,746	£13,409,746	5.36
Totals	All	3266	£25,626,802	4,674	£86,758,880	£6,477,090	£93,235,970	3.64

Figure 13: Summary benefit cost ratio table for 5-year ED2 period using Biodiversity and wider environmental benefits (costs and benefits include the green book discount rate)

¹⁵ Ow, L. and Ghosh, S. (2017). Urban cities and road traffic noise: Reduction through vegetation. Applied Acoustics, 120, pp.15-20

¹⁶ <https://www.tandfonline.com/doi/full/10.1080/21606544.2018.1434562>

Non-monetised benefits of woodland creation include:

Pest control – woodlands can help control pests, especially in an agricultural context. This is largely due to the habitat that woodland provides for the ‘natural enemies’ of pests.

Pollination – through the provision of a range of habitats, woodlands can support pollinators.

Water quality – woodlands can have water quality benefits, for example through reduced agricultural diffused pollution and reduced surface water run-off from agricultural land. The benefits of this are difficult to quantify but will be greatest when woodland lies between agricultural land and watercourses. A buffer of 12m or greater riparian buffer strip delivering the maximum protection¹⁷.

Crafting – timber produce has not been quantified but appropriate management of woodland includes rotational cutting to maintain habitat diversity and light levels. This increases the structural diversity and encourages the development of a more diverse assemblage of ground flora. A portion of the wood would be left as deadwood, but a portion could be used for local artisans for crafting. We will also investigate the possibility of this resource being used for our own use.

Well-being – research has found clear physical and mental health benefits to woodland. This includes the provision of space to exercise outdoors, along with providing a calm and relaxing environment. Dadvand et al. (2012) find that higher surrounding greenness is associated with increases in weight and head size at birth of around 44g and 2mm respectively. Donovan et al (2011) find that a 10 per cent increase in tree cover within 50m of a house reduces the number of small-for-gestational-age births by 1.42 per 1000 births¹⁸. Access to woodland also significantly improves mental health¹⁹.

Aesthetic value – woodland forms a key part of the visual beauty of the landscape in many areas and can increase house prices. The average added value per house with urban broadleaved woodland visible from the building is around £7,500, and the added average value per house with broadleaved woodland visible from commuting routes is £6500 (Garrod, 2002). Adjusting for GDP growth since 2002, those values are around £11,000 and around £9,500 respectively in 2013.

Education – woodland provides opportunities to learn in and about nature, as evidenced by the success of Forest Schools in the UK²⁰.

Culturally significant species – there are culturally significant species under threat whose survival is priceless, such as the Scottish wild cat, red squirrel, capercaillie, hawfinch, nightingale and 1 in 6 of our woodland flowers are threatened with extinction.

Non-monetised benefits of peatland include:

Water quality – Peatlands in upland areas play a significant role in the supply and the quality of drinking water. The deep peats intercept and retain a range of atmospheric pollutants, including nitrogen, sulphur, and heavy metals, providing less contamination in drinking waters. The removal of peat sediment and dissolved organic carbon represents a large cost in water treatment for water utilities for water draining from degraded peatlands.

Water supply – Peatlands are the headwaters for some of England’s major water supply catchments that supply drinking water reservoirs across the uplands. Water derived from functioning peatlands is naturally of very high quality, being relatively pure due to limited human impacts, low weathering rates and widespread overland flow.²¹

Flood hazard regulation – There is some evidence that natural and restored peatlands provide reduced downstream flood risks compared to damaged peatlands²². However, the connection between peatland and flooding is an unclear one requiring further research.

¹⁷https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/928121/3D_buffer_strips_designed_to_deliver_more_for_the_environment_-_report.pdf

¹⁸<https://www.woodlandtrust.org.uk/media/1732/economic-benefits-of-woodland.pdf>

¹⁹<https://www.mentalhealth.org.uk/campaigns/thriving-with-nature/guide>

²⁰<https://forestschoolassociation.org/what-is-forest-school/>

²¹https://www.theccc.org.uk/wp-content/uploads/2013/07/ASC-2013-Chap4_singles_2.pdf

²²https://www.theccc.org.uk/wp-content/uploads/2013/07/ASC-2013-Chap4_singles_2.pdf

Culturally significant species – there are culturally significant species under threat whose survival is priceless such as the large heath butterfly, Argent and Sable moth, golden plover, curlew, the carnivorous sundew, numerous rare mosses like the golden bog moss sphagnum.

Recreation - Peatland areas provide recreation opportunities for many people. The expenditure on recreational visits between 2009 and 2017 ranged between £124.1 million and £284.1 million. With an estimated 2,962,622ha of peatland habitat present in the UK, this equates to approximately £69 per ha with an estimated 24p per ha for educational grants. As this was not comparable data, data sets were used from a bespoke survey designed for the peatland restoration user guide (i.e., willingness-to-pay, above).

Cost of Carbon – reducing the burden on future consumers

Our proposal is the most efficient long-term solution to carbon removal as it effectively protects current, and future, consumers from drastic increases in carbon costs to offset residual emissions. As shown in figure 14 the median 2028 cost of carbon unit, as published by BEIS in 2018, was £72.10; this is the figure used by DNOs in the Ofgem CBA templates. However, BEIS revised the 2028 cost of carbon unit in 2020 and revised the figure to £272, with the 2045 figure revised to £351. It is clear from historic trends, and future trajectories, that the cost of carbon will continue to rise sharply. This cannot be avoided.

Our proposed investment for carbon removal and reduction utilising Nature-based Solutions will deliver potential carbon removals and reductions to help us achieve our credible net zero target, whilst also providing vast biodiversity benefits in our license areas. This level of investment will achieve a sequestration rate of at least 260,000 tCO₂-e by 2043. Therefore, alongside our own Science Based Targets for carbon reduction, with this investment, we would achieve our net zero in line with current Scottish and English legislation or potentially before.

These provisions will benefit our current customers and will also protect and benefit our future consumers, supporting our views on climate equity on page 19 of our EAP where we acknowledge that climate change does not impact all consumers proportionally. The cost of carbon is rising, and this means our actions now have the potential to disproportionately impact our future consumers.

Year	Low series	Central Series	High Series				
2020	120	241	361	2045	176	351	527
2021	122	245	367	2046	178	356	535
2022	124	248	373	2047	181	362	543
2023	126	252	378	2048	184	367	551
2024	128	256	384	2049	186	373	559
2025	130	260	390	2050	189	378	568
2026	132	264	396				
2027	134	268	402				
2028	136	272	408				
2029	138	276	414				
2030	140	280	420				
2031	142	285	427				
2032	144	289	433				
2033	147	293	440				

Figure 14: Low, Central and High Series Cost of Carbon, BEIS

Requested Item 5, detail on any carbon offsetting projects or schemes undertaken and/or supported, including expected emissions to be offset per annum in RIIO-ED2.

Ofgem has requested additional information on the location of our proposed nature-based solutions. The native woodland and peatland restoration projects we proposed will look to be situated within our license areas, in areas where there is greater likelihood of success. Planting and restoration activities not sited in appropriate areas can fail and, for that reason, we need to select the most appropriate sites. Additionally, further tree planting next to electricity infrastructure introduces an unacceptable additional safety risk and would result in additional maintenance to manage any tree or vegetation growth at or close to our assets.

The primary investment driver for this investment is carbon dioxide (CO₂) removal and reduction. Based on an assessment of the ability of habitats to sequester or reduce carbon, the maturity of the data available, the capacity for available land and expertise to deliver, the two terrestrial habitats with the greatest carbon potential for carbon reduction ability are woodland creation (removal) and peatland restoration (reduction) resulting in a net loss of CO₂ from the atmosphere.

- **Woodland:** To deliver on the Scottish Government's Draft Climate Change Plan²³ there are ambitious woodland creation targets which are rising from 12,000 hectares a year to **18,000 hectares a year by 2024/25**²⁴. Scotland's forests and woodlands play an important role in tackling climate change by removing around 9.5 million tonnes of harmful CO₂ emissions each year. In England, the government plans to plant approximately **7,000 hectares of woodland per year** by the end of May 2024²⁵.
- **Peatland:** Peatland restoration is a key part of the Scottish Government's goal of achieving net zero in Scotland by 2045 with a plan to **restore 250,000ha of Scottish peatland by 2030**²⁶. In England, the government have committed to securing peatland carbon stores to meet their 2050 net zero contribution and **restore 35,000ha of England's peatlands by 2025**²⁷.

We need to act now to enable us to meet our obligations and targets aligned with UK and global commitments. Habitat creation will take time to establish. There is an inherent lag between project initiation and the delivery of significant benefits in the natural capital approach. For woodland, this is due to the decades that it takes for the trees to mature and start delivering significant benefits (e.g., significant levels of carbon sequestration starts to occur around a decade after trees are planted). For peatland habitats, it takes time for the interventions to result in the peat recovering from a carbon source to carbon sink (for example, the time taken to re-waterlog the ground). Due to this lag, it is important to begin such projects as soon as possible, to minimise the time before consumers benefit from the benefits. Delays will increase the burden on the consumer due to the predicted increases in the costs of natural capital solutions.

Our EJP provides full Carbon sequestration values at 5years, 45 years and 100 years, the information below is based on 45years. It is important to note that sequestration rates accelerate over time, and we need approx. 260,000tCO₂e by 2045 in order to meet net zero by 2045. This investment is predicted to deliver that amount then. However, the rates will continue to grow.

After 45 years significant benefits are achieved, with a total benefit value of **£209,888,296** for carbon reduction. This results in a BCR value of **6.27** with a potential **855,225 t** of CO₂e reduction. If all benefits considered are monetised this would deliver **£330,342,325** (including 4,674 Biodiversity Units). This is likely to be an under estimation of benefits as not all benefits have been monetised. Additionally, it is predicted that in future costs will increase for NbS, therefore early investment is particularly attractive.

²³ <https://www.gov.scot/publications/draft-climate-change-plan-draft-third-report-policies-proposals-2017/>

²⁴ <https://forestry.gov.scot/news-releases/positive-progress-on-tree-planting>

²⁵ <https://www.gov.uk/government/news/tree-planting-rates-to-treble-by-end-of-this-parliament>

²⁶ <https://www.gov.scot/news/peatland-restoration-fund-tackles-global-climate-crisis/>

²⁷ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1010786/england-peat-action-plan.pdf

Costs and Benefits	Costs	Carbon units (tCO ₂ e)	Carbon £	BUs	Biodiversity £	Ecosystem service value/WTP	Total value
Woodland 1200ha Scotland*	£13,420,900	315,237	£82,204,786	1,272	£35,616,000	£10,471,717	£128,292,503
Woodland 866ha England*	£13,149,416	457,400	£109,447,826	918	£25,702,880	£16,047,026	£151,197,732
Peatland 600ha Scotland and England**	£3,447,846	41,294	£9,117,842	1,242	£12,720,000	£3,588,203	£25,426,045
Peatland 600ha Scotland and England**	£3,447,846	41,294	£9,117,842	1,242	£12,720,000	£3,588,203	£25,426,045
Totals	£33,466,008	855,225	£209,888,296	4,674	£86,758,880	£33,695,149	£330,342,325

Table 7: Summary of benefits of woodland and peatland in England and Scotland after a 45-year period (costs and benefits include the green book discount rate)

*Assumes biodiversity unit value of £28,000 **Assumes biodiversity unit value of £20,000

At 100 years a total benefit value of **£393,686,528** for carbon reduction is achieved with a CBA BCR value of **11.35** and a potential **1,354,869 t** of CO₂e. If all benefits considered are monetised this would deliver **£525,332,133** (including 4,674 BUs). This is likely to be an under estimation of benefits as not all benefits have been monetised.

We are not looking into offsetting projects as our approach is focused on credible nature-based solutions. The nature-based projects we have identified as part of our business plan preparation work – are all in our network areas and are listed in the table 8 below. We Have reached out to all contacted stakeholders again following draft determinations and can confirm that there are opportunities available that can deliver the volumes that we need. We had started to engage with a view to move to prefunding agreements, and we are actively discussing this with 11 of our preferred options.ⁱ²⁸ In fact there is the potential to deliver the volumes we need through one partner, and through national park restoration, however, our approach will be a portfolio of projects across both our license areas, selected on the sites that drive the best benefits to consumers and planet. We are ready to proceed with our portfolio design and confirm agreements with partners, should funding be allowed.

No.	Stakeholder	Location	Intervention	Opportunity
1	Cairngorms National Park Authority	Cairngorms national park, Scotland	Woodland and peatland	Are engaging with multiple landowners throughout the National Park. 90,000 hectares of peat to restore & 35,000 hectares of woodland creation potential. Also potential for Wildcat habitat creation, riparian woodland creation, and a suite of management opportunities (for example deer).
2	Trees for Life	Scotland	Woodland	Are engaging with landowners across 1000s of hectares across Scotland. There is an opportunity to collaborate with them on their large re-wilding projects. Their schemes

²⁸ We cannot publish some of the correspondence as there is a commercial aspect to this, and partners have requested confidentiality. We can discuss these at further Bilaterals if required.

				span 1000's of hectares and have a woodland focus. Have launched a project to rewild half a million hectares of the Scottish Highlands for Glen Affric.
3	New Forest National Park	Hampshire, England	Woodland, peatland, and wetlands	Projects available through REVERE. Opportunity would take a portfolio approach. 5000 hectares of woodland creation potential.
4	Belpoint Ltd	England	Woodland, floodplain grassland and a 120ha salt marsh restoration project	Three discrete projects. First is a 13ha arable reversion mosaic scheme split into two sites, one being entirely woodland and the other being wetland and wood pasture. The second is a project to restore 120ha of saltmarsh on reclaimed farmland and reconnect it to the adjacent NNR, National Park, Ramsar Site, SSSI and SAC. The third is associated with a large 600ha+ estate with no specific plans that could be tailored to meet SSEN's woodland creation needs.

Table 8: Nature Based Projects

Requested Item 6, Provide view of how we are addressing biodiversity net gain legislation and how credits work when located away from works (from Ofgem bilat meeting minutes)

Over the past few years biodiversity net gain legislation has become clearer with the passing of the Environment Act 2021 in England, and with Scotland's framework expected soon, however there is still a lot to do to establish the actions required as a result. We have engaged with both governments on this legislation through consultation and Bilaterals and presented our nature-based proposals. This engagement has been positive, and we believe we have an approach that satisfies the expected outcomes of the legislation, including where we are siting restoration away from the original project. This is an acceptable approach as long the restoration is enhanced beyond the initial impact - to make up for the difference. Put very simply – if you restore away from the site impacted – you have to restore more, the amount is driven by different factors, and we outline this below as well as a review of all legislation and current consultations in this area.

Biodiversity net gain (BNG) is **an approach to development, and/or land management, that aims to leave the natural environment in a measurably better state than it was beforehand**. The Environment Act 2021; applicable in England only, mandates net gains for biodiversity. The Act sets out several key components of mandatory biodiversity net gain, which are²⁹:

- Minimum 10% gain required, calculated using Biodiversity Metric and approval of net gain plan
- Habitat secured for at least 30 years via obligations/conservation covenant
- Habitat can be delivered on-site, off-site or via statutory biodiversity credits
- There will be a national register for net gain delivery sites
- The mitigation hierarchy still applies of avoidance, mitigation, and compensation for biodiversity loss
- Will also apply to Nationally Significant Infrastructure Projects (NSIPs)
- Does not apply to marine development
- Does not change existing legal environmental and wildlife protections

Where onsite restoration is not possible - the Act makes a provision for a system of statutory biodiversity credits that will be invested in habitat creation, which can be **bought as a last resort when onsite and local offsite provision of habitat cannot deliver the required biodiversity net gain**.

Scotland hasn't imposed a legal requirement for the delivery of net gain but instead proposes to deliver biodiversity gain through the National Planning Framework (NPF) and considers biodiversity "enhancement" rather than net gain³⁰. Development would be supported only where they "conserve and enhance biodiversity, including nature networks within

²⁹ Biodiversity net gain: <https://www.local.gov.uk/pas/topics/environment/biodiversity-net-gain#:~:text=The%20Act%20sets%20out%20the,or%20via%20statutory%20biodiversity%20credits>

³⁰ Biodiversity enhancement in Scotland – a different approach: [https://www.theplanner.co.uk/opinion/biodiversity-enhancement-in-scotland-%E2%80%93-a-different-approach#:~:text=Unlike%20England%2C%20Scotland%20has%20not,national%20planning%20framework%20\(NPF\)](https://www.theplanner.co.uk/opinion/biodiversity-enhancement-in-scotland-%E2%80%93-a-different-approach#:~:text=Unlike%20England%2C%20Scotland%20has%20not,national%20planning%20framework%20(NPF))

and adjacent to the site, so that they are in a demonstrably better state than before the intervention." There will not be a nationally set minimum level of biodiversity enhancement and no suggestion of a biodiversity credit system yet. However, we expect Scotland to set their own targets and they have said they will produce a new biodiversity framework following the CBD COP 15 conclusion, expected this year. The strategic approach is currently under consultation and therefore will undergo further refining however, the outcomes framework includes both woodland and peatland. One of the reasons we have selected these in our approach as we know it will align with both government policies.

DEFRA's launched a consultation on Biodiversity Net Gain Regulations and Implementation³¹ that closed in April of this year. This consultation states "*that developers should aim to avoid negative impacts and mitigate impacts on-site where they cannot be avoided. Where this is not possible, developers will be able to create or enhance habitat off-site. The establishment of a market will ensure that a supply of off-site biodiversity units is available to developments that need them. Developers will be able to deliver off-site biodiversity gains on other landholdings, or purchase biodiversity units on the market. Policy and guidance will encourage off-site biodiversity gains to be delivered locally to the development site, which is incentivised by the biodiversity metric's spatial risk multiplier. Where the available local opportunities for off-site habitat creation or enhancement are insufficient for developers to meet their net gain requirements, off-site delivery outside of the local area will be allowed. All off-site gains must be delivered within England. Spatial nature strategies, such as Local Nature Recovery Strategies, should be used to target delivery of off-site biodiversity gains, and habitat delivery in strategic areas will be incentivised by the biodiversity metric's strategic significance score.*" The credit market is still in its infancy but in circumstances where we may not be able to deliver on-site projects, we will be able to use this system of delivering off-site projects with off-site biodiversity units. The result of this consultation will help shape the requirements on companies as a result of the 2021 Environment Act.

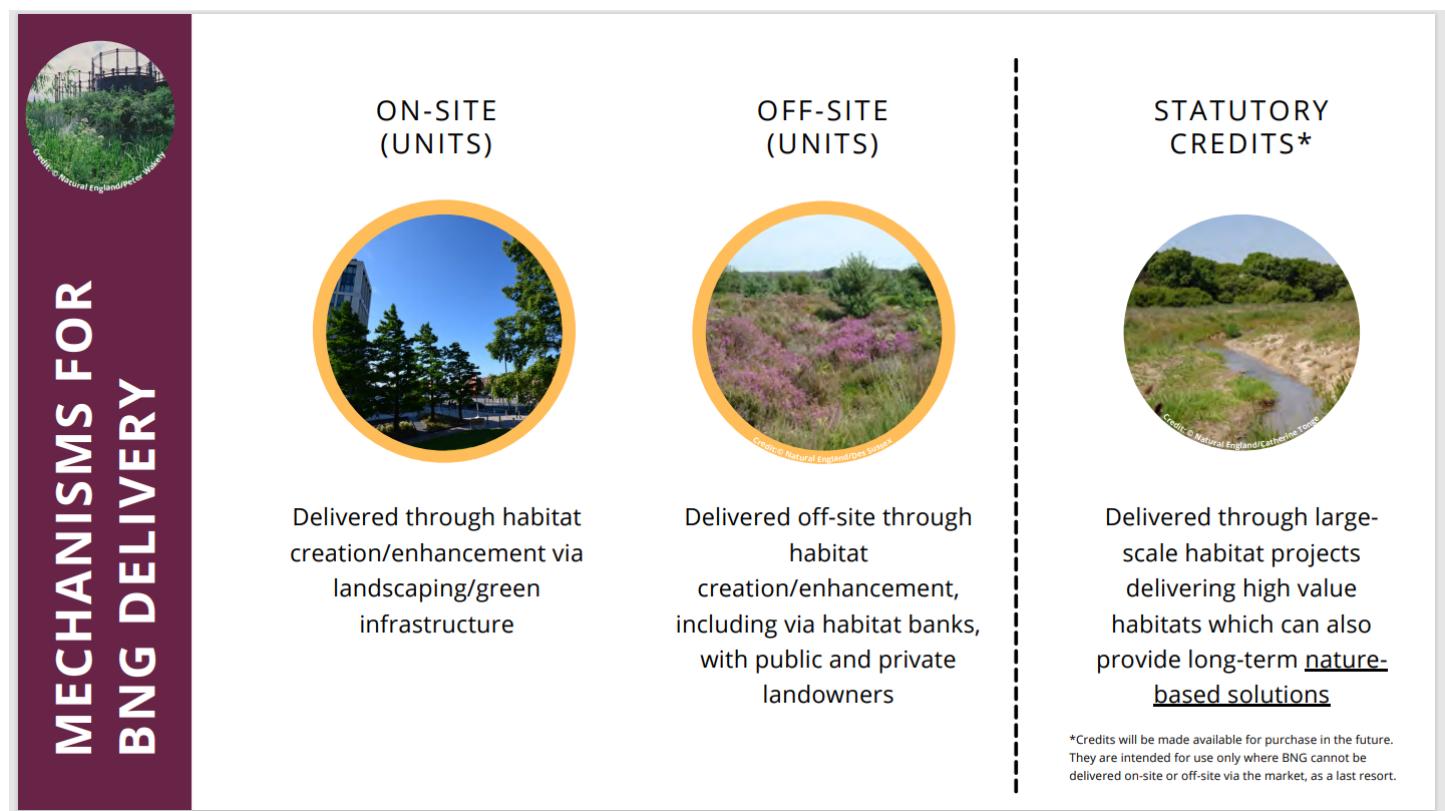


Figure 15: Natural England Biodiversity Net Gain Extract

³¹ DEFRA: Consultation on Biodiversity Net Gain Regulations and Implementation : https://consult.defra.gov.uk/defra-net-gain-consultation-team/consultation-on-biodiversity-net-gain-regulations/supporting_documents/Consultation%20on%20Biodiversity%20Net%20Gain%20Regulations%20and%20Implementation_January2022.pdf

Natural England have produced a useful guidebook³² on Biodiversity Net Gain and has included a descriptor of how BNG can be achieved, off site gain is allowed, and any off-site developments have to be recorded on central registers, they also encourage nature-based solutions. I include an extract above.

We have also looked to our professional bodies for guidance. The **Chartered Institute of Ecology and Environmental Management (CIEEM)** promotes the highest standards of practice for the benefit of nature and society. CIEEM (2018) directs compensation of biodiversity loss to be “as close as possible to the location where effects have occurred and benefit the same habitats and species as those affected”³³. When estimating the biodiversity units associated with a future habitat, factors will be assessed such as the difficulty of creating or restoring habitat, temporal risk from the difference in time between losing and gaining habitat and offsite risks - taking into account the proximity of the compensation site to the impacted site. Habitats which are relatively easy to create but which take a long time to develop (such as tree planting) will generate a low number of units, as will schemes which are located a long way from the original loss. As per the section above, we have engaged with partners that have initiatives in our network areas in both the North and South of the UK.

The UK remains one of the most heavily deforested countries in Europe with its remaining forest in particular the native woodland, being of very high biodiversity value. It is currently fragmented and restricted in range, with woodland biodiversity facing challenges such as invasive non-native species. Approximately a quarter of Scotland’s area is covered in peat, storing over 3 billion tonnes of carbon. However, it is estimated that around 70% of Scotland’s peatlands (1.6 million hectares) are degraded. At least 25% of wider uplands are also considered to be in poor condition. Our proposal to restore woodland and peatland would directly support the Scottish Government’s proposed outcomes of their strategy.

Our proposal provides additional wider benefits including biodiversity enhancements and improved habitat, air and water quality amongst many other things - local to the communities we serve. We are committed to ensuring biodiversity net gain requirements are achieved as close to the habitat affected as possible, and if not possible, we will follow the DEFRA spatial guidance to ensure our net gain is measured accordingly and credible. This is valued by our stakeholders and consumers particularly as outdoor spaces became more significant to us all throughout the pandemic.

2.3 Fluid Filled Cables

Scheme Name	Environment Output
EJP Ref	8_SSEPD_ENV_CABLE_FFC
BPDT	CV22 – Environmental Reporting
Cost	£37.32m
Ofgem Review Output	Unjustified
Ofgem Review Comment	<p><i>The needs case of the resubmitted EJP is considered valid and the optioneering is based on different volumes of leak reduction achieved. SSEN’s preferred option has the most favourable NPV.</i></p> <p><i>We consider that there is a risk that the stated leak reductions will not be achieved.</i></p>

2.3.1 Draft Determination Response

Ofgem’s Engineering Review has considered the needs case of our resubmitted EJP to be valid however declared the EJP, 8_SSEPD_ENV_CABLE_FFC, unjustified due to delivery risk. Ofgem consider there is a risk that the leak reductions will not be achieved. We do not agree with this position. However, following a positive discussion at the bilateral (held on the 14th of July 2022), where Ofgem asked for further clarity on our methodology, we were able to better understand their

³² [Biodiversity Net Gain Brochure \(blog.gov.uk\)](#)

³³ *Biodiversity net gain. Good practice principles for development. A practical guide:* <https://cieem.net/wp-content/uploads/2019/02/C776a-Biodiversity-net-gain.-Good-practice-principles-for-development.-A-practical-guide-web.pdf>

concerns and have responded to all requests in full below. We have also provided additional information below for fluid-filled cables in response to the Core Methodology document, Appendix 1 - EAP Proposals.

In response to the request for additional information in section A1.34 in the Core Methodology document, **we aim to replace 71.87km of fluid-filled cables during RIIO-ED2, reducing leakage by 20% relative to FY2019/20 which translates to 20,925.6 litres.**

Additionally, in response to section A1.35 in the Core Methodology document, we have supplied supplementary information below to detail our primary and secondary investment drivers, the associated costs, risks to delivery and our optioneering and environmental benefits to deliver our proposed replacement plan.

Replacement Plan and Delivery

FFCs represent an ageing population of legacy assets and therefore have increasing maintenance and intervention costs. For the RIIO-ED2 period, a risk-based approach for cable replacement has been developed. We aim to reduce the risk of leakage from our cables close to drinking water sources and Site of Special Scientific Interest (SSSI) areas in the SEPD network, and to reduce customer interruptions from underground FFC network failure due to age and soil movement.

Our proposed replacement plan for 71.87km of fluid-filled cables (FFC) is based on this developed methodology that assesses layers of risk including asset health, condition, and the environment. When reviewing our options amongst other things we carried out a deliverability assessment, this included comparing our proposed volumes with our ED1 run rate. Our ED2 replacement plan was assessed by our deliverability teams and confirm the plan to be achievable given it is consistent with what has been delivered in ED1.

To ensure our developed methodology did not overcommit to replacement, we also ran a traditional CBRM model. This model suggested that a volume up to 156km could be identified for replacement - more than double than we have identified in our proposal – so demonstrating that we have not included inflated volumes. Additionally, this proposed replacement figure from the CBRM model would not be achievable in a five-year price control without significant disruption to the network; considering the investment programme in the round (including the PCB replacement programme), we do not believe this is in the best interest of our consumers.

Considering this, we have then progressed with our risk-based approach, firmly believing that we have a balanced programme of replacement which delivers on stakeholder and asset need and is deliverable within ED2. We appreciate that there is always a potential risk of asset failure outside initially identified routes and an earlier intervention could need to be applied. However, we believe our selection model manages this risk and our asset management programme, and further inspection and maintenance plans will continue to do so throughout the ED2 price control.

When determining which FFC sections require intervention during RIIO-ED2 we used a weighted multi-criteria methodology which considers both the condition of the cable (probability of failure) and the consequence of failure (oil leaking into the environment). The two of these together give a view of the total risk associated with our FFC assets. This quantification of risk was used to identify which circuits should be prioritised for intervention during RIIO-ED2. Our risk-based approach also captures three environmental investment drivers outlined below:

- Prevention of environmental contamination from FFC oil leakage
- To align SSEN oil leakage rates with sector benchmarks
- Address environmental concerns and expectations of Stakeholders

Replacing the highest risk cables will also provide other non-environmental benefits, including improved quality of service and lower operating expenditures as a result of reduced inspection, maintenance, and fault repair activities. There are also routes identified for replacement through our efficiency and deliverability assessments. We can confirm that cables are not replaced simply because they are FFC, although we do have longer term targets to reduce our FFC cable holdings, they are selected based on risk and deliverability factors as outlined above. The replacement plan is comprised of the following volumes:

- Cables with a risk score of 50 to 100 (38.08km)
- Cables which are identified in HI5 asset health index and cables in the same trench/circuit (12.86km)
- Cables located in the Portsmouth Water SPZ (20.92km)

As all end-of-life cables will not be picked up under the proposed replacement of 71.87km, the remainder will be managed under CV8 & CV9 where we will look to refurbish if possible. We will continue to look at refurb options for our oil-filled cables into the next price control. Additionally, we are implementing an increased inspection scheme to monitor the cables that are not included in our proposed ED2 submission and will use future innovation strategies to look at ways of reducing oil leaks. We will continue to review the health and condition data of our oil-filled cables throughout ED2 which could result in a reprioritisation of circuits if new data is collected which changes our view on the risk associated with each cable section.

Environmental Drivers

Fluid filled cables typically have excellent reliability from an electrical perspective. However, deterioration in asset health often leads to oil leaks that are hazardous to the environment. As such, the risk to the environment is the primary concern in relation to fluid filled cables.

When these leaks occur, it should be noted that it is often possible to maintain circuits in service whilst the leaks are located. Therefore, the risk to customer supplies is low and the risk is only increased for the duration of the planned repair following the location of a leak. Additionally, as fluid filled cables operate at 33kV and above, an outage of a fluid filled cable will be very unlikely to result in interruptions to customer supplies as security of supply at this level is readily available.

In 2019, SSEN engaged with the Environment Agency to understand where our fluid filled cables posed the greatest threat to the environment. Through this engagement we identified that some of our cable circuits are located within Source Protection Zones (SPZs) for the area served by Portsmouth Water. SPZs are used to define areas close to drinking water sources where the risk associated with groundwater contamination is greatest.

The 20.92 km of FFC that are proposed for replacement in the Portsmouth Water area are located in the Havant and Bedhampton Spring. This is a major water resource used by Portsmouth Water for public drinking water supply, contributing 35% of their total supply. The Havant and Bedhampton springs provide water to the whole of Portsmouth, including the nationally significant Ministry of Defence naval base, along with hospitals and schools. It also provides water to the district of Havant. Therefore, the springs are providing water to a population of approximately 250,000 people. Portsmouth Water support any measure that can be adopted by SSEN to minimise the risk posed to drinking water supplies from any FFC and have provided an updated letter of support for our ED2 final submission (Appendix 2).

At the end of July 2022, we had an oil-filled cable leak which was located within a Source Protection Zone (SPZ). This cable had a condition score of HI3, meaning it may not have qualified for condition related intervention if we used our CBRM model to select our ED2 cables. We appreciate that by selecting cables falling under the Portsmouth Water criteria, we may not be replacing cables that with a higher HI score, however, the risk to not replacing these cables could result in polluting a Source Protection Zone (SPZ) and posing serious environmental risk as well as risk to the local communities. Given the significant consequences of failure, we believe it is prudent to prioritise the replacement during RIIO-ED2. We are continuing to overlay all SPZs to our GIS system so we can continue to identify assets that could be an environmental pollution risk if any leakage occurred.

Health and Critically Scoring

Following Ofgem's comments in our bilateral, held on the 14th of July 2022, we have provided additional information below on the volumes of oil-filled cable that would qualify for condition related intervention during RIIO-ED2 according to our CBRM models.

As with all NARMS asset, a Health Score Intervention Criteria (HSIC) needs to be applied to the Health and Criticality scores calculated by our CBRM models for each section of oil-filled cable. The HSIC is used to shortlist the sections that will require condition related intervention during RIIO-ED2.

Table 9 below, shows the sensitivity that was applied to the HSIC to explore the impact on the shortlisted volumes if we were to accept a higher risk of failure for each cable section (HSIC Option 2). For reference, a **Health Score of 8.0 equates to a HI5 asset** which is considered "end of life". Any value greater than 8.0 reflects the worsening condition of the HI5 asset within the HI5 banding. This approach is consistent with our treatment of all other NARMS asset categories.

Criticality	Health Score Intervention Criteria (HSIC) by Asset Criticality	
	HSIC Option 1	HSIC Option 2
C1	8.0	10.0
C2	8.0	9.25
C3	8.0	8.5

C4	8.0	8.0
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Table 9: Health Score Intervention Criteria Options

Table 10 below, shows the volume of oil-filled cable that is justified for asset replacement during RIIO-ED2 using both the HSIC options described above. As seen, both these volumes far exceed the proposed volume for RIIO-ED2. The volume difference between HSIC Option 1 and HSIC Option 2 is minimal and, following a deliverability assessment, it was determined that volumes of this magnitude would not be achieved within a 5-year price control without extensive disruption to the network. However, the output of this methodology demonstrates that our proposed volume of 71.87km following our approach does not include inflated volumes and is well beneath the range justified by our CBRM models.

Asset Category	DNO	ED2 Disposal Volumes (km)	
		HSIC 1	HSIC 2
132kV UG Cable (Oil)	SEPD	47.54	47.54
33kV UG Cable (Oil)	SEPD	100.07	100.07
33kV UG Cable (Oil)	SHEPD	8.47	8.34
	Total	156.08	155.94

Table 10: Volumes of Cable Justified for Replacement During RIIO-ED2

Elements of our Portsmouth Water cables are also recognised under the HSIC Option 1 if following the CBRM approach. This has confirmed our approach to prioritisation of our selected cables in terms of environmental impact. It also makes best use of consumer funding if we replace all our selected Portsmouth Water cables at the same time.

Reviewing the HSIC Option 1 assets further, 36.04km (50%) of our proposed volumes are also identified for replacement under this driver. The remaining 35.83km that aren't included in the HSIC Option 1 asset list is driven by environmental and stakeholder need or are identified through our deliverability assessment. In the same trench / area of other cables identified) so go beyond the traditional condition related intervention method.

Our costs and volumes are clearly identified in our EJP and business plan data table CV22. We discussed at the bilateral using a hybrid PCD approach to tackle the different drivers which would mean 35.83km would be funded under the PCD. However, it would be our preference to cover all investment as per costs and volumes detailed in CV22. This would mean we could continue to report openly and transparently against one BPDT which would be simpler for reporting and communicating to our stakeholders against progress, however we are happy to discuss this PCD option further.

More evidence and justification, including stakeholder evidence and other options considered, can be found in our extensive EJP - 8_SSEPD_ENV_CABLE_FFC. We recognise Ofgem's considerations that the need for this is valid and trust that we have now provided enough information in our response to alleviate Ofgem's concerns and that this EJP can now be considered justified.

3. Partially Justified Engineering Justification Papers

The following five EJPs were classed as 'Partially justified' by Ofgem, and our response will run below.

- 448_SSEPD_ENV_BUNDING; Bunding
- 7/SSEPD/ENV/FLOOD; Flood Mitigation Works
- 10/SSEPD/ENV/GENERATION; Hybrid Generators
- 6/SSEPD/SENV/LOSSES/SUBSTATION; Substation Building Improvements
- 5/SSEPD/ENV/LOSSES; Losses – TASS (Project Lean BAU Innovation Roll Out)

3.1 Bunding

Scheme Name	Environment Output
EJP Ref	448_SSEPD_ENV_BUNDING
BPDT	CV22 – Environmental Reporting
Cost	£9.5m
Ofgem Review Output	Partially Justified
Ofgem Review Comment	<i>The needs case for bunding is considered valid and driven by environmental legislation. A good breakdown of expected costs with an average estimate of £50k / site is provided. The EJP presented limited information on deliverability which is considered a risk. We therefore consider the EJP to be partially justified.</i>

3.1.1 Draft Determination Response

We welcome the recognition from Ofgem that the needs case for this work is considered valid and driven by environmental legislation. We also appreciate the recognition of the breakdown of our costs. However, Ofgem have stated that they consider deliverability a risk.

We do not believe this to be case and would like to reassure Ofgem that all works associated with the bunding proposals are being aligned to our Load and Non-Load investments to ensure we have optimised efficiency opportunities across our complete work bank. This work will be delivered through our GSP delivery programme, meaning that all projects identified will be clustered with other work and be carried out at the same time to ensure we continue to follow our touch the network efficiently model.

We would like to remind Ofgem that this bunding proposal aims to tackle 189 transformers that contain more than 200 litres of oil and currently don't have any bunding fitted. Constructing bunding on these assets will bring them in line with the requirements of The Water Environment (Miscellaneous) (Scotland) Regulations 2017 and The Control of Pollution (Oil Storage) (England) Regulations 2001. These transformers pose a significant risk if a leak were to occur as they are situated in environmentally sensitive areas, meaning they are less than 10m away from any inland freshwater or coastal waters and less than 50m away from a well or borehole otherwise known as a Source Protection Zone.

If our proposal is not actioned, this will result in us failing to bring our operations into line with the requirements of The Water Environment (Miscellaneous) (Scotland) Regulations 2017 and The Control of Pollution (Oil Storage) (England) Regulations 2001. and if a leak were to occur, we could encounter serious environmental contamination. We trust that this is enough to alleviate deliverability concerns and that this EJP can now be considered justified.

3.2 Flood Mitigation

Scheme Name	Environment Output
EJP Ref	7/SSEPD/ENV/FLOOD
BPDT	CV16
Cost	£24.2m (SEPD £23.7m and SHEPD £0.5m)
Ofgem Review Output	Partially Justified
Ofgem Review Comment	<i>The needs case for flood defence works is considered valid. However, surveys are yet to be completed which will influence the indicative costs provided and the requirements per site could be very site specific. Environmental Agency flood maps are also reviewed every 6 months which could also mean an ongoing change to volumes. This presents a risk to the proposed volumes and we therefore consider the EJP to be partially justified.</i>

3.2.1 Draft Determination Response

We welcome Ofgem's recognition that the needs case for this work is considered valid. However, we note the concern and uncertainty over the survey work proposed during the period.

In SHEPD 14 sites will have worked carried out and the other sites surveyed will help improve our data bank for our primary and secondary substations that are identified on the flood plain maps, this will continue to improve our understanding of assets at risks of climate change, this will help ensure we are targeting investment in the right areas in this and in future price controls.

In SEPD we had 47 sites that have been identified as requiring potential flood mitigation work. Flood risk surveys will be undertaken on these sites to evaluate and confirm flood defences for the sites. This survey work is to confirm the outputs and findings in our desktop studies, whilst in theory the results of the new surveys could mean a change to the proposed flood mitigation work required that was included in our final business plan submission, we are confident that due to our existing knowledge and continued focus in this area, this will not change materially and the outputs of the surveys will feed into the accuracy of our overarching work programme ensuring we programme and cluster work as efficiently as possible and providing best value to our consumers.

We also note Ofgem concerns over the release of the Environment Agency (The EA) flood maps and the risk this poses to the proposed volumes. We accept that this is a risk but consider the likelihood of change to be minimal and addressed in our EJP (7/SSEPD/ENV/FLOOD). In addition, on the assessment of the historical low level of change on every new publication of the flood maps, we believe this risk to be low. The changes over recent years have been minimal with each publication – meaning the assets on the flood plains have remained consistent. with there being minimal change in previous years of the assets identified in the flood plain. We would like to point out that this is an industry wide risk applicable to all DNOs and controlled by the EA.

We believe that our continued attention to survey work and improving our data analysis in this area will manage this risk and we trust that this is enough to alleviate Ofgem's concerns and that this EJP can now be considered justified.

Additional Information

Climate change is a huge risk for all DNOs, particularly in terms flooding. We are seeing an increase in floods globally as a result of human caused climate change and our Climate Resilience Strategy projects that we will experience much wetter days. Severe historical flood events have demonstrated the need to understand and improve the resilience of substations to flooding and led to the publication of Engineering Technical Report 138– Resilience to Flooding of Grid and Primary Substations (ETR 138). ETR 138 addresses the risk management of flooding at grid and primary substations in England, Scotland and Wales. It outlines a systematic approach and requirement to protect against coastal, river and surface water flooding.

We do not see flood mitigation work volumes decreasing but would predict increases, which would be addressed in future price controls. This type of investment is critical, and work will be aligned with other activity, where appropriate, to aid mobilisation.

Due to the high number of sites requiring flood interventions in SEPD, a desktop analysis was commissioned by third party experts, Cluttons, to undertake an assessment of the sites identified as at risk of flooding to provide a preliminary view on the potential costs. The assessment scored the sites based on flood risk, proposed flood defence measures, and provided an indicative flood defence cost. The outputs of this work detailed suggested delivery measures ranging from increasing wall heights, protecting switchboards, to protecting the whole site over the course of RIIO-ED2. Costs were then applied to each site for survey costs, outage planning and project management costs.

The scoping exercise undertaken by Cluttons has identified the sites that require the work, and some of this is supported by survey work. To mitigate the risk of flooding to our network, this will require more work than seen in current price control, which is reflected in the RIIO-ED2 forecast. Unit costs were built up from previously delivered rates, and this investment is supported with EJP's.

Since conducting work with Cluttons, we have conducted further internal desk-top survey work to continue to ratify our costs and have not found any material differences. Therefore, we believe the costs submitted in our ED2 proposal to be robust.

This should be read in parallel with Core Q 85.

3.3 Hybrid Generators

Scheme Name	Environment Output
EJP Ref	10/SSEPD/ENV/GENERATION
Ofgem Review Output	Partially Justified
BPDT	C6 – V&T Non-Capex
Cost	£2.2m
Ofgem Review Comment	<i>The volumes presented within the EJP have been determined based on expected operating hours, which are estimated to be reached every 10 years. i.e. replacement 10 years from their manufacture date. However, the operating hours/condition of the individual generators has not been provided and hence there is a risk the assets may still have remaining life / be replaced ahead of need. We therefore consider the EJP to be partially justified.</i>

3.3.1 Draft Determination Response

The comment from Ofgem's Engineering Review has considered the original paper partially justified due to generator condition with potential life left. We do not agree with this position.

As generators reach 10 years from their year of manufacture, supply chain issues become apparent as replacement parts/spares become obsolete and operating costs become high. Therefore, it is pertinent to replace generators that reach 10 years of age regardless of operating hours to ensure security of supply and ensure the generators are economically sound and performing well. Replacing these generators with hybrids will reduce noise, greenhouse gas emissions, and particulate matter in the air so aiding communities and our own commitment to net zero. The choice to swap out diesel generators for lower polluting options should not be delayed, and Ofgem supports this as per A1.22 in the Common Methodology. The below additional information addresses any changes since final business plan submission and seeks to address Ofgem's comment from the draft determinations and move the position to justified.

3.3.2 SHEPD

The Scotland Network (SHEPD) has a number of diesel generators currently in use. In total there are 135 generators ranging from 30kVA to 1250kVA. We are looking to replace the 30KVA diesel generators with hybrid generators as this will reduce cost, GHG emissions and noise pollution. Details of the 30 diesel generators to be replaced are set out below in Table 11, including their manufacture dates and operating hours (as at 21/07/22).

Generator ID	Year of manufacture	Operating Hours
30-1N	2009	459
30-2N	2009	1,186
30-3N	2010	2,823
30-4N	2010	150
30-5N	2010	1,886
30-6N	2010	1,231
30-7N	2010	3,556
30-8N	2010	4,216
30-9N	2010	4,617
30-10N	2010	8,244
30-11N	2010	3,861
30-12N	2010	3,864
30-15N	2011	12,069
30-16N	2011	5,841
30-17N	2011	11,612
30-18N	2011	10,603
30-20N	2013	13,503
30-21N	2013	15,886
30-22N	2013	10,804

30-23N	2013	15,372
30-24N	2013	8,345
30-25N	2013	10,338
30-26N	2016	5,740
30-27N	2016	10,180
30-28N	2016	5,521
30-29N	2016	5,888
30-30N	2016	9,865
30-31N	2016	7,856
30-32N	2016	8,777
30-33N	2016	10,714
TOTAL	30 Generators	

Table 11: SHEPD diesel generators to be replaced with hybrid generators

3.3.3 SEPD

The Southern Network (SEPD) also has a number of diesel generators currently in use. These are:

12 500KVA sets
 13 200KVA sets
 25 100KVA sets
 20 60KVA sets
 20 30KVA sets
 6 battery generators
 10 hybrid generators - rated at approx. 20kVA

There are 20 of the 30kVA diesel generators and we plan to replace these with hybrid generators. The details for the diesel generators being replaced are set out below in Table 12, including their manufacture dates and operating hours (as at 21/07/22).

Generator ID	Voltage	Lease end date	Operating Hours
030-01	30kva Gen Trl	26/06/2027	8,270
030-02	30kva Gen Trl	22/06/2027	7,875
030-03	30kva Gen Trl	22/06/2027	9,851
030-04	30kva Gen Trl	22/06/2027	10,330
030-05	30kva Gen Trl	27/06/2027	10,480
030-06	30kva Gen Trl	27/06/2027	9,324
030-07	30kva Gen Trl	27/06/2027	10,480
030-08	30kva Gen Trl	27/06/2027	10,470
030-09	30kva Gen Trl	29/06/2027	11,530
030-10	30kva Gen Trl	29/06/2027	2,112
030-11	30kva Gen Trl	19/10/2026	6,056
030-12	30kva Gen Trl	19/10/2026	3,921
030-13	30kva Gen Trl	19/10/2026	10,266
030-14	30kva Gen Trl	19/10/2026	8,102
030-15	30kva Gen Trl	11/04/2028	5,583
030-16	30kva Gen Trl	11/04/2028	6,523
030-17	30kva Gen Trl	11/04/2028	7,495
030-18	30kva Gen Trl	11/04/2028	7,493
030-19	30kva Gen Trl	11/04/2028	8,456
030-20	30kva Gen Trl	11/04/2028	6,584
TOTAL	20 generators		

Table 12: SEPD diesel generators to be replaced with hybrid generators

3.3.4 Conclusion

Replacing these generators with hybrids will reduce noise, greenhouse gas emissions, and particulate matter in the air so aiding communities and our own commitment to net zero. The choice to swap out diesel generators for lower polluting options should not be delayed, and Ofgem supports this as per A1.22 in the Common Methodology. We trust that this is enough additional information to alleviate Ofgem's concerns and that this EJP can now be considered justified.

3.4 Substation Building Improvements

Scheme Name	Environment Output
EJP Ref	6_SSEPD_ENV_LOSSES_SUBSTATION
BPDT	<ul style="list-style-type: none">• C5 – Non-Operational Property• M4 Losses Snapshot• Annual Environmental Action Plan Report
Cost	£2.7m
Ofgem Review Output	Partially Justified
Ofgem Review Comment	<i>The proposed investment contains costs for substations not yet identified, this presents a risk that costs could potentially change during ED2. Hence, we consider the EJP to be partially justified.</i>

3.4.1 Draft Determination Response

The comment from Ofgem's Engineering Review has considered the original paper partially justified due to non-identified substation sites and the perceived risk this presents to costs. We do not believe this to be the case and provide further information below.

We are committed to reducing electrical losses on our network. Reducing distribution losses is key to achieving our Science-Based Target (SBT) of at least a 35% reduction in our combined Scope 1 & 2 emissions by the end of RIIO-ED2, a 55% reduction by 2033 and an ambition of meeting Net Zero by 2045 in a credible and transparent way. Implementing the proposed substation building improvements and energy efficiencies will enable a reduction in losses due to reduced substation energy usage.

At time of Final Business Plan Submission, we included 19 named priority sites with a further 25 sites to be identified following a review of other planned work across the complete work portfolio of substations – to allow a targeted approach that maximised efficiency. At the time of publication in December 2021, we had not confirmed these additional sites. We have now carried out this review and have named the additional 25 sites (10 in SSEH, 15 in SSES) below. We trust this alleviates concerns raised during the Engineering Review and merits a move of position to justified.

Additionally, we note Ofgem's comment that all funding in this space is subject to submission of evidence to address concerns regarding SLC 43B (prohibition on Generation) we confirm that our proposals do not include any form of generation, and therefore assume that no further evidence is required to secure the funding. However, we will continue to keep SLC 43B under review in case it starts to drive inefficient outcomes.

3.4.2 Assets Applicable

19 substations including 3 in SSEH and 16 in SSES had been selected for building improvements and a further 25 have been identified since final business plan submission (10 in SSEH and 15 in SSES).

These substations have been selected due to their large volume of traffic use as manned offices, welfare rooms and additional facilities. All our substations have unique qualities therefore, we will review interventions at each substation throughout RIIO-ED2 to ensure we are doing all we can at each site to maximise the benefits available.

The 44 substations already identified for upgrade works are listed below including details of the site and its location. The building footprint has been estimated using our EO system (online mapping tool) so there may be fluctuations when the sites are analysed in more detail.

Substation Name	Location	Size	Building footprint (m ²)*	Identified after final BP submission?
Wootton Road	SEPD-Ridgeway	33kV	330	
Andover Local Grid	SEPD-Ridgeway	33kV	393	
Dorcan South	SEPD-Ridgeway	33kV	233	
Norrington	SEPD-Ridgeway	33kV	345	
Lovelace Road	SEPD-Ridgeway	33kV	213	
Headington	SEPD-Ridgeway	33kV	326	
Northolt	SEPD-Thames Valley	33kV	441	
Taplow	SEPD-Thames Valley	33kV	302	
Burghfield Grid	SEPD-Thames Valley	132kV	434	
High Wycombe Grid	SEPD-Thames Valley	132kV	139	
Thatcham Grid	SEPD-Thames Valley	132kV	282	
Green Park	SEPD-Thames Valley	33kV	173	
Nuffield	SEPD-Thames Valley	33kV	41	
Southcote	SEPD-Thames Valley	33kV	97	
Hunston	SEPD-South East	132kV & 33kV	349	
Haslingbourne	SEPD-South East	33kV	393	
Fareham Grid	SEPD-South East	132kV	223	Y
Havant Grid	SEPD-South East	132kV	144	Y
Fernhurst Grid	SEPD-South East	132kV	121	Y
Five Oaks	SEPD-South East	33kV	79	Y
Wymering Grid	SEPD-South East	132kV	278.9	Y
Wymering Primary	SEPD-South East	33kV	228.1	Y
Sandown Primary	SEPD-South East	33kV	91	Y
Bournemouth	SEPD-Wessex	132kV	290	Y
Bourne Valley	SEPD-Wessex	33kV	337	Y
Wareham	SEPD-Wessex	132kV	295	Y
Langley	SEPD-Wessex	132kV	256	Y
Bittern	SEPD-Wessex	33kV	176	Y
Weston	SEPD-Wessex	33kV	263	Y
Mannington	SEPD-Wessex	33kV	170	Y
Yeovil	SEPD-Wessex	132kV	408	Y
Dunblane	SHEPD-North	33kV	126	
Milnathort	SHEPD-North	33kV	133	
Forres	SHEPD-North	33kV	139	
Aberfeldy	SHEPD-North	33kV	34	Y
Locearnhead	SHEPD-North	33kV	48	Y
Kilninver	SHEPD-North	33kV	32	Y
Ellon	SHEPD-North	33kV	156	Y
Huntly	SHEPD-North	33kV	140	Y
Culter	SHEPD-North	33kV	128	Y
Inverness Primary	SHEPD-North	33kV & 11kV	257	Y
Waterloo Place	SHEPD-North	33kV & 11kV	79	Y
Kirkwall	SHEPD-North	33kV & 11kV	219	Y
Dalneigh	SHEPD-North	33kV & 11kV	120	Y

Table 13: Substations identified for upgrade works

3.4.4 Optioneering – Investment Under Consideration

The EJP had some ambiguity towards which option was being progressed. Table 14 below summarised the options considered for upgrading the substations. It also indicates the preferred option in line with the rest of the EJP evidence and findings.

Option	Description	Status
	Do Nothing	Base case
1	Do Minimum – upgrade substations with key measures	Progressed
2	Upgrade substations with key and additional measures	Progressed – recommended and preferred option
3	Upgrade substations as per do minimum with investigation of additional measures	Not progressed - further investigation required

Source EJP 6/SSEPD/ENV/LOSSES

Table 14 Optioneering

3.4.5 Conclusion

We are committed to managing and reducing losses on our network. Reducing electrical losses is key to achieving our GHG emissions reduction targets and ambition to meet Net Zero by 2045 in a credible and transparent way. The proposed substation building improvements will reduce substation energy usage and, additionally, will improve asset health. We trust that this is enough additional information to alleviate Ofgem's concerns and that this EJP can now be considered justified.

3.5 Losses - TASS

Scheme Name	Environment Output
EJP Ref	5_SSEPD_ENV_LOSSES_TASS
BPDT	<ul style="list-style-type: none">CV21 LossesE4 Losses Snapshot
Cost	£2.2m
Ofgem Review Output	Partially Justified
Ofgem Review Comment	<i>The EJP presented good evidence of the needs case and optioneering. However, we have some concerns regarding volumes and therefore view the EJP as partially justified.</i>

3.5.1 Draft Determination Response

We welcome Ofgem's recognition of the good evidence and optioneering in our EJP. However, Ofgem's Engineering Review has considered the original paper partially justified due to concerns around the volumes. We received a response to our supplementary question (Losses (TASS) EJP) which gave further clarification on Ofgem's concerns around volumes. We have provided our responses to these concerns below.

3.5.2 Ofgem Concern: The Volume of Sites Listed for further Consideration are the Same as those which are listed to be Delivered

To determine the EJP volumes a TASS Evaluation Tool was used. This tool appraises the financial viability of applying TASS at individual substations by simulating TASS operation with site specific load profiles and assigning monetary values to the derived losses saving and associated reduction in CO₂ emissions and produces a CBA. The process set out in the TASS Substation Assessment Technical Guide then provides a framework around the use of the cost benefit analysis tool to evaluate the technical feasibility of TASS application at specific substations. The assessment to identify our proposed sites comprised five key steps:

- Step One - TASS Evaluation Tool cost benefit analysis - generic cost assumptions
- Step Two - is there a dedicated 33 kV circuit breaker?
- Step Three - review of asset condition
- Step Four - detailed protection and control study
- Step Five - TASS Evaluation Tool cost benefit analysis - with site specific costs

For RIIO-ED2, Steps One and Two have been undertaken which has resulted in 58 sites identified for SHEPD and 76 sites for SEPD, which merit further steps to be undertaken to identify suitable sites for the potential deployment of TASS. Steps three, four and five have yet to be undertaken and will be progressed throughout ED2 subject to the justification of this investment. The sites which have been identified for further analysis are shown in Appendix A of our EJP (5_SSEPD_ENV_LOSSES_TASS) and have been included in the final delivery total. We have confidence in our methodology and that the identified sites will be suitable for the application of TASS.

3.5.3 Ofgem Concern: What Will Occur to the Remaining Volumes if any Sites are Considered Unsuitable

We have confidence in our methodology and that the identified sites will be suitable for the application of TASS, however, in the unlikely event that following the completion of steps three, four and five the identified sites are deemed to be unsuitable we will look to reprioritise the investment at other sites to ensure the delivery of the proposed outcomes. Costs will however still be incurred to reach this stage because of the required site-based survey work.

3.5.4 Ofgem Concern: The Initial Site Selection List was not Shared with Ofgem Therefore Ofgem are Unable to Determine why the Volumes are as Proposed at this Stage

This investment converts the Networks Innovation Allowance - Project LEAN into business as usual. The Low Energy Automated Networks (LEAN) project aimed to deploy technology to reduce electrical losses on the 33kV/11kV networks. Full information on NIA Project LEAN is available online on the ENA Innovation Portal³⁴. Where the methodology and site testing is well documented. As part of the original feasibility study - 141 SHEPD and 428 SEPD sites were initially evaluated using the TASS Evaluation tool. Following the evaluation process, 58 SHEPD sites and 76 SEPD sites were identified as being suitable for taking forward to the next steps in the assessment process. The extensive feasibility and initial site selection information can be shared if required, however is well documented on the NIA platform.

³⁴ NIA Project LEAN: <https://smarter.energynetworks.org/projects/sset207-01/>

3.6 Island Generation

Scheme Name	Environment Output
EJP Ref	345/SHEPD/REGIONAL/BATTERYPOINT
BPDT	CV15 – QoS and North of Scotland
Cost	£9.0m
Ofgem Review Output	Partially Justified
Ofgem Review Comment	<i>The needs case is considered justified and will see the replacement of 4 older diesel generators at Battery Point Power Station in Stornoway, however we consider there to be a risk that all 4 generators are replaced. We therefore consider the EJP to be partially justified.</i>

3.6.1 Draft Determination Response

The comment from Ofgem's Engineering Review has considered the original paper partially justified due to risk. In addition to the Engineering Review comment, Ofgem also provided further clarity on its concerns through the response to SQ SSEN023. It challenged the justification of choosing Option 3 over Option 2, as well as the long-term strategy of diesel generators.

We do not agree with the current position from Ofgem and believe that Option 3 provides the most efficient, economic, and safe output. There would be no benefit to consumers in replacing only 2 KVSS engines at Battery Point, as Option 2 presents, given the outlined issues with performance, availability (and cost) of spares, operational compliance, and environmental impact.

The location change of the 2 new generators to Arnish Power Station on Stornoway, from Battery Point Power Station, also strengthens the position given the advantages that Arnish presents: The two new generators can safely be installed at Arnish given the site plan, where Battery Point is a constrained site and there would have been logistical and safety issues with install. Additionally, generators at Arnish Power Station can be controlled remotely via the Perth Control Centre, so improving operational control and response times.

Investing in new generators to replace old, failing generators at Battery Point Power Station will improve North of Scotland Resilience and enable us to reach our GHG emissions reduction targets – a 1.5°C Science Based Target – by improving efficiency of the engines and thus reducing GHG emissions.

The below additional information addresses any changes since final business plan submission and Ofgem's Engineering Review Comment – as well as additional SQ commentary - from the draft determinations. We trust this alleviates any concerns raised during the Engineering Review and merits a move of position to justified.

3.6.2 Long-term strategy for diesel generation sites

SSEN recognised the need of a strategic approach to manage these critical assets to ensure an effective transition to Net Zero for our island communities. That is why SSEN has put forward the Network Innovation Competition Submission Net Zero Island (NZI) Project to Ofgem in August 2022. The project seeks to identify and demonstrate sustainable, and commercially viable, Whole System options to eliminate the use of carbon intensive diesel generation for maintaining supplies to our remote island communities in the North of Scotland. This is a pressing need; essential to allow SSEN to meet its Science Based targets and accelerate local decarbonisation ambitions.

Currently, there is no readily available low carbon solution to replace the use of diesel generators for maintaining supplies over long durations. The NZI project will take a structured approach to identifying alternatives, whilst engaging and supporting our wider Scottish Island Strategy, Scottish Government, and local Island Strategies. This will include, amongst other activities, working with other innovation programmes to identify emerging long duration energy storage technologies as well as mobilising demand side options to support resilience. It will also identify the likely viable options from a technical, economic and sustainability perspective; ensure alignment with HOWS UM.

More details of this project can be found [here](#). Its interaction with other elements within the ED2 Business Plan can also be found in SSEN Draft Determination response, Annex 10 – North of Scotland.

3.6.3 Expected Outputs

The output for the preferred option will be delivery of two new 5MW generators at Arnish Power Station, Stornoway. These generators will replace the oldest and least reliable generators at Battery Point Power Station, Stornoway, by removing them from service after the new generators are installed.

The location of generator replacement has changed from Battery Point Power Station to Arnish Power Station on Stornoway for several reasons:

- Battery Point is a congested site; therefore, the station would not be able to remain operational during obsolete generator engine removal and subsequent install of the new generators.
- Head clearance and other safety considerations above the operating cranes over the remaining generators would be an issue due to the constrained space at Battery Point.
- The proposed new generators require Selective Catalytic Reduction (SCR) systems to be incorporated into the exhaust system. This cannot be accommodated in Battery Point's current site plan given the external space the SCR require.
- SEPA have expressed concerns over locating the new generators at Battery Point Power Station considering the station's proximity to residential housing due to noise and air pollution.

Considering this, Arnish Power Station has been determined the better site as it has capabilities to remove the old generators and install the new generators without impact to its operation.

Additionally, engines at Arnish Power Station can be remotely operated from our control room in Perth providing faster response time and greater security of supply to consumers. Arnish is also further away from residential housing which reduces noise and air pollution issues.

3.6.4 Optioneering

Ofgem has rightly noted the marginal differences between options 2 and 3 in the CBA. However, this is largely because option 2 simply delay the replacement of the old engines no. 5 and 6 in ED3.

There would be no benefit to consumers in replacing only 2 KVSS engines at Battery Point given the outlined issues with performance, availability (and cost) of spares, operational compliance, and environmental impact. Generator number 1 has already been removed from service due to major failure; given its age and past performance, it was not cost effective to repair. The remaining 3 KVSS engines (numbers 2, 5 and 6) continue to struggle to meet the needs of our permit limit values. During recent emissions testing at Battery Point Power Station via an independent external contractor, engine number 6 unfortunately failed the NOx emission limit value, resulting in a minor breach notification to SEPA. This is shown in the figure below.

Engine number 6 will shortly receive a 12000-hour overhaul which should improve the NOx emissions associated with its use, however, the remaining KVSS engines in service are consistently pushing the upper NOx limit upon testing. Therefore, further breaches could be expected.

Additionally, only replacing two KVSS engines with one new efficient engine as proposed presents risk where the remaining KVSS engines fail or become completely unsupportable. This would directly impact available capacity and, in periods of high demand (during winter or a fault), there would be a multitude of challenges in ensuring security of supply to our island communities. Therefore, we continue to propose replacing all 4 KVSS engines, numbers 1, 2, 5 and 6, at Battery Point Power Station with 2 new engines at Arnish Power Station, Stornoway.

EXECUTIVE SUMMARY

EMISSIONS SUMMARY					
Parameter	Units	Result	Calculated Uncertainty +/-	Emission Limit Value (ELV)	Accreditation
Total Particulate Matter	mg/m ³	86.4	3.37	100	MCERTS
Particulate Emission Rate	g/hr	1671	65.2	-	
Oxides of Nitrogen (as NO ₂)	mg/m ³	1976	74.9	1850	MCERTS
Oxides of Nitrogen (as NO ₂) Emission Rate	g/hr	38153	1446	-	
Carbon Monoxide	mg/m ³	283	4.04	350	MCERTS
Carbon Monoxide Emission Rate	g/hr	5477	78.0	-	
Oxygen	% v/v	11.8	0.05	-	MCERTS
Moisture	%	4.07	0.17	-	MCERTS
Stack Gas Temperature	°C	300	-	-	MCERTS
Stack Gas Velocity	m/s	11.5	0.28	-	
Gas Volumetric Flow Rate (Actual)	m ³ /hr	27622	1421	-	
Gas Volumetric Flow Rate (STP, Wet)	m ³ /hr	13185	678	-	
Gas Volumetric Flow Rate (STP, Dry)	m ³ /hr	12649	651	-	
Gas Volumetric Flow Rate at Reference Conditions	m ³ /hr	19315	993	-	

ND = None Detected.

Results at or below the limit of detection are highlighted by bold italic text.

The above volumetric flow rate is calculated using data from the preliminary survey. Mass emissions for non isokinetic tests are calculated using these values. For all isokinetic testing the mass emission is calculated using test specific flow data and not the above values.

Reference conditions are 273K, 101.3kPa, dry gas 15% Oxygen.

Figure 16: Emissions Testing Results for Engine 6 at Battery Point Power Station

3.6.5 Deliverability and Risk

This section discusses SSE's intended approach to delivering the 2 new 5MW Generators at Arnish Power Station, Stornoway. It summarises the lead time to delivery as well as highlighting any risks or constraints, addressing Ofgem's comments surrounding delivery risk.

Lead time to delivery

A feasibility study by an external consultant has been completed to ensure that the existing site at Arnish Power Station can accommodate an additional building to contain the two new engines, their ancillary systems, and the Selective Catalyst Reduction exhaust equipment. Associated costs for the building were also determined during this study.

A previous engine installation project at Lerwick Power Station, Shetland, has provided a vast source of information such as engine unit price, planning, environmental impact, incorporation into existing infrastructure and project duration. This information has been used to prepare the ED2 submission to replace our inefficient engines with alternative modern efficient models that are less polluting and deliver a reduction in Greenhouse Gas emissions.

From the supplier information currently available, it is estimated that the lead time for delivery of the engine units would be one year from placing an order; with the building and the infrastructure to support them developed during this time.

It is anticipated that the project works would start in the first year of ED2 with the final payments being in the second year.

Risk

As the two new engines will be installed as a new facility on an existing site, there will be no operational impact until they require to be incorporated into the current infrastructure e.g., mechanical and electrical service connections. As a result, the risk associated for the majority of the project is low and has no effect on the operation of either Battery Point or Arnish Power Stations in the build phase. During the connections detailed above, operational risk will increase, however, this will be planned and mitigated to ensure there is no effect on security of supply for customers e.g., during periods of low island demand when Battery Point is available.

In their role as SSE's environmental regulator, SEPA would be included in all planning aspects of this project.

3.6.6 RIO-ED2 BDPT Figures

Figure 17 summarises the proposed volumes and costs associated with the investment.

Asset Category	Unit	2024	2025	2026	2027	2028	Total
Island Generation – Battery Point new diesel engine installation	#	1	1				2
	£m	£4.5m	£4.5m				£9.0m

Figure 17: Proposed Volumes & Costs

3.6.7 Conclusion

In conclusion, we believe that Option 3 provides the most efficient, economic, and safe output. There would be no benefit to consumers in replacing only 2 KVSS engines at Battery Point, as Option 2 presents, given the outlined issues with performance, availability (and cost) of spares, operational compliance, and environmental impact.

Investing in new generators to replace old, failing generators at Battery Point Power Station, is a necessary component of an improved North of Scotland Resilience by securing long-term security of supply and will enable us to reach our net zero goals by reducing GHG emissions.

We trust that this is enough additional information to alleviate Ofgem's concerns and that this EJP can now be considered justified.

4. Additional Draft Determination Response Evidence

4.1 CVP (Life Below Water)

Scheme Name	Environment Output
CVP Ref	N/A
Ofgem Review Output	Justified
Ofgem Review Comment	<i>We have concerns about the methodology used by SSEN to calculate consumer benefits and the resulting CVP reward amount. We intend to engage with SSEN to develop a sufficiently robust methodology for calculating the value that consumers place on biodiversity ahead of RIIO-ED2 Final Determinations.</i>

4.1.1 Draft Determination Response

Protecting marine biodiversity: Life Below Water

We are pleased that Ofgem recognise the value in our CVP proposal. We are delighted that we will be able to undertake this ambitious project to deliver meaningful and long-lasting benefits for our island and coastal communities, pending a final decision from Ofgem. We recognise the challenges that this project will bring, but the opportunity it provides both SSEN and to other companies more widely to improve the environment we have an impact on. We continue to believe that this CVP will open up a wider conversation on the environment, not just within our sector, but beyond, as companies are encouraged to go further than they have ever before. We were encouraged by our stakeholders to look beyond our typical activities and this CVP pushes those boundaries and challenges SSEN in new ways. We are excited by this acceptance.

We note that Ofgem have provided feedback on our proposal, and we recognise the importance of addressing these questions in order to secure CVP funding at final determinations. We have continued to engage with Ofgem on the project and our progress in addressing uncertainties before we commence the project. In particular, we have engaged with Ofgem to understand concerns around benefits calculations. Further updates on this are provided below setting out how we have directly responded to these concerns. We have also considered how the CVP mechanism can be designed to ensure that consumers are protected in the event of under delivery.

4.1.2 Long-term commitment

We reiterate our commitment to long-term investment in support of marine biodiversity. We believe this CVP is the start of a long-term commitment to improving how we interact with our 'less visible' environments. We genuinely believe that this small project (in relative financial size) has the potential to really unlock future consumer value, not only within our sector, but far beyond as the full scale of damage on our ecosystems becomes better understood. We are looking to reverse the damage we collectively have caused on the wider environment and look to invest positively in the future.

Seagrass restoration produces a plethora of benefits of the longer term, most notably: (i) modification of physical environment, (ii) creation of living habitat, (iii) foundation of coastal food webs, (iv) carbon sequestration, (v) improved protection from coastal erosion, and many other benefits, including disease control, reduced ocean acidification, sediment stabilisation, bird food provision (e.g. Brent Geese, Swans, Wigeon), etc. The work carried out under this CVP will improve the understanding and research into these benefits and we are committed to these schemes over the longer term.

4.1.3 Research

Seagrass research continues across the UK, and our experts tell us that we are at a critical phase and nearing the point where they think mass planting at scale could be a reality. There are many exciting projects underway across the UK seeking to understand how we can implement successful seagrass planting. Knowledge and understanding of this area will continue to develop over time. Our ongoing stakeholder engagement demonstrates that the activity in this space is intensifying.

We understand there is a difference in success rates between seeds and seedlings and that certain varieties are more successful in one approach or the other. Within this context, we ask Ofgem to consider whether the funding could be used to develop the route to planting activities, within our license areas, if this was a mechanism to reduce planting costs and increase the scale of planting that we could undertake, therefore delivering overall greater value for consumers. This research will not only improve the germination rates but will also ensure we choose the most appropriate locations to carry out the work.

Our CVP will build on the research that is already underway, partnering beyond the research community to deliver projects on the ground. This is one of the reasons why we forecast that the cost per hectare to plant will likely reduce even during RIIO-ED2, but an enabler to that is targeted work to plug the research gaps, which will be built into our CVP projects, we anticipate that this work will bring us more in line with other nations on seagrass science and as a result will have a clear multiplier effect, not just for the projects under this CVP but for projects across the UK. We hope overall that this CVP will help encourage other organisations to become more active in this space. Whilst this funding will be targeted to our eventual projects in our license area, the findings will benefit UK wide projects so all UK consumers will benefit.

4.1.4 Stakeholder Support

We have continued to work with our stakeholders to gather further evidence of stakeholder support for and consumer benefits associated with this CVP.

At our sustainability and environment webinar held on 27th July 2022, 93% of delegates agreed/strongly agreed that seagrass restoration is a worthwhile initiative that will deliver benefits to consumers and the planet. Our CVP proposal was viewed as worthwhile and cost-effective, with 65% of delegates supporting Ofgem's consultation position to reward SSEN's Life Below Water CVP. We were encouraged to be ambitious and look to restore seagrass beds and to create links with local communities.

Since holding the above webinar, we have met with key stakeholders to further discuss the impact of Ofgem's draft determinations, when discussing our Life Below Water CVP stakeholders told us.

- '*I fully support your ambition and that you are trying something difficult and new, it is a good idea for us to keep talking.*' Project Seagrass
- '*We certainly feel very positive towards your Life Below Water being awarded and will support that*' Nature Scotland
- '*We have always supported this initiative.*' CEG Member

4.1.5 Benefit Calculation

We have continued our engagement with seagrass experts to determine if our benefit calculation continues to represent best practice. We have asked SIA Partners to provide a review of the methodology and whilst this has resulted in an update to the calculation to reflect updated carbon values (offset slightly by inflation adjustments), there has been no significant change in the values of expected benefits that our proposal will deliver. The updated results are shown below and confirm the robustness of our initial analysis:

Updated valuation - August 2022			
Total cost, PV	Gross Benefit, PV	NPV	SROI
£2,462,713	£5,862,866	£3,400,153	£1.38

Figure 18: Updated Valuation Results

SIA Partners' analysis uses the latest version of the Common Social Value framework and used updated carbon prices from the HM treasury Green Book data.

Ofgem noted that it intended '*to engage with SSEN to develop a sufficiently robust methodology for calculating the value that consumers place on biodiversity ahead of RIIO-ED2 Final Determinations*' (para 2.26). In our environmental bilateral we explained how we would ensure the benefits calculation was up to date. We have undertaken this additional assurance through SIA Partners to make sure our benefits calculations continue to follow best practice.

4.1.6 Deliverability

We note the Challenge Group concern around risks to deliverability, including costs (para 2.25). We acknowledge that our plans are larger in scale than any project currently underway. However, seagrass activities are intensifying and we believe through this CVP we will contribute to the learning and research that will bring the UK closer to other more progressed nations on this topic, we will help plug the research and development gaps and remove the barriers to mass planting at scale. We also hope that this award will encourage wider seagrass support and enable different funding sources to be leveraged. We need to be supporting the development of a more sustained nursery infrastructure and wider research. We believe that in developing seagrass meadows of up to 17 hectares, we will create economies of scale and reduce costs for future projects. In this context, and given general increases in activity, we consider that costs will reduce significantly during RIIO-ED2. We set out a firm position that if costs are lower, and there is capacity and scope for further projects, we will look to extend beyond our original 17-hectare proposal.

4.1.7 Performance Metrics

As part of our response, we have also considered the wider performance metrics required to be considered as part of this proposal. We know that this is a developing space and through these metrics we believe we can show how the pipeline of activity could develop over RIIO-ED2 to deliver consumer value. We note that there will be multiple reports in this space potentially, including our Annual Environmental Report and the Regulatory Reporting Packs. We will engage with stakeholders and Ofgem to make sure the right level of reporting is undertaken and that it remains focused and easy to access.

Whilst we will work with Ofgem further on this, we believe that the following metrics warrant inclusion in reporting to allow for stakeholder visibility on how we continue to engage and look for opportunities, and transparency on the activities and benefits we deliver.

- Research projects supported
- Number of potential sites identified through survey
- Number of sites active
- Forecast seagrass planting (hectares) to be undertaken
- Actual seagrass planted
- Communities engaged

We would also like to develop a metric that in some way records how many other projects we have inspired through this CVP, and also input to the societal benefits and metrics that the experts are trying to establish and prove for UK waters, but more thought is required on how these would be suitable metrics to report against given that most benefits are realised over the longer term, this could be an area of development to include in ED3 and beyond. These could focus on the environmental benefits like improved water quality, improved fishery population, coastal erosion improvements and carbon sequestration.

4.1.8 Claw back approach

Our proposed delivery model is focused on building meaningful partnerships with organisations and local communities where these meadows have the greatest likelihood of impact and highest chance of success and viability. In our draft business plan (July 2021) we sought to draw the link to areas close to our subsea cable locations. However, in our final submission (December 2021) we recognise and understood that physical location is paramount to enhancing the success of seagrass projects. We are therefore proposing to retain the commitment to addressing the scale of the ambition but widen it out across our license areas at locations where the benefits are strongest. The proposed license drafting seeks to identify the distance from our subsea cables and in specifying this precisely it might inadvertently restrict planting opportunities. We seek to discuss this further with Ofgem.

Ofgem wants to understand how a claw back mechanism could work in the event of under delivery or non-delivery. We believe that a mechanistic review and comparison to the total hectarage planted (as measured) to the overall 17 hectare target would be the simplest and most transparent approach to measuring our performance.

We seek to engage further with Ofgem on the mechanics behind this. Please see our response to Overview Q8 for further details.

Once again, we would like to say that we agree with your decision to award this CVP, we along with our stakeholders believe it is a very exciting area, that has endless opportunities to improve our marine ecosystems. The consequential impact that this will have if done well - will definitely provide value to the UK consumer and of course the planet.

4.1.9 Action update following SSEN Environmental Bilateral on 14 July 2022:

	Action items	SSEN Update
1	Confirm definition of 'near to subsea cables' for LD	<p>As previously discussed at the LDWG and as a result of the ongoing discussions we continue to have with Seagrass experts, we would like to remove the reference to 'near subsea cables' in our licence condition. The feedback we have had from those experts and we will include this in our consultation response, is that restricting the location to the proximity of existing subsea cables may exclude the sites or locations that offer the highest opportunity of success. At this stage we also could not with confidence say what the distance to the cables could be measured at. We therefore would like to discuss with you further around the widening of the language to retain 'within our licence area' and this will give the flexibility we may require across RIIO-ED2.</p>
2	Be clearer on consumer benefits through methodology and final costs at the end of the period	<p>We have continued to engage with Seagrass experts as we seek to ensure that our benefits calculation reflects best practice. The guidance from those experts has been that we are measuring the right benefits, focusing correctly on biodiversity, fishery stocks and water quality and not just on carbon sequestration. We commissioned SIA Partners to look again and refresh the benefits calculation and it has seen no significant change when reviewed again (marginally higher due to carbon values, but offset by changes in inflation rates).</p> <p>In terms of certainty around the costs that we expect to incur as part of this CVP, part of the challenge remains around the increase in research that is still being undertaken to drive higher yields and better outcomes. This will continue, but there are supply chain issues with the sourcing, growing, and developing seagrass nurseries. This is one of the reasons we see our activity within this space as helping to give confidence that there is a demand for these facilities and that in driving towards our ambition of 17 hectares we will help to drive down costs as scale is introduced into the sector.</p> <p>We have included in our consultation response the consideration that with the funding we could help, within our licence areas, to develop the nurseries and help to address the supply issues. We feel that this will help secure the planting that we require during RIIO-ED2 and help to support the wider activity we expect to follow from our RIIO-ED2 plans across many sectors.</p>
3	SSEN to provide more information on the SROI detail and around the 17 hectare cap	<p>As above, we commissioned SIA Partners to refresh our SROI calculations. There were no major changes to our SROI calculations, and we believe that these continue to reflect best practice.</p> <p>We are confident that the costs and benefits included reflect best practice, and as we outlined above we believe there is scope to use this funding to help drive costs lower through research and deliver the ambitious 17 hectares we propose.</p> <p>If the 'near to' reference is kept within the licence and specified at a set distance, we do not have certainty that we would be able to meet this added restriction. However, keeping it within our license areas, we have confidence that there is sufficient scope will secure multiple sites to meet this target.</p>
4	SR to be clear where possible on delivery partners, routes and methodologies	We continue to engage with potential delivery partners around site locations. No sites have been locked in at this stage, but there are options across both our licence areas. Feedback from Seagrass experts is particularly positive about using our geography to the advantage of the wider UK, as we have both northernly and southernly areas which will greatly contribute to the learnings and wider seagrass projects to help drive the spread of seagrass activity across the UK. Our areas effectively top and tail the UK and the topology, hydrology and species are different. That brings different challenges, being able to unplug knowledge gaps and overcome hurdles in these areas – means that this learning will benefit the rest of the UK when they look to follow suit.

Action items	SSEN Update
	<p>We are willing to share site maps with our subsea cable locations and overlay initial discussions on project options. Part of the challenge in this space, particular in relation to the ongoing academic and scientific research is the small budgets that these NGOs have to undertake activity. The external quality of the marine bed data sets and surveying is poor with knowledge and understanding still developing. Working with the partners and experts we can help to improve this data set. Meaning our seagrass activity will be more targeted. This in turn will free up further resource for our experts that they can tackle other issues meaning there will be a complementary benefit from these activities. With the strategic aim of being able to achieve mass planting at scale.</p>

Table 15: Action update following SSEN Environmental Bilateral on 14 July 2022

5. Additional Advocacy / Engagement

Since submitting our ED2 Business Plan we have continued to engage with our stakeholders to ensure our proposed sustainability and environmental plans are a true reflection of what our stakeholders want and need. Following Ofgem's publication of their Draft Determinations on our ED2 Business Plan we have continued to test our proposals with our stakeholders making sure we have got it right given the current UK economic backdrop.

5.1 SSEN Sustainability and Environment Draft Determinations Workshop

On 27 July 2022, we hosted an online sustainability and environment engagement session using the Teams platform. The purpose of this workshop was to give our stakeholders an opportunity to provide feedback on Ofgem's draft determinations for our RIIO-ED2 Business Plan in the areas of environment and sustainability.

We instructed EQ Communications, a specialist stakeholder engagement consultancy, to facilitate the workshop and independently take notes of the comments made by stakeholders. You can see full details of this report in Appendix 4.

The workshop comprised presentations by SSEN followed by discussions in two breakout rooms, introduction, and Our Environment Action Plan (EAP) and Meeting Net Zero and Nature Based Solutions (NbS)

Headlines from the event:

- **Stakeholders supported our approach to SF6 reduction, as well as our SBTs. Participants saw the value in NbS and urged us to be ambitious on local and national levels.**
- **Our Life Below Water CVP proposals for seagrass bed restoration were viewed as worthwhile and cost-effective.**

We were encouraged to take SF6 reduction seriously and to seek alternatives to SF6. Participants in the breakout rooms largely disagreed with Ofgem's consultation proposal to remove SF6 investment. Our approach to SBTs was viewed favourably and we were encouraged to implement an ambitious approach incorporating innovation as a matter of urgency. Longer term targets that went beyond RIIO-ED2 were also considered valuable.

We were commended for our approach to nature and the delivery of net zero. Stakeholders believed NbS would deliver multiple benefits and facilitate Net Zero and carbon sequestration. Investing in land and biodiversity net gain initiatives was considered more beneficial than buying carbon credits. We were encouraged to look at long-term NbS. Caution was raised on offsetting projects owing to the risk of forest fires. Seagrass restoration was viewed as a starting point, with wider action needed to promote NbS.

Stakeholders held that nature restoration projects should not be a substitution for carbon reduction. Local community projects and large-scale projects were both considered important. We were recommended to consider the carbon footprint of shipping in their supply chain. Catchment-based and regional solutions were seen to offer local benefits. Planting hedgerows under pylons was suggested to offer better biodiversity net gain scores than tree planting by discussion participants.

There was broad support for our CVP proposals for seagrass bed restoration. We were encouraged to be ambitious and look to restore seagrass beds as well as being encouraged to create links with local communities. Increasing stocks of commercially important fish species and combatting overfishing were considered worthwhile avenues for seagrass restoration. Stakeholders were supportive of Ofgem's consultation position on our Life Below Water CVP proposal for Seagrass bed restoration and the initiative was considered cost-effective.

5.2 Continued Engagement

We have continued to engage with our key stakeholders since submitting our final business plan in the form of focussed bilateral, testing our proposed environmental and sustainability plans to ensure we have still got this right. Our stakeholders have welcomed our openness and transparency and have had no objections to our current thinking for ED2. You can see details of all our engagements in Annex 4 Engagement.

6. Consultation Questions

The consultation questions that we have responded to and that are relevant to the EAP are below:

Core Q11. Do you agree with our proposed approach for the Annual Environment ODI-R?

Core Q12. What are your views on the proposed mid-period review on DNO environmental performance and their progress to targets?

Core Q13. Do you agree with our consultation position for the DNOs' EAP proposals in RIIO-ED2 as set out in this document? (Further detail included in Appendix 1 of this document)

Core Q14. Do you agree with our proposal to withdraw the Environmental Scorecard ODI-F for RIIO-ED2?

Core Q15. Do you agree with our proposed approach to design of the Environmental Re-opener?

Core Q16. Do you agree with our proposal for addressing PCB contamination in PMTs through a volume driver in RIIO-ED2?

Core Q85. Do you agree with our proposed assessment approach for Flood Mitigation?

Core Q88. Do you agree with our proposed assessment approach for Losses?

Core Q89. Do you agree with our proposed assessment approach for environmental reporting?

Core Q90. Do you agree with our proposed assessment approach for PCBs?

SSEN Q4. What are your views on our consultation position to accept SSEN's CVP to protect marine biodiversity (life below water)?

These can be read in full in the Question responses.

7. Appendices

7.1 Appendix 1: Evidence of Address to Ofgem Requests for Additional Information

Subject Area	Core Methodology Reference	Additional Info Required	Response Provided?	Where?
BCF	Page 58. BCF - Reducing Building Energy Usage	Our consultation position is that baseline funding for these projects is subject to submission of evidence to address concerns regarding SLC 43B (Prohibition on Generation).	Y	Annex 8 and Response Form 3
PCBs	3.180 When considering the lifetime of these assets and the decarbonisation objectives, we also consider the possibility of upsizing transformers to be appropriate as long as the DNOs provide sufficient evidence to justify the incremental costs to consumers.	As statement	Y	Response Form 3
PCBs	3.182 So far, the DNOs have submitted a variety of proposals to meet their compliance obligation and address this uncertainty. We request that the DNOs provide further data and evidence for the costs and volume of work as part of their consultation responses. If this data and evidence can support the design of a robust volume driver, we propose to confirm the design in our Final Determinations, including the form and granularity of the mechanism to reflect the unit rate(s) and possible upsizing requirements. If the DNOs do not provide sufficient data and evidence, we propose to set an evaluative PCD to ensure appropriate delivery.	As statement	Y	Response Form 3
FFC	A1.34. At this stage, we do not have sufficient information on the investment drivers of the indicated activities and the optioneering presented to allow us to form our position.	<ul style="list-style-type: none">• A leakage reduction target (in percentage and litres). This should also include the number of kilometres of cables expected to be replaced during RIIO-ED2.• Further evidence and justification for the primary and secondary investment drivers, the associated costs, risks to delivery, optioneering and environmental benefits.	Y	Annex 8

FFC	A1.35. We propose to accept baseline funding if the DNOs provide satisfactory information and evidence. If DNOs fail to do so, we will consider the use of a PCD, where appropriate, to ensure that the DNOs are delivering on the targets proposed in their Business Plans and are reducing leakage from fluid-filled cables over RIIO-ED2.	As statement	Y	Annex 8 and Response Form 3
Carbon Offsetting or Removal - NbS	A1.43. At this stage, we would like to invite DNOs to submit as part of their responses to this consultation, where it has not already been provided, the following information:	<ul style="list-style-type: none"> • A marginal abatement cost curve for carbon. • A joint consumer willingness-to-pay study for carbon offsetting and/or carbon removal projects. • Stakeholder and/or consumer support for offsetting activities. • A summary of the benefits to network consumers. • Detail on any carbon offsetting projects or schemes undertaken and/or supported, including expected emissions to be offset per annum in RIIO-ED2. 	Y	Annex 8
Carbon Offsetting or Removal - NbS	A1.44. We propose to accept the DNO proposals and fund through a price control mechanism if the DNOs provide satisfactory information and evidence. If DNOs fail to do so, we propose to reject all funding associated with carbon offsetting	As statement	Y	Annex 8
AER	Core Q11. Do you agree with our proposed approach for the Annual Environment ODI-R?	<i>Consultation expected</i>	Y	Response Form 3
Mid-Period Review	Core Q12. What are your views on the proposed mid-period review on DNO environmental performance and their progress to targets?	-	Y	Response Form 3
EAP	Core Q13. Do you agree with our consultation position for the DNOs' EAP proposals in RIIO-ED2 as set out in this document?	Response to all EAP positions - more info for unjustified NbS, SF6, FFC and all partially justified EJPs	Y	Annex 8 and Response Form 3
Environmental Financial Incentive	Core Q14. Do you agree with our proposal to withdraw the Environmental Scorecard ODI-F for RIIO-ED2?	-	Y	Response Form 3
Environmental Reopener	Core Q15. Do you agree with our proposed approach to design of the Environmental Re-opener?	-	Y	Response Form 3
PCBs	Core Q16. Do you agree with our proposal for addressing PCB contamination in PMTs through a volume driver in RIIO-ED2?	<i>Consultation expected</i>	Y	Response Form 3

Flood Mitigation	Core Q85. Do you agree with our proposed assessment approach for Flood Mitigation?	-	Y	Response Form 7
Losses	Core Q88. Do you agree with our proposed assessment approach for Losses?	-	Y	Response Form 7
Environmental Reporting	Core Q89. Do you agree with our proposed assessment approach for environmental reporting?	-	Y	Response Form 7
PCBs	Core Q90. Do you agree with our proposed assessment approach for PCBs?	-	Y	Response Form 7

7.2 Appendix 2: Nature Based Solutions - Willingness to Pay Summary, Arcadis

Below is an overview of ‘willingness to pay’ information identified from a review of existing literature. This strengthens our NbS position and clearly shows this should be a priority investment.

Table 3. Willingness to Pay Summary of Literature Review, Arcadis Consulting

Study	Summary	Outcome
Three-quarters of adults in Great Britain worry about climate change - Office for National Statistics (ons.gov.uk)	<p>Just over two-fifths (43%) reported feeling anxious about the future of the environment more widely in the past month.</p> <p>Women were more likely to report worry about both the impact of climate change and anxiety about the future of the environment than men.</p> <p>Adults who reported being worried about the impact of climate change were three times more likely to have made a lot of changes to their lifestyle in response to the issue than those who were relatively unworried.</p> <p>In the survey, people were also asked to describe in their own words how they feel about the future of the environment. Some common themes were identified in the responses, such as:</p> <ul style="list-style-type: none"> people's concern for their family and future generations anxiety and helplessness the expense of making eco-friendly changes. 	<p>People are extremely anxious about climate change which is a useful context for the willingness to pay summary.</p>
Willingness to pay for carbon sequestration and co-benefits of forests in Turkey Tolunay and Başfüllü (2010)	<p>Questionnaire with respondents from 36 cities across Turkey. Questionnaire made up of three sections:</p> <ul style="list-style-type: none"> Perspective of environmental problems and use of forestry resources Socioeconomic and demographic Their valuation of forests Respondents provided information on current forest stocks. <p>Asked what they would pay for new forests (US\$5, 10, 15, 20, 25, 37.5, 50, 75, 125 or 250).</p>	<p>On average the maximum willing to pay was £19.41 /capita</p>
Valuing a managed realignment scheme: What are the drivers of public willingness to pay? K. Needham (2018)	<p>Study into using ecosystem services (carbon sequestration and habitat provision) for flood defence systems. Identifying the publics willingness to pay towards specific managed realignment scheme on Tay Estuary, Scotland. Proximity to the scheme was a driver of willingness. The closer to the scheme the more willing people were to pay.</p>	<p>The mean willingness to pay for habitat management and creation for flood defences was £43/year per household</p>

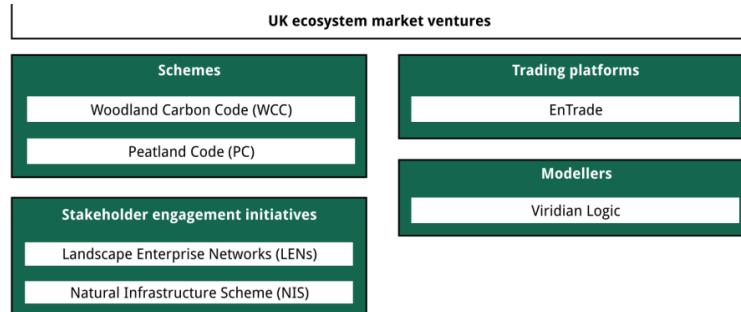
Study	Summary	Outcome																				
Household willingness to pay and farmers to accept compensation for establishing recreational woodland. I.Bateman (2010)	<p>Study of 325 households in Wantage, Oxfordshire into willingness to pay for creation of new recreational woodlands. Asked both annual costs and costs per visit.</p> <p>While not directly related to carbon capture relevant for willingness to pay regarding woodland creation.</p>	£44.45/year for use of new recreational woodland.																				
Public willingness to pay for carbon farming and its co-benefits. ME.Kragt (2016)	<p>Questionnaire in Australia about willingness to pay for carbon storage in agricultural soils and planting of native vegetation. There was a low willingness to pay for carbon storage in agricultural soils and vegetation and there was not a preference to reducing soil erosion.</p> <p>The study commented that some respondents had a reduced willingness to paying if they did not believe in human caused climate change.</p>	On average willingness to pay £0.65/Metric tonne of CO₂ £10.91/ha of new native planting on farmland																				
Estimating the economic value of improvements in river ecology using choice experiments. N.Hanley et al (2005)	<p>Participants were asked for their willingness to pay for river restoration on the Clyde and the Wear, with a change in condition from 'fair' to 'good'. There were 3 different categories that respondents had to value for each river: River Ecology, Aesthetics of river and Bankside condition.</p> <p>People living near to the Clyde appeared to value improvements to their local river more highly than people living near to the Wear.</p>	<table border="1" data-bbox="1382 692 1921 938"> <thead> <tr> <th></th><th>Both</th><th>Wear</th><th>Clyde</th><th rowspan="4"></th></tr> </thead> <tbody> <tr> <td>River Ecology</td><td>£20.17</td><td>£12.54</td><td>£60.08</td><th data-bbox="1921 692 1932 938"></th></tr> <tr> <td>Aesthetic</td><td>£16.19</td><td>£12.35</td><td>£42.38</td><th data-bbox="1921 851 1932 938"></th></tr> <tr> <td>Bankside</td><td>£21.53</td><td>£12.93</td><td>£67.08</td><th data-bbox="1921 938 1932 938"></th></tr> </tbody> </table>		Both	Wear	Clyde		River Ecology	£20.17	£12.54	£60.08		Aesthetic	£16.19	£12.35	£42.38		Bankside	£21.53	£12.93	£67.08	
	Both	Wear	Clyde																			
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Bankside	£21.53	£12.93	£67.08																			
Willingness to pay for policies to reduce future deaths from climate change: evidence from a British survey - ScienceDirect Graham et al., 2019.	<p>The majority (61%) of people were willing to pay to reduce future increases in climate change-related deaths in Britain. Those regarding climate change impacts as not at all serious were less willing to pay than those regarding the impacts as extremely serious. Income was also related to WtP; the highest-income group were twice as likely to be willing to pay as the lowest-income group.</p>	<p>WtP per month: Mean £9.17 and Median £14.16</p> 																				
Consumer Attitudes to Decarbonisation and net zero (ofgem.gov.uk) 2019	<p>In 2019 OFGEM found that consumers did not feel responsible, nor would they make significant behavioural changes. This reflects other studies where consumers feel that "big business" should be the ones to change.</p>	No quantification																				
Estimating the willingness to pay for a heat pump Nesta	<p>Nesta worked with BIT to research how much people might be willing to pay for a heat pump. They spoke to 1,081 homeowners and found that 25% of them would be willing to pay the full cost of a heat pump (around £10,000-£12,000) while approximately one in</p>	No quantification																				

Study	Summary	Outcome
	three homeowners would be willing to pay a bit extra if it meant reducing emissions. Cost remains the biggest barrier to heat pump adoption, followed by information.	
Valuing_the_social_and_environmental_contribution_of_woodlands_and_trees_.pdf (exeter.ac.uk)	Work by Exeter University in 2014 found a 'willingness to pay' of between £3.50 to £18.50 for visits to woodlands.	WtP between £3.50 to £18.50 for visits to woodlands.
Col Funding.pdf (iucn-uk-peatlandprogramme.org) Moxey and Morling (2018)	This report discuss approximate likely capital costs of approximately £1000/ha for peatland sites requiring a mix of restoration activities. However, they outline costs can be significantly higher than this for sites requiring more intensive interventions. This also does not include administrative and recurring costs.	Likely peatland restoration costs of £1000/ha .
The opportunity cost of delaying climate action: Peatland restoration and resilience to climate change (sruc.ac.uk) Glenk et al., 2021	The study found that respondents have a substantial WTP for peatland restoration in Scotland. The study found considerable benefits for early restoration action (up to £191 million annually in our case study), which is linked to an increased resilience of peatlands under future climate change. This demonstrates that delaying restoration and thus accumulating a mitigation debt has an important opportunity cost that substantially decreases the related economic benefits. Attitudes towards climate change and climate change beliefs are found to explain variation in the public's WtP. This research strengthens the economic argument for not delaying climate change mitigation through ecosystem restoration, demonstrating that the mitigation debt also translates into a welfare loss. To fully realise the potential benefits associated with immediate mitigation using peatland restoration, however, more needs to be understood about the mechanisms that facilitate large-scale implementation in practice.	The WtP of a 10% increase in proportion of Scottish peatland in good condition relative to 'business as usual' was £65.03 .
Woodland grants and incentives overview table - GOV.UK (www.gov.uk)	<p>From the Forestry Commission</p> <p><u>Woodland Creation Planning Grant (WCPG)</u></p> <p>you can apply for £1,000 to complete a stage one checklist.</p> <p>At stage two, you can get £150 per hectare to produce a woodland creation design plan, minus the £1,000 offered at stage one. You can also receive a 70% contribution towards any additional, specialist surveys that we agree need to be undertaken.</p> <p>Funding is capped at £30,000 per project.</p> <p>If your application is under 10 hectares in size, we will pay a minimum payment of £500 for stage two. Minimum area is 5 hectares.</p>	Summary of some potential funding sources for woodland (WCC provides guidance on the sale value of carbon but would not be appropriate to use as it involves selling the carbon captured).

Study	Summary	Outcome
	<p><u>England Woodland Creation Offer</u></p> <p>In addition to covering the standard capital costs of tree planting (up to a cap of £8,500 per hectare) and annual maintenance payments of £200 per hectare for 10 years, EWCO also offers 'Additional Contributions' (per hectare) for:</p> <ul style="list-style-type: none"> nature recovery: £1,100 to £2,800 water quality: £400 reduced flood risk: £500 riparian buffers: £1,600 close to settlements: £500 public access: £2,200 <p><u>Woodland Carbon Code</u></p> <p>The WCC guidance estimates that a new native woodland can capture 400-500 tonnes of CO2 (tCO2e/ha) over 100 years. Buyers have recently paid between £5 and £15/tCO2e.</p>	
Economic-benefits-woodland-woodland-Trust-2015.pdf (laisygoedwig.org.uk)	<p>Woodland Trust study including assessment of woodland's value</p> <p>Non-use value – appreciating goods and services that woodlands may provide to others or in the future:</p> <ul style="list-style-type: none"> climate change mitigation – reducing the extent of global climate change – at the current official carbon price, the value of the carbon dioxide locked up in UK woodlands is around £16,000 per hectare; and option, existence and bequest value – safeguarding woods and their associated biodiversity for future generations – valued at, for example, £1,848 per hectare, per year, for lowland broadleaved native forest. <p>Direct use value – enjoying goods and services produced by or in woodlands:</p> <ul style="list-style-type: none"> business – producing goods and services with a market value, such as timber – output of forestry goods tends to increase by over £200 a year with each additional hectare of woodland; and recreation – visiting woodlands – there are 700 visits for every hectare of woodland, valued at £1 to £3.50 per visit. <p>Indirect use value – benefiting from positive externalities provided by woodlands:</p> <ul style="list-style-type: none"> flood management – reducing the extent of damage in floods – the potential value in terms of flood risk reduction of managing a hectare of woodland 	Value of visit to woodland between £1 to £3.50 per visit.

Study	Summary	Outcome
	<p>located in the upper Thames catchment could be £350 to £500 per hectare, per year; and health benefits – particularly improving air quality – air pollution mitigation benefits in urban areas have been estimated at around £240 a year for each hectare of woodland.</p> <p>The study estimates that the total value of UK woodlands is around £270bn.</p>	
nf_growth_a5_final.pdf (thenorthernforest.org.uk)	<p>Study found workers might be willing to pay approximately £226.56 per year per household for woodland views on journeys to and from home. A study in North-West England found that homebuyers would be willing to pay £7,680 per household for views of broadleaved woods.</p>	<p>WtP of £226.56 per year per household for woodland views on journeys to and from home.</p>
Evaluation of a public dialogue on Carbon Capture Utilisation and Storage (CCUS) (publishing.service.gov.uk)	<p>This study presents the results of an independent evaluation of a public dialogue to explore attitudes towards carbon capture, usage, and storage.</p>	<p>No quantification</p>
Carbon Capture Usage and Storage (sciencewise.org.uk)	<p>Participants disagreed on fellow citizens' willingness and ability to adjust their lifestyles to cause fewer CO2 emissions. Where participants were confident that people could and would make a difference through behaviour change, they often favoured it over CCUS (carbon capture, usage, and storage). The opposite was true for participants who were more sceptical; they doubted that behaviour change could substantially contribute to the pathway to net zero. Some of these participants explicitly linked this to their support of CCUS, which they described as an easier, faster, or more reliable manner of reducing net CO2 emissions, and as such would contribute more to the pathway to net zero.</p>	<p>No quantification</p>
Public perception of carbon capture and storage: A state-of-the-art overview - PMC (nih.gov)	<p>A review of the literature on public perception of carbon capture and storage from 2002–2018 and looked at CCS (carbon capture and storage) current status in different countries. This work shows that most attention is devoted to CO2 storage; whereas its capture and transportation are poorly studied in terms of public perception. Wider development is required for the methodology enabling a transition from global rhetoric concerning global warming issues to the implementation of particular projects.</p>	<p>Germany: WtP 15.9% more for electricity in exchange for 10% increase in CCS power</p> <p>Europe wide: 25% respondents WtP 1–5% more for energy produced from environmentally friendly sources, 16% of respondents are willing to pay 6–10% more.</p> <p>UK: 90.3% of respondents after the workshop on low-carbon energy technologies (88.6% before the workshop) are willing to pay maximum £50 per quarter (2.2% of their monthly salary).</p>

Study	Summary	Outcome
<p>Frontiers Who Is Paying for Carbon Dioxide Removal? Designing Policy Instruments for Mobilizing Negative Emissions Technologies (frontiersin.org)</p>	<p>A review of the funding and policy surrounding Carbon Dioxide Removal (CDR). They argue that decarbonisation should be funded primarily by governments rather than private organisations and philanthropists. CDR should be viewed as a public service like waste disposal. Permanence of CO₂ stored in plant biomass is lower than that stored deep underground or in mineralized form.</p> <p>Policy and incentives to accelerate CDR:</p> <ul style="list-style-type: none"> R&D subsidies to stimulate research into CDR Subsidies for implementing mitigation Mandates for public and private organisation to fund CDR Ancillary policies to bring consistency (creating regulatory boundaries and guidelines) <p>CDR policy needs to:</p> <ul style="list-style-type: none"> gain clarity on the intended role of CDR for limiting warming, accelerate innovation, ensure participation, transition to long-term cost-effective operation, robustly measure, report and verify results as well as account for them properly and manage side-implications. 	No quantification
<p>Defra's Payments for Ecosystem Services Pilot Projects 2012-15: Review of key findings (publishing.service.gov.uk)</p>	<p>A review of the impact of payment for ecosystem services projects. Key indicators for impact:</p> <ul style="list-style-type: none"> Cost-effectiveness or value for money relative to some carefully defined baseline Net social benefits of the scheme, including environmental gains Degree of participation Degree of spatial targeting (where it matters) Paying for outcomes vs paying for actions The size and role of transactions costs <p>Identifying and engaging beneficiaries to become active buyers and investors is a prerequisite for the success of any PES scheme – what is the business case for payment?</p>	No quantification
<p>Estimation of Citizens' Willingness to Pay for the Implementation of Payment for Local Forest Ecosystem Services: The Case of Taxes and Donations (https://www.mdpi.com/2071-1050/13/11/6186/pdf)</p>	<p>Study into the WtP for enhancement of local forest ecosystem services through taxes and donations in South Korea.</p> <p>Globale PES (payment for ecosystem services) market size is estimated to be £29–35 billion per year</p>	<p>As a tax: WtP to enhance local forests in South Korea was £9-13/ year</p> <p>As a donation: WtP to enhance local forest was £8-17/ year</p> <p>Income is a significant factor for both tax and donation.</p>

Study	Summary	Outcome														
Estimating the willingness to pay for regulating and cultural ecosystem services from forested Siwalik landscapes: perspectives of disaggregated users Annals of Forest Science Full Text (biomedcentral.com)	<p>Assessed forest users WtP or willingness to contribute (e.g. through labour) for forest services based on socio-economic status and proximity to forest in Siwalik landscape in Nepal. Four different services: flood control, water quality improvement and aesthetic values, bequest value (preserving for future generations). Researchers advocate that the option of contributing labour instead of money was a better option in developing countries but should not be used as a blanket approach.</p>	<p>More affluent respondents were more willing to contribute money and less affluent preferred to contribute their time and labour.</p> <p>95% of respondents were willing to pay money or in kind for forest ecosystem services. Closer proximity to forests resulted in respondents being willing to contribute more.</p>														
Exploring ecosystem markets for the delivery of public goods in the UK (whiterose.ac.uk)	<p>Under the Peatland Code (PC), up to 85% of total costs can be leveraged from public sources.</p>  <table border="1" data-bbox="518 605 1259 917"> <thead> <tr> <th colspan="2">UK ecosystem market ventures</th> </tr> </thead> <tbody> <tr> <td data-bbox="518 652 871 763">Schemes</td><td data-bbox="871 652 1259 763">Trading platforms</td></tr> <tr> <td data-bbox="518 684 871 716">Woodland Carbon Code (WCC)</td><td data-bbox="871 684 1259 716">EnTrade</td></tr> <tr> <td data-bbox="518 732 871 763">Peatland Code (PC)</td><td data-bbox="871 732 1259 763"></td></tr> <tr> <td data-bbox="518 795 871 906">Stakeholder engagement initiatives</td><td data-bbox="871 795 1259 906">Modellers</td></tr> <tr> <td data-bbox="518 827 871 859">Landscape Enterprise Networks (LENs)</td><td data-bbox="871 827 1259 859">Viridian Logic</td></tr> <tr> <td data-bbox="518 874 871 906">Natural Infrastructure Scheme (NIS)</td><td data-bbox="871 874 1259 906"></td></tr> </tbody> </table> <p>Supply: There are challenges reported from both buyers and sellers (farmers/landowners). Engagement was an issue for all ventures, the PC/WCC (Woodland Carbon Code) schemes reported lacking data, such as contact details of relevant farmers to engage. There was therefore a need to engage with the farmers via alternative, often resource intensive means, e.g. on-the-ground staff.</p> <p>Demand: Sensitivities around the freedoms and willingness of businesses to share financial data. Additionally, many businesses were reluctant to pay for interventions that farmers should be doing as part of compliance and/or that could be paid for by public finance.</p>	UK ecosystem market ventures		Schemes	Trading platforms	Woodland Carbon Code (WCC)	EnTrade	Peatland Code (PC)		Stakeholder engagement initiatives	Modellers	Landscape Enterprise Networks (LENs)	Viridian Logic	Natural Infrastructure Scheme (NIS)		<p>No quantification</p>
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Natural Infrastructure Scheme (NIS)																
Ecosystem Services Valuation (parliament.uk)	<p>For the most part, policy decision-making processes take account only of traded goods, for example, the market price of land or the value of crops it will produce. They ignore the value of the majority of ecosystem services that will be altered by land use change.</p> <p>Valuation can be used to:</p>	<p>No quantification</p>														

Study	Summary	Outcome
	<p>Understand the contribution that an ecosystem makes to an area and the dependencies between the different ecosystem services arising from it</p> <p>Determine whether a policy intervention is justified and any losses or gains in ecosystem service benefits</p> <p>The costs and benefits for different stakeholders from how an ecosystem is managed</p> <p>Justify the need for financial resources to sustain, restore or enhance ecosystem services</p> <p>A recent review has concluded that there is scope for better guidance on the selection, design and application of the different methods, and a need to include tests for rigour and robustness of the analysis and results.</p> <p>Policies tend to take more account of shorter term and more localised private gains of benefits (such as increased agricultural productivity from wetland drainage) than longer term and more distant loss of public benefits (such as increased risk of flooding and decreased water quality).</p> <p>Cost benefit analysis:</p> <p>Used to influence policy, it has more of a benefit to society than the cost</p> <p>Not all sites create the same cultural benefit, e.g. locations near high levels of population density may provide higher levels of cultural benefit than more remote sites</p> <p>Some habitats, such as Ancient Woodland and Chalk Grassland are so rare, unique or locally specific that valuation is not applicable and recreation of compensatory habitat is not possible within relevant time scales</p>	
<p>Willingness to pay for flying carbon neutral in Australia: an exploratory study of offsetter profiles</p> <p>Andy S. Choi et al., 2014</p>	<p>The study used choice modelling to measure the economic value of aviation carbon mitigation through voluntary donations. The options with the most positive support were funding renewable energy projects in developing countries and the airline using biofuels</p>	<p>Respondents had a mean willingness to pay of £12.31 / tonne CO₂</p>
<p>Exploring airline passengers' willingness to pay for carbon offsets.</p> <p>Jin-Long Lu and Zhang Yi Shon, 2012</p>	<p>Investigated the willingness to pay for carbon offsetting in Taiwanese passengers. The results suggest that passengers' knowledge and perceptions of the carbon-offset scheme greatly influence the stated willingness to pay.</p>	<p>Willingness to pay of passengers flying from Taiwan to:</p> <p>China - £4.13</p> <p>Northern Asia - £6.61</p> <p>Southern Asia – £8.92</p> <p>Western Cities - £23.62</p>

Study	Summary	Outcome
Willingness to Pay of Air Passengers for Carbon-Offset Rong-Chang Jou and Tzu-Ying Chen, 2015	Investigates the willingness to pay by economy passengers for CO2 emissions produced during their journey from Taiwan to Hong Kong.	70% of passengers were willing to pay more than £16.51 and the average WtP was £24.81

7.3 Appendix 3: Letter of Support from Portsmouth Water

Amber Parker

Sustainability & Environment Advisor

Scottish and Southern Electricity Networks

Inveralmond House

200 Dunkeld Road

Perth PH1 3AQ



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Web: www.portsmouthwater.co.uk

Portsmouth Water – letter of support - final submission Ofgem's draft determination consultation period.

Dear Amber,

At Portsmouth Water our objectives are to reduce pollutants that are affecting water quality across all our catchment but in particular, nitrate, heating oil and oil filled cables. Catchment delivery involves investigation of sources of contamination, whether they are rural or urban point source or diffuse pollution and working with landowners and farmers to incentivise and to influence their behaviours and actions to reduce impacts upon surface water and groundwater.

Our biggest pollution risk in our catchment are from heating oil tanks and agricultural fuel tanks. The risks are from old and faulty tanks and theft of fuel which usually ends up with majority of the tank fuel leaking into ground which in turn travels to the groundwater table. Impacted groundwater with fuel can then be potentially abstraction at our water treatment works (WTW). We have now installed oil monitoring meters at our WTW so that if any oil is abstracted, the works shut off before it is put into supply.

Other catchment risks include oil filled cables that criss-cross all the catchment carrying electricity to our homes. These get damaged or get worn out and leak into groundwater. We also have pollution risks from farmers washing down equipment that is used for pesticide spraying, fly tipping and poor rural drainage.

We try and engage and work with a number of organisation to reduce and eliminate the above risks through planning applications consultations to reduce pollution through construction and drainage,

working with UK Power Networks to identify faulty cables and remediate them, and work extensively with farmers and landowners to offer them funding to build proper pesticide handling areas.

Portsmouth Water supports your proposals and would welcome to be involved in any future project or scheme as a key stakeholder to reduce pollution from oil filled cables. We would be keen to share our expertise in groundwater and water quality protection to help contribute to the project direction and to ensure research outputs are of most use to the industry. Portsmouth Water would provide insight and expertise regarding pollutant sources, pathways, and receptors as well as sharing data that is relevant. Additionally, our support would provide a greater opportunity to promote your projects and schemes through our internal and external networks, on-boarding key stakeholders and extending the project reach.

This is an exciting opportunity for collaboration across the industry in the field of water quality on a critical research topic that will increase understanding on the continuity of quality from source-to-receptor. Portsmouth Water fully endorses your proposal.

Please feel free to contact me at any time to discuss the content of this letter.

Yours Sincerely,

A handwritten signature in blue ink, appearing to read "Simon Deacon".

Simon Deacon

Catchment and Environment Manager

simon.deacon@portsmouthwater.co.uk



7.4 Appendix 4: EQ Report on SSEN Sustainability and Environment Workshop 27th July 2022

SSEN ENVIRONMENT AND SUSTAINABILITY DRAFT DETERMINATIONS STAKEHOLDER WORKSHOP

JULY 2022



Scottish & Southern
Electricity Networks

Powering our
community

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INTRODUCTION

On 27 July 2022, Scottish and Southern Electricity Networks (SSEN) Distribution hosted an online sustainability and environment engagement session using the Teams platform. The purpose of this workshop was to give stakeholders an opportunity to provide feedback on Ofgem's draft determinations for SSEN's RIIO-ED2 Business Plan in the areas of environment and sustainability.

SSEN instructed EQ Communications, a specialist stakeholder engagement consultancy, to facilitate the workshop and independently take notes of the comments made by stakeholders. Every effort has been made to faithfully record the feedback given. In order to encourage candour and open debate, comments have not been ascribed to individuals.

The workshop comprised presentations by SSEN, followed by discussions in breakout rooms.

- Introduction and our Environmental Action Plan (EAP)
- Meeting Net Zero and Nature-Based Solutions

Following the initial housekeeping, session one began with a presentation by Shirley Robertson, Head of Environment, Consenting and Sustainability Strategic Policy at SSEN. Shirley began by giving stakeholders an overview of SSEN's operations, and then provided background information about the pathway to ED2. She explained how Chapter 13 of SSEN's Business Plan was supported by the Environmental Action Plan (EAP), Climate Resilience Strategy, and Sustainability Strategy. The EAP amounted to £172m of investment to decarbonise SSEN's network in the move to Net Zero and to protect the environment from pollution caused by SSEN's assets. Shirley stated that continuing to deplete nature was not an option, and that SSEN's pollution prevention investment would aid the removal of PCBs from the network in the time specified by legislation and allow for the phasing out of oil-filled cables.

Shirley then moved on to SSEN's science-based targets. Given the legal requirement to achieve Net Zero by 2045 in Scotland and 2050 in England, SSEN looked at the globally recognised SBTi framework to ensure that it was on a pathway to Net Zero. SSEN was accredited in October 2021 and was the first of the UK distribution network operators (DNOs) to set targets in line with a 1.5-degree trajectory. Shirley then explained SSEN's proposal to reduce emissions from its assets by a minimum of 35%, report on, and begin reducing its holdings. She pointed out that SSEN has opted to undertake an ambitious route to replace assets that are severe and poor leakers in order to achieve higher leakage reduction rates and support the delivery of its science-based target, something that was strongly supported by stakeholders. It was noted that sulphur hexafluoride (SF_6)

leakage is not a driver under normal asset replacement, and that while Ofgem had found the need for SF₆ reduction justified, in its draft determination, it considered SSEN's costs to be unjustified, as there is a risk related to which leak reductions will be delivered, due to the cost difference between both options submitted.

Following the discussion, participants returned to the main session, and Shirley Robertson began the next presentation: on Net Zero and nature-based solutions. She explained that SSEN was doing everything possible to reduce its business carbon footprint (BCF) through the accredited science-based targets. Carbon removals would only be viable after SSEN had accomplished this. Nature-based solutions gave the opportunity to achieve the volumes of sequestration required to meet Net Zero and to deliver on biodiversity units in light of new net gain legislation. Shirley presented a graph charting the gap to Net Zero against SSEN's Scope 1 and 2 initiatives. It was emphasised that achieving Net Zero was possible but would require concerted behavioural change. Shirley underlined the fact that investing in nature made sense environmentally as well as financially and socially, because SSEN and consumers could be protected from volatility in the cost of carbon credits.

Shirley cited the Dasgupta Review to highlight the economic danger involved with inaction on the environment. She then explained that the 2021 Environment Act required every planning permission granted to demonstrate a biodiversity net gain (BNG) of 10%, including for infrastructure projects. It was anticipated that Scotland would put similar requirements in place. SSEN's proposal for nature-based solutions for carbon removal was then showcased against Ofgem's draft determination response.

SSEN's proposal in its Business Plan was to restore approximately 17ha of seagrass across its two licence areas. Shirley explained that seagrass restoration is something that coastal communities, conservation charities and government agencies are currently very keen on exploring, but the funds are often lacking to pursue the opportunities that exist around the UK, as seagrass restoration is still in its relative infancy in the region. Seagrass restoration facilitates numerous benefits for people and wildlife and helps to re-establish some of the areas historically lost (92% of the UK's seagrass has disappeared). In its draft determination, Ofgem stated that it had concerns about this Customer Value Proposition (CVP) relating to the calculations of consumer benefits.

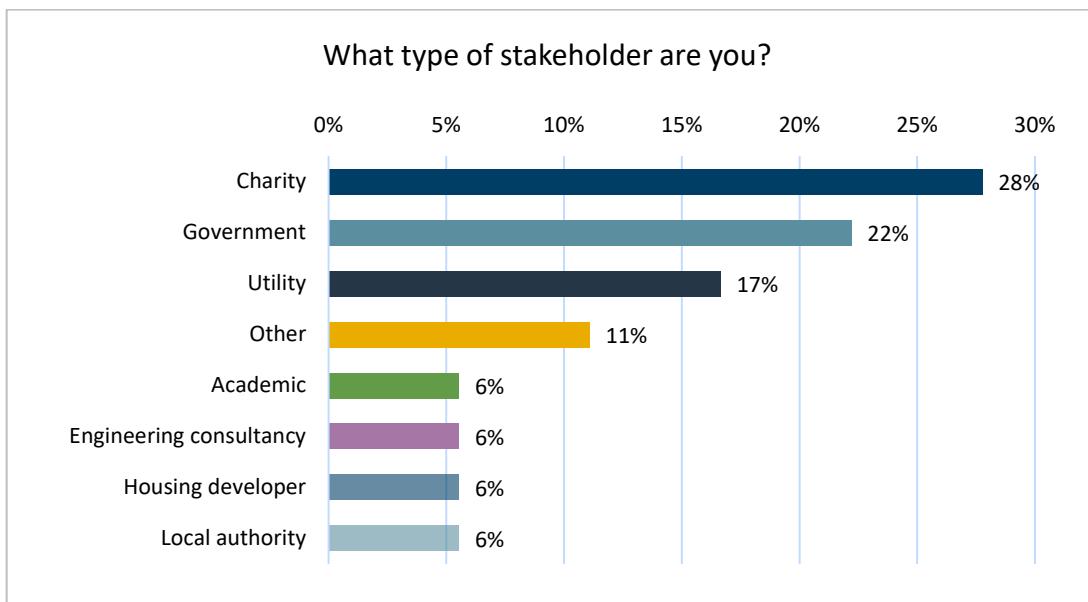
It was added that SSEN was working to ensure that this CVP went through at Final Determinations, and stakeholders were asked to voice their support through consultation with Ofgem in SSEN Q4. An electronic voting round was held using Slido before stakeholders moved into breakout rooms for discussion.

Following the final discussion session, Shirley Robertson explained how stakeholders could ensure that their voices were heard in Ofgem's draft determinations. The consultation timeline was explained, and stakeholders were asked to send responses to Ofgem by 25 August 2022. Key consultation questions on EAP proposals and SSEN's CVP to protect marine biodiversity were emphasised. There was a brief wrap-up, during which stakeholders were invited to fill in a feedback form.

EXECUTIVE SUMMARY

PARTICIPANTS

- In total, 24 stakeholders participated in the event, each representing a different organisation.
- Following each discussion session, stakeholders used the Slido voting platform to answer voting questions about the topics discussed. Between 12 and 18 responses were provided for each question.
- Charities were the most represented, with 28% of attendees voting for this option when asked to choose their stakeholder category on Slido. This was followed by Government (22%), Utilities (17%) and 'Other' (11%).
- Six representatives of SSEN attended the event.



INTRODUCTION AND OUR EAP

- Participants in the discussion considered SF₆ to be a very potent greenhouse gas, making it an obvious target for reduction. SSEN was encouraged to remove SF₆-insulated equipment. Education was considered vital to inform people about SF₆. There were calls for a shift in approach to preventing pollution, as opposed to fighting it reactively. Participants were very much in favour of SSEN seeking alternatives to SF₆. In the breakout rooms, participants largely disagreed with Ofgem's consultation proposal to remove the SF₆ investment for SSEN, whose costs were thought to be considered and justified.

- Stakeholders in the breakout rooms responded positively when asked about SSEN's approach to science-based targets. SSEN was praised for its transparency, as well as for including Scope 3 targets. SSEN was encouraged to implement this approach as a matter of urgency.
- Environmental group representatives expressed support for an ambitious approach focused on science and engineering. SSEN was encouraged to incorporate innovative development into its approach. Materials and building approaches to seals, along with championing alternative equipment, were suggested as areas of focus. The suggestion was raised that SSEN could set out longer-term targets that went beyond the next price control period in order to convince Ofgem of its proposals.

MEETING NET ZERO AND NATURE-BASED SOLUTIONS

- SSEN was commended for its approach to the delivery of Net Zero. Stakeholders believed that nature-based solutions would deliver multiple benefits, as well as contribute towards Net Zero and carbon sequestration. There were calls for a collaborative approach to upgrading the network to save on indirect emissions. SSEN was urged to look at schemes on their own land, such as retrofitting buildings and adding solar panels. Participants argued that tree planting should be done in the UK. Investing in land and biodiversity net gain initiatives was preferred to buying carbon credits.
- On nature-based solutions, SSEN was encouraged to look long term and recognise that battery storage was a short-term solution. Caution was raised on offsetting projects, as planted trees could be wiped out by forest fires. Seagrass restoration was viewed as a starting point, with wider action needed to promote nature-based solutions.
- It was emphasised that nature restoration projects should not be a substitute for carbon removal. Community projects at a local level and large-scale projects were both considered important. SSEN was recommended to consider local or national manufacturing, given the carbon footprint of shipping. The creation and reforestation of woodland was considered challenging because of the lack of space for woodland of significant size. Catchment-based and regional solutions for nature restoration were identified as good routes to deliver local benefits.
- Planting hedgerows under pylons was considered to be a good solution that was missing from SSEN's proposal, offering better biodiversity net gain scores than tree planting.
- There was broad support for SSEN's CVP proposals for seagrass bed restoration. SSEN was encouraged to understand its impact on the seabed at an organisational level and to go further than repairing it, by restoring it. SSEN was prompted to create links with local communities working on seabed restoration projects through its seabed cable projects. Overfishing was cited as a concern for seagrass protection. Increasing stocks of commercially important fish species was considered beneficial.

Opinions varied on the value of offsetting. Marine Protection Areas, established by maritime bodies alongside Ofgem, could help SSEN to achieve its goals. Stakeholders were open to knowledge exchange and investment in this area.

- Stakeholders were supportive of Ofgem's draft determination on SSEN's CVP proposal for seagrass bed restoration and felt that this was a cost-effective initiative. Stakeholders encouraged SSEN to involve fishing industry and academia representatives in its work. SSEN was urged to distinguish between its own nature-based solutions and those of other companies to Ofgem, in addition to calculating customer benefits that could be delivered by the proposal.

STAKEHOLDER FEEDBACK

- In written feedback submitted after both workshops, 43% of all stakeholders said that they found the workshop to be 'interesting', and 57% found it to be 'very interesting'.
- 72% of all stakeholders either 'agreed' or 'strongly agreed' that the right topics were covered on the day, although 29% indicated that they were 'neutral' on this question.
- When asked for their opinion on how the workshop discussions had been chaired by the independent facilitator, 71% of all stakeholders answered 'very good' and 29% answered 'good'.

SESSION ONE: OUR EAP

During session one, stakeholders were asked to provide feedback about SSEN's Environmental Action Plan. Questions focused on SSEN's approach to SF₆ reduction, science-based targets and Ofgem's consultation position to remove the SF₆ investment for SSEN.

Stakeholders were overwhelmingly in favour of SSEN tackling both severe and poor leakers of SF₆. When asked to vote on this, participants gave an average score of 4.71 out of 5, where 1 was 'strongly disagree' and 5 was 'strongly agree'. By contrast, stakeholders returned an average score of 1.92 when asked whether they supported Ofgem's consultation position to remove the SF₆ investment for SSEN. Stakeholders evidently considered it a priority to move away from SF₆, giving an average score of 3.94 when asked if SSEN should actively look for alternatives to SF₆ to reduce the amount of it on the network. The majority of stakeholders (69%) 'strongly agreed' that SSEN should continue to deliver against its ambitious science-based target in order to be on a pathway to Net Zero. Views were somewhat polarised; 31% of respondents 'strongly disagreed' with this statement, resulting in an average score of 3.75 for this question.

Participants in the discussion considered SF₆ to be a very potent greenhouse gas, making it an obvious target for reduction. One stakeholder argued that severe leakers should be tackled as per Ofgem's stipulations and urged SSEN to work to remove SF₆-insulated equipment. An academic stakeholder observed that education was necessary to inform people about SF₆. Utility and government stakeholders asserted that both severe and poor leakers should be addressed. An environmental group representative raised the issue of technology and the problem of seals breaking down over time and causing emissions. There were calls for a shift in approach to preventing pollution, as opposed to fighting it reactively. Participants spoke in favour of SSEN seeking alternatives to SF₆, with one utility stakeholder stating that such an innovative approach would need to move in step with science-based targets. Participants in the breakout rooms largely disagreed with Ofgem's consultation proposal to remove the SF₆ investment for SSEN, whose costs were thought to be considered and justified. A utility stakeholder suggested that a reduced-cost model could potentially be presented for RIIO-ED2.

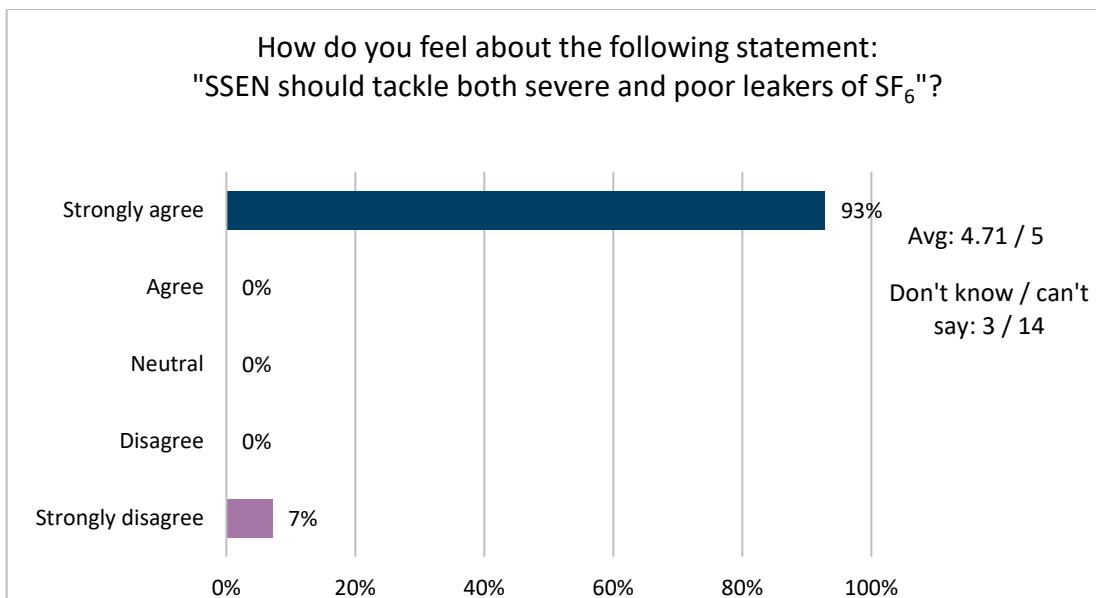
Stakeholders responded positively when asked about SSEN's approach to science-based targets, and SSEN was praised for its transparency, as well as for including Scope 3 targets. Environmental group participants were convinced that this was the right approach to drive change, and that the targets should be implemented

urgently and as widely as possible. SSEN was encouraged by one business group representative to take a stance on its minimum requirements to encourage manufacturers to create greener products.

Environmental group representatives expressed support for an ambitious approach focused on science and engineering and spoke in favour of the Scottish Government's 2045 target. SSEN was encouraged to incorporate innovative development into its approach. Materials and building approaches to seals and championing alternative equipment that worked just as well as, if not better than, diesel equipment were suggested in the breakout rooms as areas of focus for SSEN's efforts. One utility stakeholder proposed that SSEN could set out longer-term targets that went beyond the next price control period in order to convince the regulator of their proposals.

Stakeholder feedback

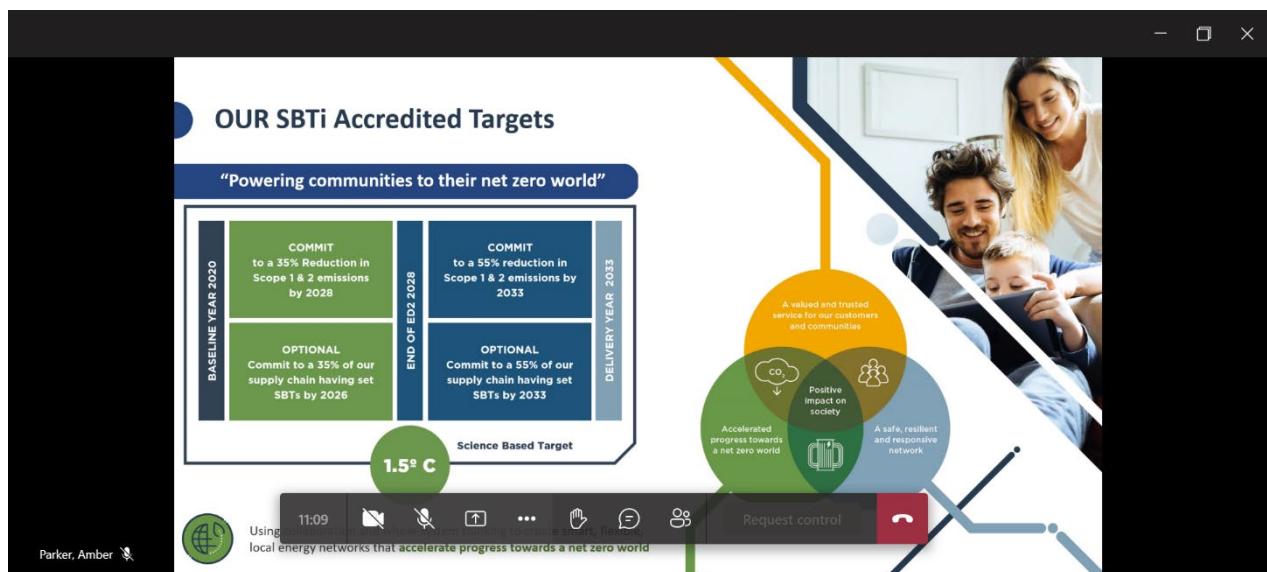
1. Do you think SSEN should tackle both severe and poor leakers of SF₆?



- “It seems like this is such a potent greenhouse gas. If this is approaching the levels of problem we have with carbon, then it’s a no-brainer.” Environmental group
- “They should tackle severe leakers. It’s also what Ofgem has called for. There is lots of kit across the country that contains this gas. SSEN will have to work to get it off the system, and they actually have financial incentives. Our concern is SSEN has not pushed this hard enough.” CEG
- “I agree that this is a good idea. We have had a lot of pollution incidents over the years, and this would help to reduce the amount of pollution across our catchment. However, I would stress that both of these leakers are key for us.” Utility

- “Absolutely, these leakers seem to be a problem and need to be tackled.” Government
- “I agree that something needs to be done, but there is also a question of technology tied up in this, as the leakages are coming from them. For example, is it an issue of poor designs rather than poor raw materials? Switchgears are moving components, with gas moving about inside, meaning that these gases need to be sealed inside. I imagine that these seals are breaking down over time, releasing the gas.” Environmental group
- “For me, I think that there needs to be a shift in approach, moving towards focusing on pollution prevention rather than reactive pollution fighting. Therefore, I think that it would be better to invest in the equipment to stop the pollution happening now. This investment is crucial to reducing these leakages.” Utility

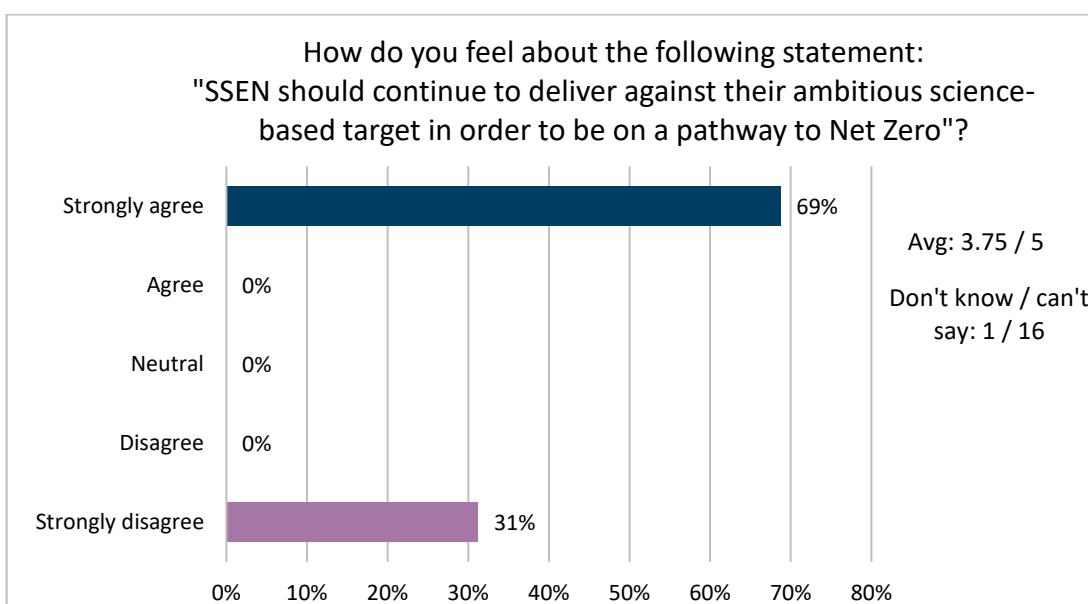
2. Do you still believe in our approach to science-based targets?



- “This is definitely the way to drive change. Science has had a bad reputation in recent years because of populism. You need to keep things simple for the sake of understanding.” Environmental group
- “I’m all in favour of science-based targets.” Parish or community council
- “SSEN deserve commendation for their transparency. I understand the need to drive towards Net Zero, but it is responsible to recognise what you can and can’t do. If you maintain your current engagement, we will have progress.” Academic
- “It’s very good to see you’re including Scope 3 targets in particular.” Housing developer

- “I support science-based targets and performance indicators.” Charity
- “Absolutely, this cannot wait.” Utility
- “I agree with it. Please implement them as far as possible as a matter of urgency.” Environmental group
- “I think that it’s sensible to base the approach around the science. What alternative is there?” Environmental group
- “Science-based approaches seem eminently sensible. I recognise that the levels of 1.5 may not be enough, but that kind of baseline is not set by you.” Local authority
- “It makes sense. I can’t think of a better option to be honest.” Government

3. SSEN should continue to deliver against their ambitious science-based target in order to be on a pathway to Net Zero

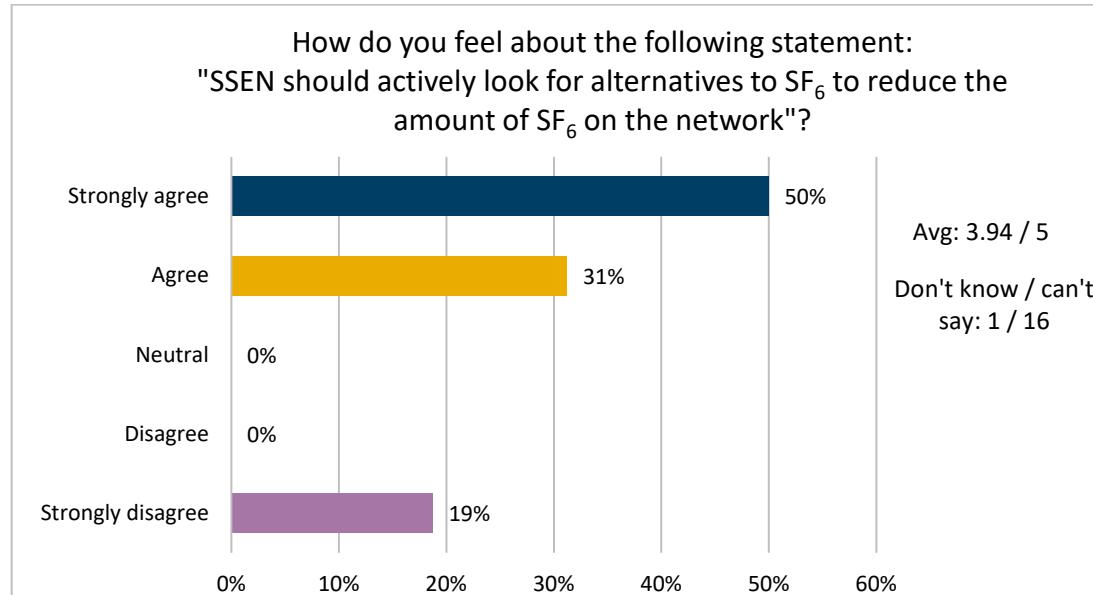


- “You have to provide equipment that works the same if not better than diesel equipment. You have to change the mindset and show that battery equipment can outdo diesel equipment. We need SSEN to push this down the line at a much higher level. Internally this also means giving sites the option to use battery-operated equipment.” Business group
- “You have to look at this through a lens of what constitutes value for money, but also think about what is achievable based on these targets. I understand that you have short-term business plans with OFGEM, but at the same time, you can also set out 5-, 10-, 20- and 25-year targets which can provide

a framework for your ambitions and your pathway to Net Zero. Such an approach could be looked upon favourably by the regulator, as you are looking a long way into the future.” Utility

- “It’s interesting that this is a science-based approach, as I see the solution being driven by a science-and engineering-based approach. For example, materials and building approaches for seals could come under this idea of engineering approaches and could result in new solutions. Therefore, you should think about incorporating innovative development into the approach for these new science-based targets.” Environmental group
- “We support ambitious targets and approaches and advocate the Scottish government’s Net Zero ambitions for 2045.” Environmental group

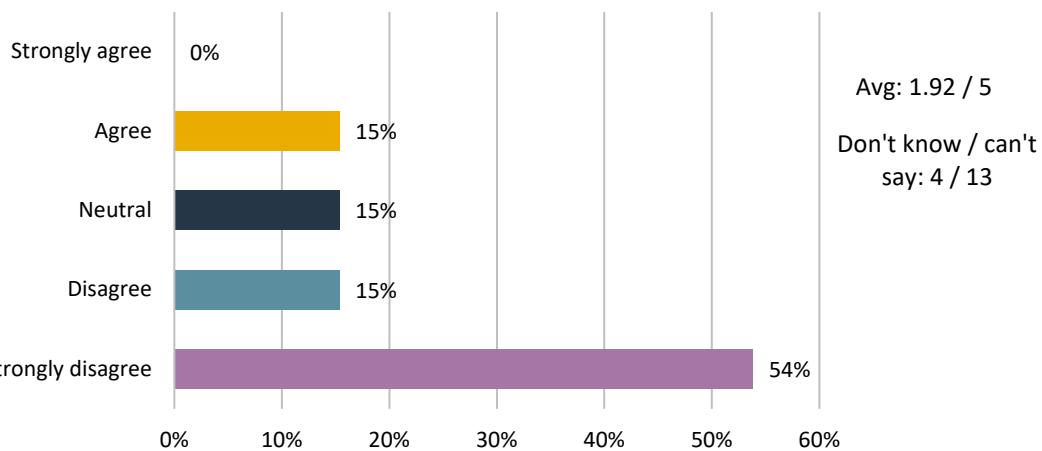
4. SSEN should actively look for alternatives to SF₆ to reduce the amount of SF₆ on the network



- “It’s all about sticking to the science. We definitely should look for alternatives.” Environmental group
- “This is all part of the innovation approach that we discussed earlier, and it needs to go hand in hand with science-based targets. An innovation programme needs to underpin these efforts.” Utility

5. Stakeholders support for Ofgem’s consultation position to remove the SF₆ investment for SSEN

How do you feel about the following statement:
 "I support Ofgem's consultation position to remove the SF₆ investment for SSEN"?



- “No.” Utility
- “SSEN’s costs are considered and justified. Is there a basis to put forward a reduced-cost model for this round of funding?” Utility

OUR Credible Net Zero

AVOID
Avoid future carbon emissions by evaluating the data and making more conscious decisions

REDUCE
Reduce current GHG emissions by utilising efficiencies in energy, materials, supply chain and innovation

REMOVE
Remove carbon from the atmosphere

CARBON REMOVAL
Full review of our carbon removal proposals started in July to ensure credible opportunities are included in our plan.

Parker, Amber

SESSION TWO: MEETING NET ZERO

In session two, stakeholders were asked to provide feedback about SSEN's approach to nature and the delivery of Net Zero.

In the breakout discussions, SSEN was commended for its approach to delivering Net Zero. An environmental group stakeholder remarked that SSEN was leading the way compared to the other DNOs. It was believed that nature-based solutions would deliver multiple benefits as well as contributing towards Net Zero and carbon sequestration. Housing developers and environmental group representatives called for a collaborative approach to bring together the various elements and to upgrade the network to save on indirect emissions. One utility stakeholder recommended that SSEN urgently\ look at schemes on its own land, such as retrofitting buildings and adding solar panels. Environmental group and utility stakeholders struck a note of caution on tree planting and purchasing carbon credits. Specifically, it was suggested that tree planting should be carried out in the UK, and that investing in land and biodiversity net gain initiatives was preferable to buying carbon credits.

Slido voting results indicated that stakeholders considered nature-based solutions to be a sensible route to achieving Net Zero, with an average score of 4.36 / 5 for this question. A housing developer encouraged SSEN to look long term and to recognise that battery storage was only a short-term solution. There were calls to cut consumption and consider the provenance of the timber used by the company, for example. A word of caution was offered on offsetting projects, as planted trees could be wiped out by forest fires. A charity representative was supportive of nature-based solutions overall but was somewhat concerned about complacent business practice and attempts to identify mere technical solutions, such as offsetting. A time limit to further incentivise change was suggested. A local authority representative viewed seagrass restoration as a starting point and believed that wider action was needed to promote nature-based solutions.

Stakeholders returned varying responses when asked to vote on whether nature restoration projects should be local to consumers to ensure benefits were realised at a local level, with this question returning a voting score of 3.64 / 5. An environmental group stakeholder stressed that such projects should not be a substitute for carbon removal. Another asserted that local opportunities should be prioritised, but not at the expense of national ones. Community projects at a local level and large-scale projects were both considered important. Local projects needed to demonstrate impacts to communities, and SSEN was urged to focus on distributing projects equitably.

A housing stakeholder suggested that SSEN should look at local or national manufacturing, given the colossal carbon footprint of shipping. A parish or community council representative believed that the

creation/reforestation of woodland would be challenging because of the lack of space for woodland of significant size. A radical shift in town planning would also be required to minimise travel distances. An environmental group stakeholder highlighted that the restoration of peatbogs presented a big source of opportunity in Scotland, as they emit a lot of CO₂. Catchment-based and regional solutions for nature restoration were identified by a utility stakeholder as being good routes to deliver local benefits. It was thought that these would provide opportunities for SSEN to explore larger projects.

In the Slido voting responses, most stakeholders considered that finding nature-based solutions now was a sensible approach to managing the cost of carbon volatility in the future, with an average score of 3.92 / 5 for this question. Utility and local authority participants in the breakout rooms voiced their agreement that this was sensible, with one stakeholder acknowledging the challenge of balancing sustainability with affordability. An environmental group stakeholder suggested that planting hedgerows under pylons would be a good solution that was missing from SSEN's proposal. A utility representative seconded that hedgerows would be good as they offered better biodiversity net gain scores than trees do.

When asked whether they were supportive of SSEN's CVP proposals for seagrass bed restoration, a number of breakout discussion participants spoke favourably of these. SSEN was encouraged to understand its impact on the seabed at an organisational level, and to go further than repairing it, by restoring it. Further to this, SSEN was encouraged to create links with local communities working on seabed restoration projects through its seabed cable projects. Overfishing was cited as a concern, as seagrass often ends up in fishing nets, and needs to be protected. In line with this, an environmental group stakeholder emphasised the benefit of increasing stocks of commercially important fish species. A charity representative built on this by raising the fact that native oyster restoration projects and integrated multi-trophic aquaculture (IMTA) has value as part of a combined approach.

Opinions differed on the value of offsetting, with one parish or community council stakeholder believing it to be more viable than carbon storage, and an environmental group representative stating that offsetting was part of the solution, but that carbon reduction was preferable. A utility stakeholder was in favour of SSEN's CVP proposals and called for Marine Protection Areas to achieve these goals. An environmental stakeholder suggested that Ofgem could work with maritime bodies to set these up and ensure their success. Similar projects offered the possibility for SSEN to learn from stakeholders, and an environmental group representative suggested that SSEN could help organisations to expand their green space and rewild land through investment.

Voters in the Slido poll resoundingly agreed that seagrass restoration was a worthwhile initiative that would deliver decent benefits to consumers and the planet, with an average score of 4.36 / 5. Numerous stakeholders were supportive of Ofgem's consultation position on SSEN's CVP proposal for seagrass bed restoration,

returning an average score of 3.79 / 5. An academic viewed this as a cost-effective initiative that should involve representatives of the fishing industry and academia. Stakeholders were broadly supportive of seagrass restoration, and encouraged SSEN to distinguish to Ofgem between its own nature-based solutions and those of other companies. A utility representative encouraged SSEN to calculate the customer benefits that could be delivered by the proposal. An environmental group stakeholder voiced the fact that the science being used in this area was still quite new, and that the next five years would bring clarity.

Stakeholder feedback

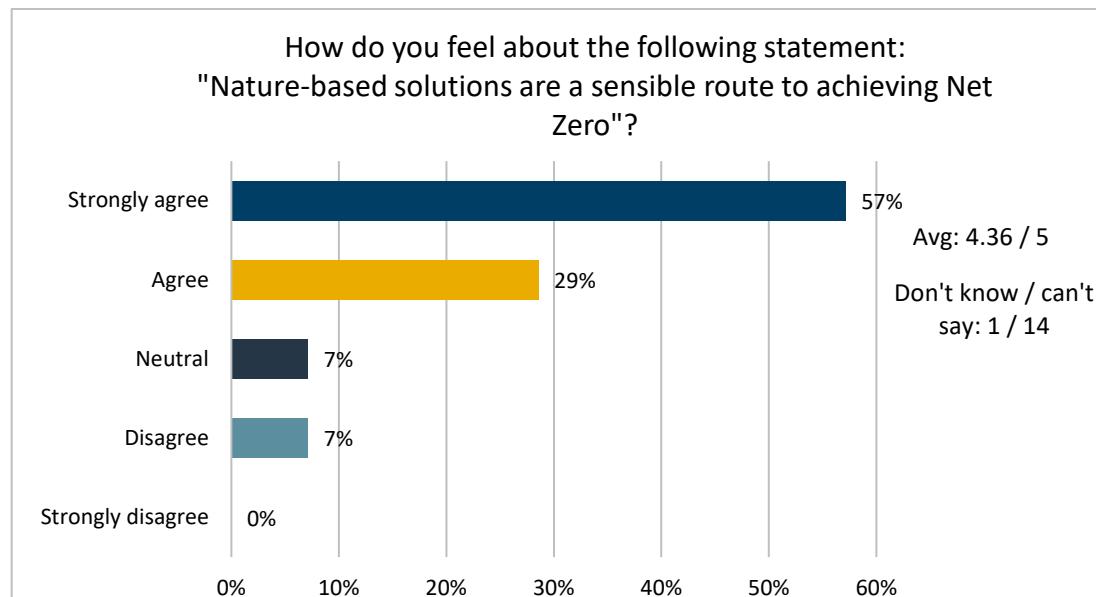
1. How do you feel about our approach to nature and the delivery of Net Zero?

- “It’s quite difficult as a lot of people are looking for nature-based solutions. The first thing needs to be a reduction in our carbon use. The second is a nature-based solution where carbon cannot be removed from the business.” Environmental group
- “A wider body than the DNO should coordinate efforts to champion Net Zero.” Parish or community council
- “Everyone will need to champion this as we all have to do our bit. There’s a role for everyone. There are so many elements to bring together.” Environmental group
- “I’ve heard that SSEN will include blue and green carbon in the carbon audits, which is good.” Charity
- “Resilience is an aspect that is difficult to build in, but we need our engineers, scientists and policymakers to understand its importance.” Local authority
- “If we collaborated to upgrade the network, that would save on indirect emissions significantly.” Housing developer
- “I would commend this. We’re doing something similar to this at Portsmouth Water, particularly around biodiversity net gain, and are looking at a permitted development plan that tries to achieve biodiversity net gain. I would also urge SSEN to more urgently look at schemes on their own land, such as retrofitting buildings and adding solar panels. The most important thing to do here is work with stakeholders and lay in these Net Zero goals collaboratively. Don’t work in silos, as you can achieve greater results that way.” Utility
- “I absolutely support the proposed approach. If you said that a DNO would be proposing something like this 5-10 years ago, I wouldn’t have believed it. It’s clearly very proactive and seems to be leading the way compared to the other DNOs. These solutions would deliver multiple benefits on top of contributing towards Net Zero and carbon sequestration, such as providing access to green space.” Environmental group
- “I like this idea, but there’s a slight issue in a sense: if every company says that they will be planting trees, you will either get people fighting over forest space or there will be forests everywhere. We

need to get someone coordinating this more widely. I am also against the idea of companies planting trees in the Amazon, as it is all very out of your control. Trees need to be planted in this country.” Environmental group

- “Solar panels on roofs are good as they’re providing energy to your buildings and not taking up space on land. However, please go further and look at building insulation and heat pumps, so that you can use less carbon. There is also a golden chance here to plant trees and hedgerows on your thin strips of land for pylons and overhead wires.” Environmental group
- “As a policy, buying carbon credits should be a last resort, as they are expensive. If you have a portfolio, concentrate on your own land or work with partners. I think that investing in land and biodiversity net gain initiatives is better than buying credits.” Utility

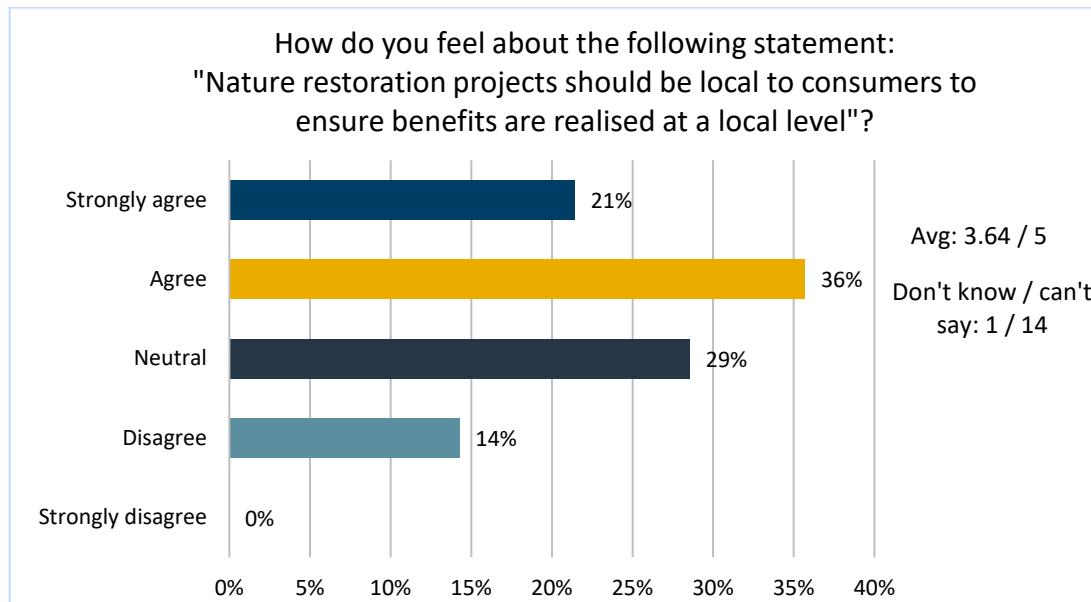
2. Do you feel that nature-based solutions are a sensible route to achieving Net Zero?



- “One of the big problems is as soon as SSEN appear before landowners they just see pound signs floating about. The solutions are already up and running. Let’s not try to reinvent the wheel. You need to look long term; battery storage is a short-term solution as you don’t know what to do with them when they die. We need to go back to basics and cut out what we’re using in the first place. There’s been no thought in the last few years about where wood poles are coming from for example. Meanwhile all the good timber in Scotland is being used elsewhere. You need to start promptly.” Housing developer
- “I’m supportive overall, but I’m somewhat concerned that it could introduce a laziness in business practice and attempts to identify merely technical solutions such as offsetting. You could also have a time limit to further incentivise change.” Charity
- “Are we planning just on the here and the now, or are we building in climatic projections?” Charity

- “It’s all about doing it for the main reasons. It must have a value, and not be just to plug a gap. It’s not just about doing one thing, but the whole package.” Environmental group
- “The red flag for me is whether it will last. For instance, you hear about global offsetting projects that are cancelled out by forest fires.” Housing developer
- “Seagrass restoration is just a starter. There are so many more opportunities to do something different and better. We’re only touching the tip of the iceberg and there is a lot we need to do to promote nature-based solutions.” Local authority
- “Yes, I agree with this approach and think that it’s a good idea.” Government

3. Do you think that nature restoration projects should be local to consumers to ensure benefits are realised at a local level?



- “These things cannot be a substitution for carbon reduction. They are long-term solutions as trees take a long time to grow and seagrass beds take a long time to be re-established. We train up communities so that restoration can be implemented locally. You cannot just rely on large-scale projects.” Environmental group
- “Why are you not looking at local or national manufacturing? The carbon footprint of shipping is colossal.” Housing developer
- “Local people need to see the difference being made in their area to combat what we’re fighting here. There’s not the scale for some of those, particularly in the southeast. You need a good distribution of projects if that’s to be the focus.” Environmental group
- “I can’t see us actually creating enough space to create a new wood of significant size. This will have to be done in the most suitable places. This can be communicated through nature programmes and is

probably as effective as having them in the local area. We also need to look at minimising transport distances and our carbon emissions. We need town planning that minimises distance between home and work. Travelling 30-50 miles to work is a huge amount of charge for an EV." Parish or community council

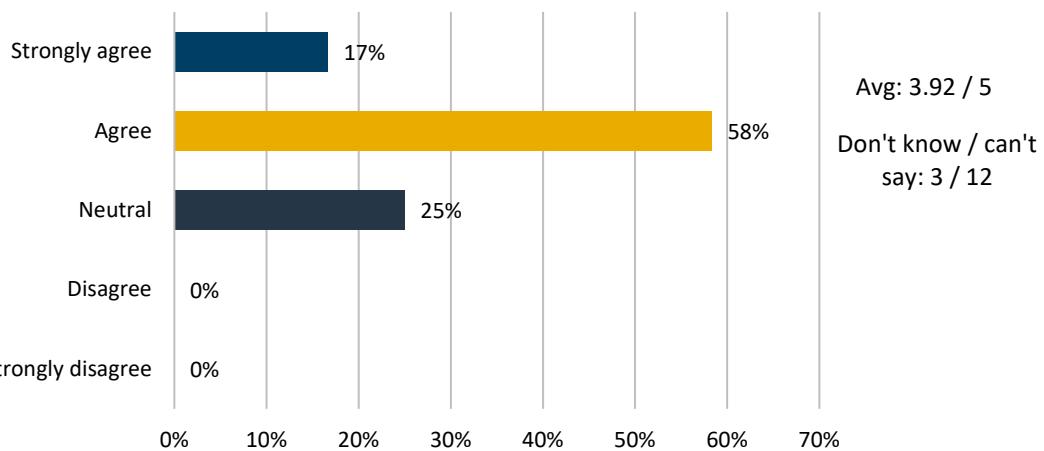
- "Yes and no. I'd rather do it than not, but we're not going to be able to do it everywhere." Government
- "Restoration of peatbogs are a source of big opportunities in Scotland, as they emit lots of CO₂. Where there are opportunities locally, they should be pursued as a priority, but don't let focusing on local schemes hold you back from taking action." Environmental group
- "I would suggest catchment-based and regional solutions for nature restoration as good routes to deliver local benefits. They would provide opportunities for SSEN to explore bigger projects." Utility



4. With regard to the cost of carbon – do you value this approach given it would protect consumers in the longer term?

- "Is there a mechanism in place for SSEN to sell these credits if they hit their own targets so that they can help others achieve their own targets?" Utility
- **Nature-based solutions now are a sensible approach to manage the cost of carbon volatility in the future.**

How do you feel about the following statement:
 "Nature-based solutions now are a sensible approach to manage
 the cost of carbon volatility in the future"?



- “Yes, that sounds sensible.” Utility
- “I agree that it’s sensible. You have to navigate this double-edged sword of improving the natural environment and bringing down bills.” Local authority
- “Planting hedgerows under pylons would be good and they are missed here.” Environmental group
- “I agree that hedgerows would be good. They can achieve better biodiversity net gain scores than trees.” Utility

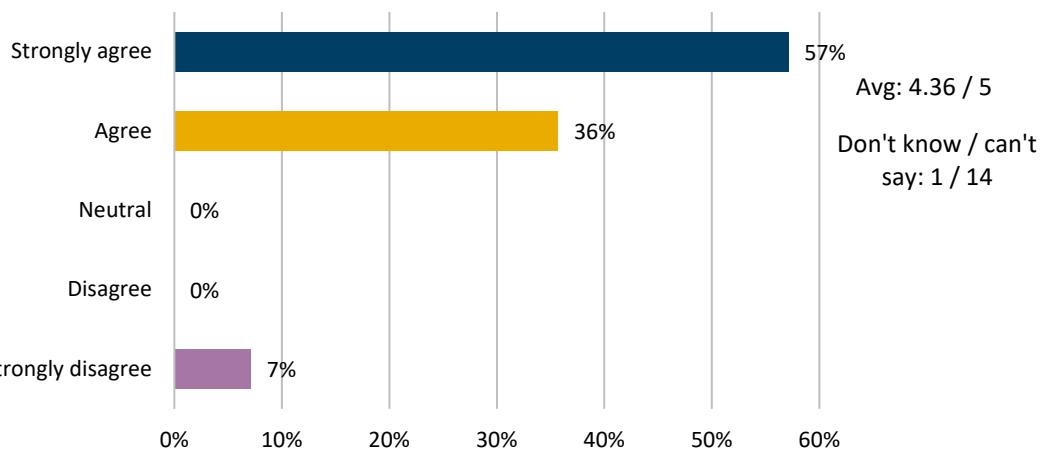
1. Do you continue to/support our CVP proposals for seagrass bed restoration?

- “Yes. We are working alongside organisations who are further along than us to get this rolling. If we can get enough other communities on board and look at bigger projects in the Firth of Forth, it’s significant.” Environmental group
- “An element may be changing how things are done already rather than looking at entirely new things. This would mean carbon reduction rather than just compensation through offsetting. Monitoring and how you can attribute that can be a stumbling block. Offsetting probably needs to be there as some things cannot be managed out.” Environmental group
- “Offsetting is preferable to carbon storage which is a fairy tale. At least this is achievable. There’s a lot of Victorian and even older infrastructure like old mills that have become attractive homes for people. The sum of this across the UK must be a staggering amount of power.” Parish or community council
- “We’re not just talking about carbon offsetting, it’s the win-win of increasing stocks of commercially important fish species. This needs to be in the mix too in the conversation about offsetting.” Environmental group

- “The whole organisation needs to understand its impact on the seabed. It’s certainly important not just to repair it, but to restore it as well. We are animals as well, and we must consider ourselves as part of that picture.” Environmental group
- “I’m totally supportive, but it is part of a bigger picture. We’re also looking at native oyster restoration. High-capital projects aren’t the solution. We also need to look at IMTA. We can combine different activities.” Charity
- “Let us know what the costs involved in such an initiative are.” Academic
- “92% of seagrass has disappeared. Why? If that has been caused by overfishing, that new grass will simply end up in people’s nets. It’s a great idea to do this, as this seagrass takes in so much carbon, but you need to make sure that you protect it.” Environmental group
- “This is a great idea. We work on seagrass restoration projects in Scotland, with a fund in place called SMEATH. There is plenty of scope for further restoration in areas where these pressures are reduced or absent.” Environmental group
- “I agree on this, but you do need some Marine Protection Areas to achieve these goals. There is a similar project off the south coast of England around restoring seagrass beds, so there are things that SSEN could learn from other stakeholders.” Utility
- “It sounds a good idea, but it’s interesting that they’re not directly local projects. This actually shows the benefits of having a mixture of local and non-local projects.” Local authority
- “There are seabed restoration projects and seabed cable projects already underway, so SSEN could look to create links with local communities through them.” Environmental group
- “Can SSEN help by investing in organisations doing this kind of work? For example, organisations that need to expand their green space and rewild their land come to mind here. You could help them by investing in these schemes and building them into your plan.” Environmental group

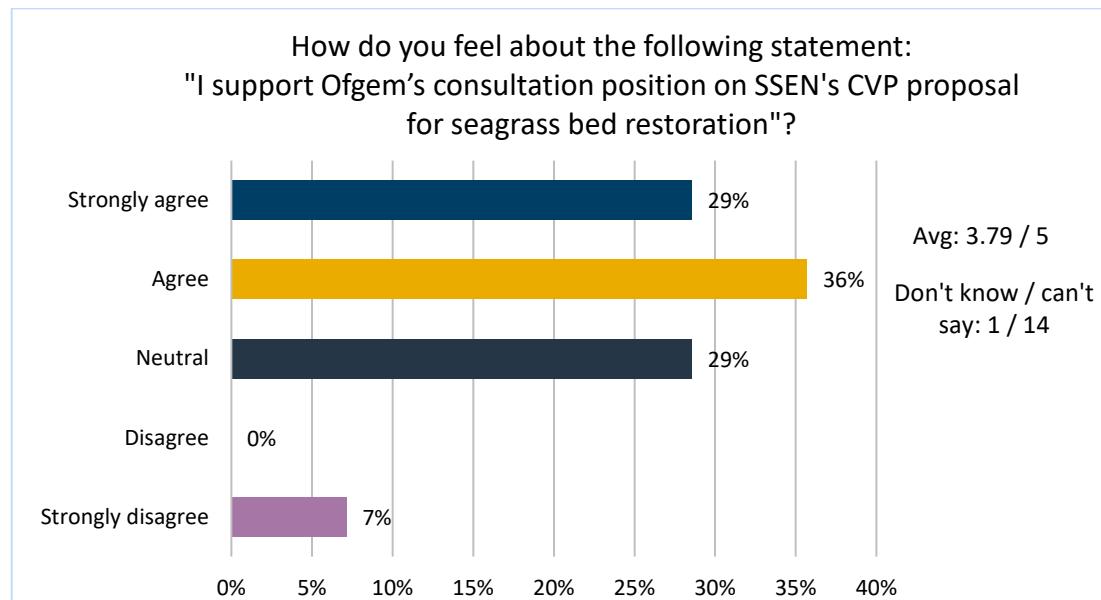
2. Seagrass restoration is a worthwhile initiative that will deliver decent benefits to consumers and the planet

How do you feel about the following statement:
 "Seagrass restoration is a worthwhile initiative that will deliver decent benefits to consumers and the planet"?

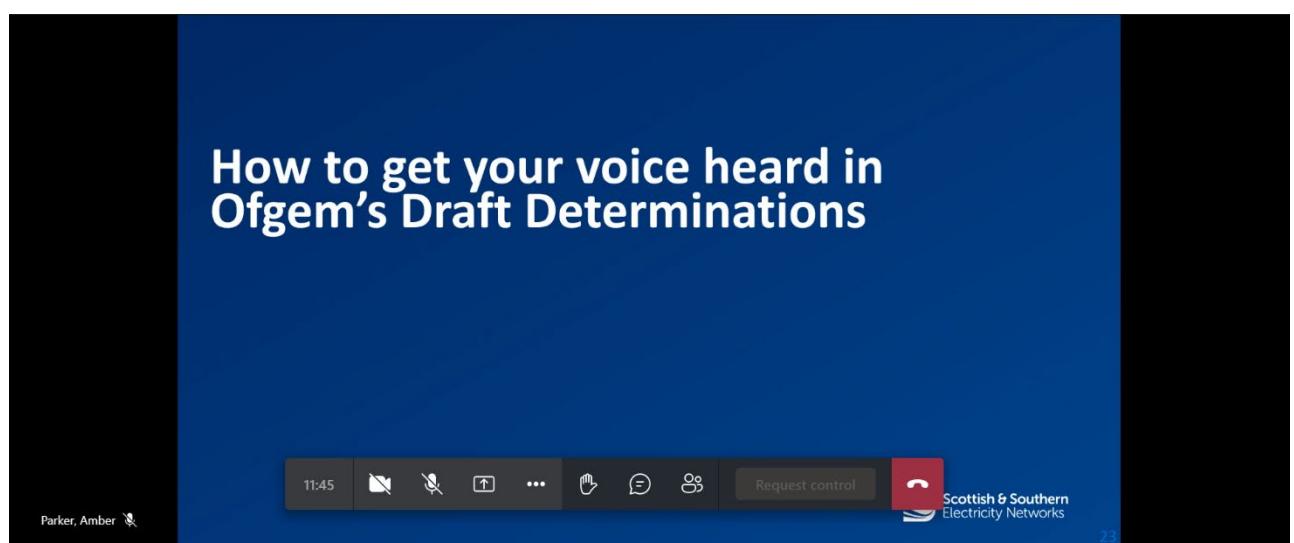


- “The jury’s still out on this and we are monitoring things with partners including universities. The science they’re using is fairly new as well. The next five years will bring clarity.” Environmental group
- “This is a cost-effective initiative, but I wonder why there’s no representation from people in the fishing industry. There also needs to be more collaboration with academic institutions.” Academic
- “You’d need a licence for seaweed deposits. You’d need to speak to someone from Natural Scotland.” Government
- “We’ve always supported this initiative. You must also distinguish between the nature-based solutions you’re offering and what other companies are doing to Ofgem.” CEG
- “Yes.” Utility

3. I support Ofgem's consultation position on SSEN's CVP proposal for seagrass bed restoration



- "I think that you've got to do the calculations for consumer benefits. It sounds like there are customer benefits that will be delivered through them." Utility
- "OFGEM can also work with maritime bodies to set up these Marine Protection Zones and ensure that these projects are a success." Environmental group



CONCLUSION

Stakeholders supported SSEN's approach to SF₆ reduction, as well as their science-based targets. Participants saw the value in nature-based solutions and urged SSEN to be ambitious on local and national levels. SSEN's CVP proposals for seagrass bed restoration were viewed as worthwhile and cost-effective.

SSEN was encouraged to take SF₆ reduction seriously and to seek alternatives to SF₆. Participants in the breakout rooms largely disagreed with Ofgem's consultation proposal to remove SF₆ investment. SSEN's approach to science-based targets was viewed favourably, and it was encouraged to implement an ambitious approach incorporating innovation as a matter of urgency. Longer-term targets that went beyond RIIO-ED2 were considered valuable to convince Ofgem of SSEN's proposals.

SSEN was commended for its approach to nature and to the delivery of Net Zero. Stakeholders believed that nature-based solutions would deliver multiple benefits and facilitate Net Zero and carbon sequestration. Investing in land and biodiversity net gain initiatives was considered more beneficial than buying carbon credits. SSEN was encouraged to look at long-term nature-based solutions. Caution was raised on offsetting projects owing to the risk of forest fires. Seagrass restoration was viewed as a starting point, with wider action needed to promote nature-based solutions.

Stakeholders held that nature restoration projects should not be a substitution for carbon reduction. Local community projects and large-scale projects were both considered important. SSEN was recommended to consider the carbon footprint of shipping in its supply chain. Catchment-based and regional solutions were seen to offer local benefits. Discussion participants suggested that planting hedgerows under pylons offered better biodiversity net gain scores than tree planting.

There was broad support for SSEN's CVP proposals for seagrass bed restoration. SSEN was encouraged to be ambitious and look to restore seagrass beds and was prompted to create links with local communities. Opinions varied on the value of offsetting, though Marine Protection Areas were vaunted to help SSEN achieve its goals. Stakeholders were supportive of Ofgem's consultation position on SSEN's CVP proposal for seagrass bed restoration, and the initiative was considered to be cost-effective.

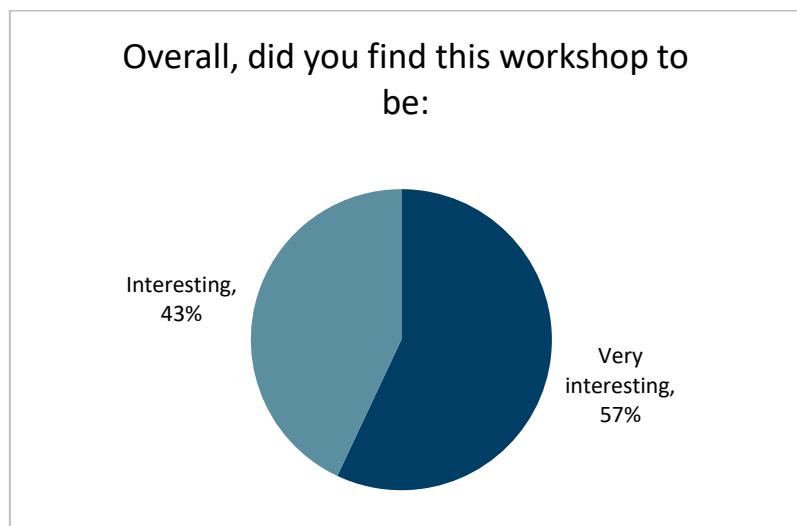
APPENDIX 1: WORKSHOP PARTICIPANTS

EVENT	SSEN Sustainability and Environment Engagement Workshop	
DATE	Wednesday 27 July 2022	
TIME	10:00-12:00	
ATTENDEES	<ul style="list-style-type: none"> • Shirley Robertson, SSEN • Amber Parker, SSEN • Kim Soucy, SSEN • Craig Thom, SSEN • Clara Mitchell, SSEN • Lyndsey Stainton, SSEN • Barra & Vatersay Community Ltd • CALA Homes • Cherwell District Council • Dummer Parish Council • Eneida.io • GAP Group GAP Plant and Tool Hire • Grid Edge Policy • Hitachi Energy • IQA • J MacMillan and Son Savills 	<ul style="list-style-type: none"> • LSTC • Maritime and Coastguard Agency MCA • Natural England • NatureScot • Portsmouth Water • Project Seagrass • Scottish Government • Seawilding • SSEN CEG • Success Connections • SWLEP • University of Abertay • Utility Results • West Sussex County Council

APPENDIX 2: WORKSHOP FEEDBACK

After the workshop, stakeholders were asked to complete a short feedback form. The feedback was as follows.

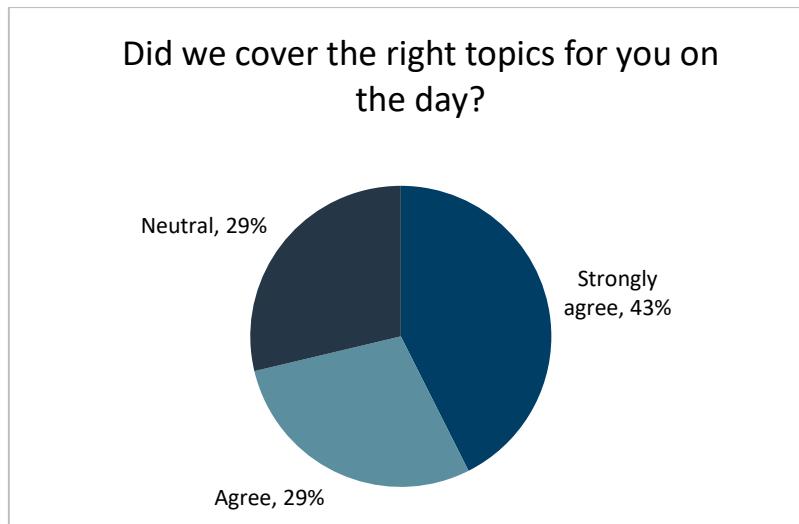
1. Overall, did you find this workshop to be:



Comments:

- “I really appreciated being brought into the conversation and hearing everyone's viewpoints.”
- “Not my field of work but an interesting insight into the sustainability plans of the company.”
- “I found the discussions during the SSEN draft determination workshop held on the 27th of July 2022 via the MS Team to be very engaging and interesting. The staff of SSEN that spoke during the event were quite insightful and transparent in communicating the implication of Ofgem's decisions on the attainment of the DNO's SBT in its Net Zero drive regarding the disallowed items of the proposed business plan in its EAP.”

2. Did we cover the right topics for you on the day?



Comments:

- “My subjects of interest were adequately covered by the various speakers through the PowerPoint presentations and the workshop materials supplied.”

3. What did you think of the way the workshop was chaired by your facilitator?



Comments:

- “The facilitator (James Garland) that chaired the workshop was quite a pleasant communicator, he handled the forum professionally and constructively. He created an atmosphere that encouraged inputs from across the range of the stakeholders present.”
- “Good opportunity for everyone to contribute.”
- “Included everyone and made the best of a quiet group.”
- “Excellent.”

4. Do you have any other comments?

- “Thanks for this. I'm new to energy and I learned a lot attending this event.”
 - “The introduction could have been a little clearer. There was heavy use of jargon which I may have heard before but don't use every day. It made comprehension of that session hard work.”
 - “I'd like to see more stakeholders' education and awareness of the issues at stake during the determination process of RIIO-ED2. This is especially on the implications of the disallowance in the Business Plan proposal to replace the fluid-filled cables to eliminate the risk of leakages.”
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