

RIIO-ED2 Engineering Justification Paper (EJP)

Embodied Carbon

Investment Reference No: 13/SSEPD/ENV/CARBON



Contents

1	Executive Summary	3
2	Summary Table	3
3	Introduction to Embodied Carbon	3
3.1	Background to Investment, Investment Drivers, Reasons for the Timing and Expected Outputs	4
4	Background Information	4
4.1	Embodied Carbon.....	4
4.2	Licence Obligations and Environmental Action Plan Minimum Requirements	5
4.3	Stakeholder Engagement Feedback.....	6
4.4	Assets Applicable and Methodology.....	7
5	Optioneering – Investment Under Consideration	9
5.1	Option 1. Do nothing.....	9
6	Analysis and Cost	9
7	Deliverability & Risk	10
8	Conclusion	11

1 Executive Summary

Our **Environmental Action Plan (EAP) (Annex 13)**.1 sets out our methodology that we propose to undertake during the RIIO-ED2 period in response to increasingly ambitious environmental drivers and stakeholder expectations. As part of our EAP, we set out our commitment to Embodied Carbon.

This paper sets out our plans for the creation and implementation of a tool to calculate our embodied carbon from manufacture to installation for projects which commence in ED2 and beyond. The primary driver for this scheme is Environmental.

Following optioneering and detailed analysis, as set out in this paper, the proposed scope of works are:

- Creation and implementation of embodied carbon tool for use in SSEN

The cost to deliver the preferred solution is £0.2m and the works are planned to be completed over the course of ED2.

This scheme delivers the following outputs and benefits:

- Achieve a 5-10% reduction in embodied carbon by 2033

2 Summary Table

Name of Scheme/Programme	Embodied Carbon			
Primary Investment Driver	Environmental – Key objectives include: <ul style="list-style-type: none"> • Achieving a 5-10% reduction in embodied carbon in 2033 			
Scheme reference / mechanism or category	13/SSEPD/ENV/CARBON			
Output reference / type	Embodied Carbon			
Cost	£0.2m SHEPD & SEPD			
Delivery Year	RIIO-ED2 (2024 – 2028)			
Reporting Table	Business Plan Data Tables <ul style="list-style-type: none"> • C4 - IT 			
Outputs in RIIO-ED1 Business Plan?	N/A			
Cost	£0.2m			
Spend Apportionment	Licenced Area	ED1 (£m)	ED2 (£m)	ED3+ (£m)
	SHEPD/SEPD	-	£0.2m	-

3 Introduction to Embodied Carbon

This section provides a high-level overview of the key areas discussed in the paper.

3.1 Background to Investment, Investment Drivers, Reasons for the Timing and Expected Outputs

This Engineering Justification Paper (EJP) examines the development of an embodied carbon reporting tool for projects which commence in RIIO-ED2 and beyond. The development of a tool to calculate and report the embodied carbon of our products and services will help to identify the embodied carbon footprint within the supply chain, enabling benchmarking and opportunities to reduce it. Reduction in embodied carbon is required to help us meet our Environmental Action Plan commitments and Science Based Targets (SBT), whilst also delivering stakeholder desires of taking actions to accelerate Net Zero. We need to act now to enable the embodied carbon reporting tool to become embedded within their processes and allow time for supply chain training and upskilling. The output at the end of ED2 will be the provision of accurate embodied carbon data within our supply chain, to enable reduction opportunities to be identified and undertaken.

4 Background Information

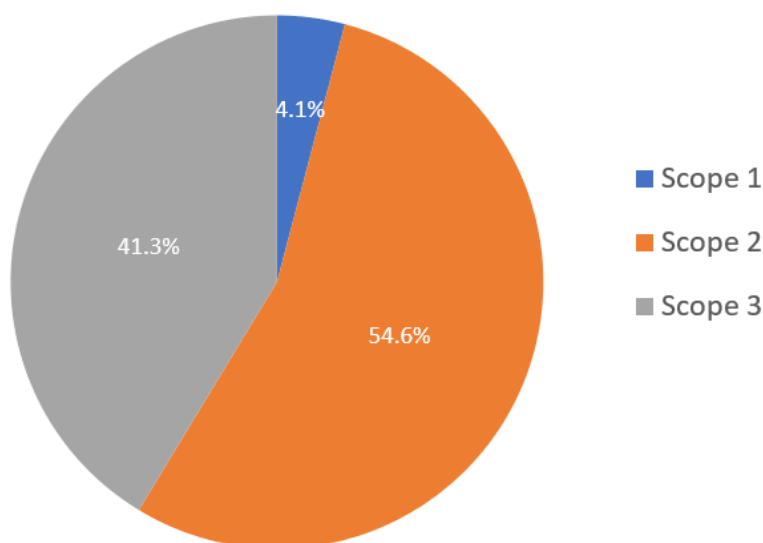
The section provides a background to the strategy. It describes the definition of embodied carbon, our embodied carbon footprint, an overview of the proposed embodied carbon reporting tool and targeted assets, as well as detailing the investment drivers for this intervention.

4.1 Embodied Carbon

Embodied carbon represents the Greenhouse Gas (GHG) emissions associated with materials and construction processes throughout the whole life cycle of an asset. It is included as a Scope 3 GHG emission in Category 1: 'Purchased Goods and Services' of the GHG Protocol, which includes an organisation's upstream (i.e. cradle-to-gate) emissions from the production of products purchased or acquired by the reporting company.

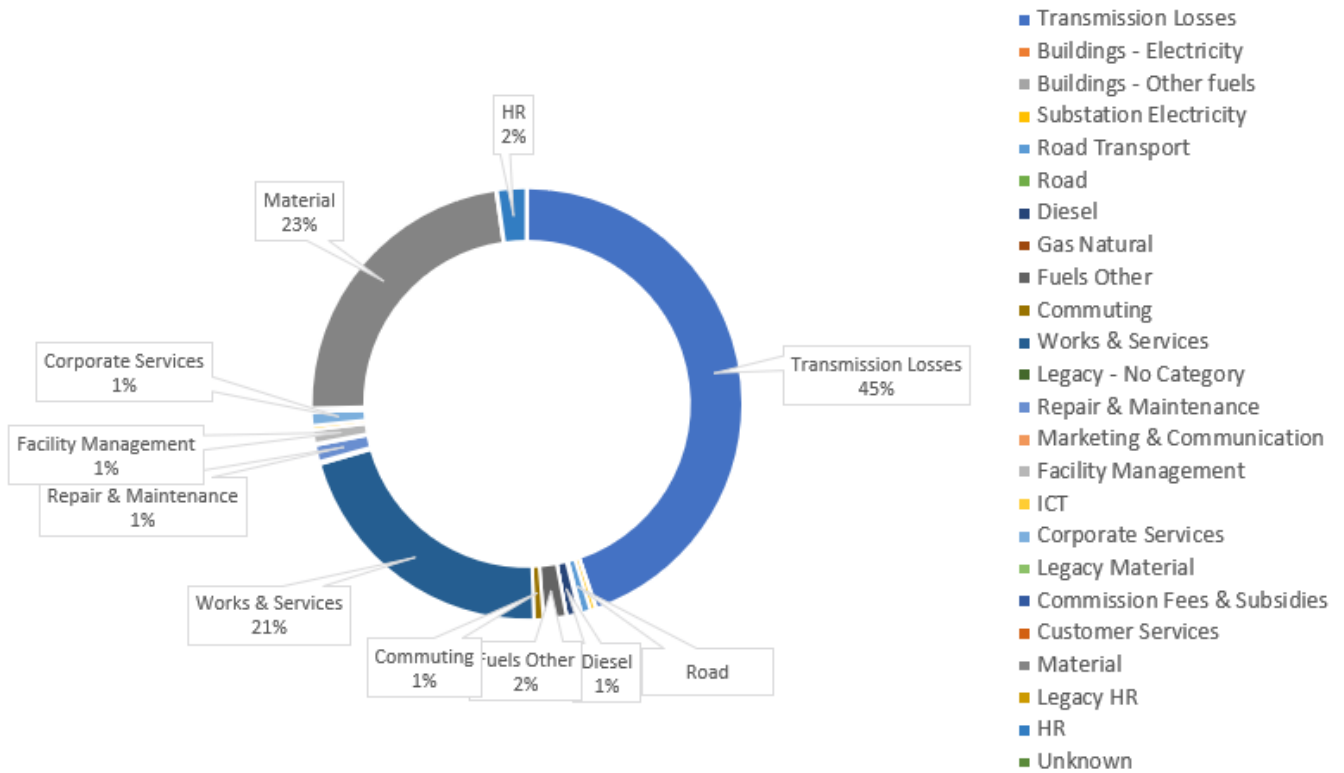
Figure 1 shows a breakdown of our emission sources by scope and suggests that more than 40% of emissions originate from Scope 3.

Figure 1 – breakdown of SSEN's emissions sources by scope



The embodied carbon of our products and services is represented by ‘Material’ and ‘Works & Service’ within Figure 2, which account for 32% and 21% of Scope 3 emissions respectively.

Figure 2 – SSEN’s Scope 3 emissions breakdown into categories



‘Material’ category data includes GHG emissions from major elements that constitute material such as substation materials, cabling materials, other miscellaneous equipment, pipes, fittings, and parts. ‘Works & Service’ category data includes GHG emissions from construction, works including substations works, OHL works and installations, and fencing.

We currently do not have a reporting tool to calculate embodied carbon, yet this research suggests embodied carbon accounts for over 50% of our Scope 3 emissions. It is crucial therefore to accurately assess embodied carbon for our products and services in order to enable a reduction in embodied carbon – and consequently Scope 3 emissions – to be achieved.

As discussed in latter sections in the EJP, we have committed to calculating our embodied carbon from manufacture to implementation for projects which commence in ED2 and beyond. We will also aim to achieve a 5-10% reduction in Embodied Carbon by 2033.

4.2 Licence Obligations and Environmental Action Plan Minimum Requirements

Ofgem have introduced a requirement for Distribution Network Operators (DNO) to submit an Environmental Action Plan which includes minimum requirements to ensure they contribute to decarbonising the energy

system and reduce the impact of network activity on the environment. As such, we are committed to calculating our embodied carbon from manufacture to implementation for projects which commence in ED2 and beyond and to set an ambitious reduction target for embodied carbon by 2033. We will commit to:

- Monitoring and reporting on embodied carbon in new projects
- Collaborating with DNO's supply chain on addressing challenges to reduce embodied carbon in the network
- Establishing baseline and a target to reduce embodied carbon to new projects during RIIO-ED2.

Our EAP also includes Science Based Targets which help meet our registered commitment with the Science Based Targets Initiative (SBTi). SSEN Distribution are the first UK DNO to commit to setting Science Based Targets (SBT's) in line with a 1.5°C pathway. The targets are in line with the level of decarbonisation required to meet the most ambitious goal of the Paris Agreement – to limit global warming to 1.5°C above pre-industrial levels.

Verified by the SBTi, we're cutting emissions further and faster by:

- Committing to reduce our combined Scope 1 and 2 emissions by 55% by 2033 from a 2020 baseline
- Setting a voluntary target and committing to working closely with our supply chain so that 35% of our suppliers will set science-based targets by 2026.

4.3 Stakeholder Engagement Feedback

In preparation of our RIIO-ED2 business plans several stakeholder engagement exercises have been undertaken to better understand what will be important to our network customers during RIIO-ED2 and to ensure the views of stakeholders are reflected in the cost and volumes proposed.

We have undertaken the following stakeholder events. In total there were 193 attendees with a range of representation from customers, utility companies, developers, environmental representatives, charities and town councils. During the events the following subjects were put to our stakeholders. A summary of the key feedback that was gathered from the stakeholder engagement exercises is presented with the full report available.

Stakeholder Event	Date	Relevant Topics	# Stakeholders 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

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

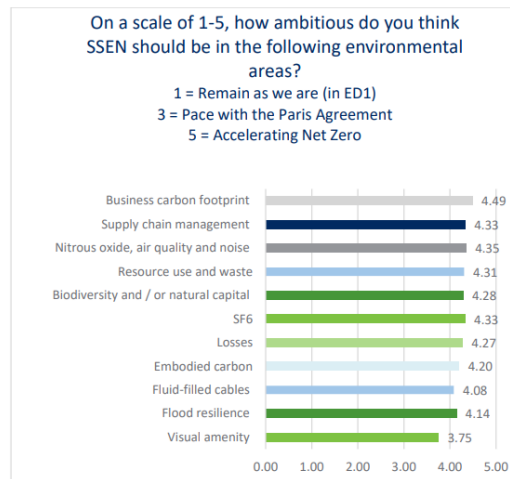
Stakeholder Feedback: In both Scotland and England, stakeholders wanted us to be as ambitious as possible with its sustainability strategy and net zero targets. This was reflected in the electronic voting, where 93% opted for either 'accelerating net zero' or 'achieving net zero'. In both licence areas, 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 us 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.

The use of an embodied carbon reporting tool will help us capture key data and therefore contribute to reducing GHG emissions and our overall reduction strategy. This will assist in meeting stakeholder desires of taking actions to accelerate Net Zero.

Subject 2: SSEN’s Environmental Action Plan

Stakeholder Feedback: During the electronic voting, stakeholders were asked how ambitious we should be regarding each area of its Environmental Action Plan. 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. Stakeholders wanted us to be most ambitious 16 regarding ‘business carbon footprint’, which was ranked highest at both the northern Scotland and central southern England workshops.



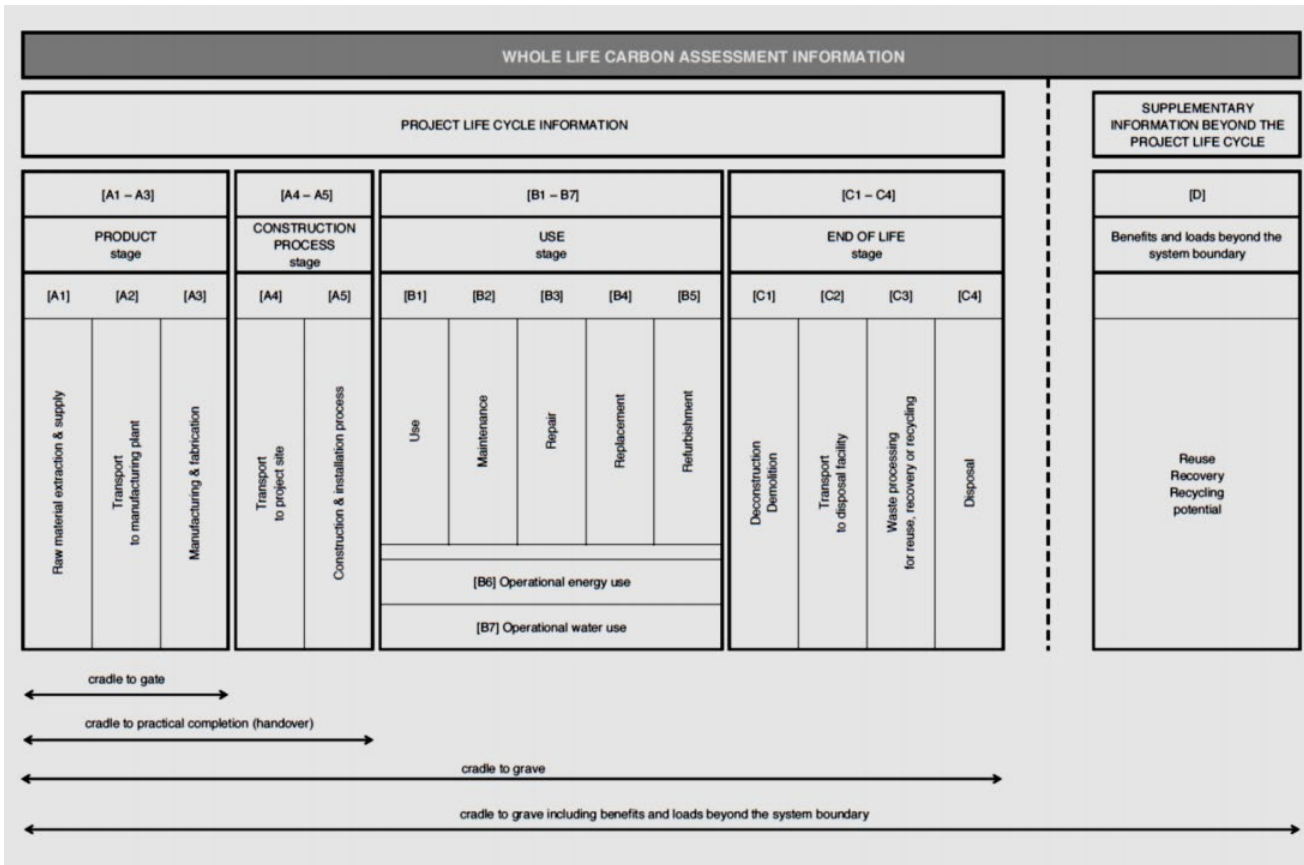
Given carbon footprint is ranked highest, we are looking to undertaken measures to address this top priority area and taking actions to reduce embodied carbon will do this.

4.4 Assets Applicable and Methodology

In the UK, the framework for appraising the environmental impacts of the built environment is provided by BS EN 15978: 2011: (Sustainability of construction works — Assessment of environmental performance of buildings — Calculation method). It sets out the principles and calculation method for whole life assessment of the environmental impacts from built projects based on life-cycle assessment. BS EN 15978 sets out four stages in the life of a typical project described as life-cycle modules (See Figure 3):

- Module A1 – A5 (Product sourcing and construction stage)
- Module B1 – B7 (Use stage)
- Module C1 – C4 (End of life stage)
- Module D (Benefits and loads beyond the system boundary)

Figure 3 – Life-cycle modules (BS EN 15978)



We will capture embodied carbon for the following assets from Modules A1 – A5: i.e. the GHG emissions from ‘cradle to practical completion (handover)’.

- Electrical Assets GHG emissions (A1-A3)
- Civil Assets GHG emissions (A1-A3)
- Transportation GHG emissions (A4)
- Construction & Installation GHG emissions (A5)

An embodied carbon reporting tool has been developed to capture and report embodied carbon data from our supply chain. In order to address potential variability in data quality and maturity, this tool proposes to use agreed levels of emission factors, all based on common datasets and representing different stages of data maturity, to enable common reporting. Data quality is likely to improve as the use of the tool becomes embedded within supply chain processes and once training and upskilling in embodied carbon has taken place, suggesting that data quality will continuously improve throughout the ED2 reporting period.

Embodied Carbon Data Maturity Hierarchy listed below (high – low) provides an overview of the data maturity approach we will employ to capturing data for use:

- 1) Supplier-specific data – where embodied carbon data in line with recognised standards is provided for a product or service – e.g. an Environmental Product Declarations (EPD) – this will be utilised within the Embodied Carbon reporting tool.
- 2) Generic developed data – the Embodied Carbon reporting tool will embed recognised industry standards – such as Inventory of Carbon and Energy (ICE) values or Department for Business,

Energy and Industrial Strategy (BEIS) Government emissions conversion factors for GHG company reporting – to assign GHG emission factors for a product or service.

- 3) 'Building block' data – Where specific product data is not available, assumptions will be made on the constituent parts of the product in order to build up a representative embodied carbon figure. This option is likely to be used at earlier design stages when granular detail about specific types of assets is not available.
- 4) Representative data – where the only data available for an asset is cost, then a representative factor will be utilised.

5 Optioneering – Investment Under Consideration

5.1 Option 1. Do nothing

No method is developed for calculating embodied carbon within the supply chain, so we would not have the process in place to accurately calculate its embodied carbon nor calculate the reduction in embodied carbon from mitigation measures taken. Consequently, we would be unable to achieve its commitment within our Environmental Action Plan.

Option 1 is not viable.

As option 1 is not viable, we would recommend proceeding with the use of the Embodied Carbon tool.

6 Analysis and Cost

Table 1 – costs for using Embodied Carbon Reporting tool

Embodied Carbon Reporting Tool	ED1 Costs	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Use of embodied carbon tool (£m)	£ -	£ 0.04	£ 0.04	£ 0.04	£ 0.04	£ 0.04	£ 0.2

Table 1 shows the costs associated with the use of the Embodied Carbon Reporting tool, which includes annual license fee and support package.

Our draft RIIO-ED2 Business Plan costs are derived from our outturn RIIO-ED1 expenditure. We have modified costs per activity, capturing and reporting those adjustments in our cost-book. By tying our costs back to reported, outturn, real life data this approach provides multiple data points on which both the Regulator and we can benchmark cost efficiency. It provides a high level of cost confidence in our Business Plan cost forecast for RIIO-ED2.

Through our benchmarking analysis, we recognised that not all Non-Load related RIIO-ED1 actual unit costs sit within the upper quartile efficiency band. Where this is the case, we have applied a catch-up efficiency to those cost categories. Further detail on our unit cost approach, cost efficiency and cost confidence for RIIO-ED2 can be found within our **Cost & Efficiency (Annex 15.1)**.

We expect that as our Business Plan continues to develop, project scopes and costs will be refined, especially with valuable stakeholder feedback on our draft proposals. In our final Business Plan submission in

December our cost forecasts will contain that refinement and the changes captured within our supporting Plan documentation. Development of our Commercial Strategy is expected to drive much of this refinement

7 Deliverability & Risk

Our *Ensuring Deliverability and a Resilient Workforce (Chapter 16)* of our business plan it describes our approach to evidencing the deliverability of our overall plan as a package, and its individual components. Testing of our EJPs has prioritised assessment of efficiency and capacity, and this has ensured that we can demonstrate a credible plan to move from SSEN's ED1 performance to our target ED2 efficiency. We have also demonstrated that SSEN's in house and contractor options can, or will through investment or managed change, provide the capacity and skills at the right time, in the right locations. This assessment has been part of the regular assessment of our EJPs, IDPs and BPDTs, and we will further refine our bottom up efficiencies and work plan phasing for our final submission in December through the ongoing development of our ED2 Commercial & Deliverability Strategy and engagement with our supply chain.

Our deliverability testing has identified a major strategic opportunity which is relevant to all EJPs.

- In ED2 SSEN will change the way Capital Expenditure is delivered, maximising synergies within the network to minimise disruptions for our customers. This is particularly relevant for a Price Control period where volumes of work are increasing across all work types.
- The principle is to develop and deliver Programmes of work, manage risk and complexity at Programme level and to develop strategic relationships with our Suppliers and Partners to enable efficiency realisation.
- The Commercial strategy will explore the creation of Work Banks (WB) and identify key constraints. The Load work will be the primary driver for a WB, supplemented by Non-Load work at a given Primary Substation. This approach will capitalise on synergies between the Load and Non-Load work, whereby the associated downstream work from a Primary Substation will maximise outage utilisation, enabling the programme to touch the network in a controlled manner with the objective of touching the network once. Where there is no Primary Load scheme to support the Non-Load work, these will be considered and packaged separately, either insourced or outsourced dependant on volume, size and complexity.
- Transparency with the Supplier in terms of constraints, challenges, outage planning and engineering standards will capitalise on efficiencies, supported by a robust contracting strategy.

The specific considerations for deliverability based on the scope of this EJP are detailed below:

- Training
- location including access issues and civils
- supply chain
- Work phasing and project interdependencies
- System interfaces for controls, Network operation and SCADA

The initial review of our breakdown emission sources by scope suggest more than 40% of emissions originate from Scope 3. However, a more detailed screening is needed to quantify these emissions more accurately; further data collation and analysis would provide a more accurate baseline from which to assess embodied carbon targets and opportunities.

The quality of data is likely to improve once supply chain embodied carbon knowledge and capabilities mature. In order to address potential variability in data quality and maturity, this tool proposes to use agreed levels of emission factors, all based on common datasets and representing different stages of data maturity,

to enable common reporting. In addition, we will engage with the principal / tier one suppliers to assist in upskilling their partners and provide them with the capabilities to provide accurate and reliable embodied carbon data for use in the tool.

8 Conclusion

The purpose of this Engineering Justification Paper (EJP) has been to describe the overarching investment strategy for the development and use of an embodied carbon reporting tool for projects which commence in ED2-RIIO and beyond. This will help us to identify the embodied carbon footprint within our supply chain, enabling benchmarking and highlighting opportunities for future reductions in line with business ambitions and baseline data. The drivers for using this tool are set out below:

- Compliance with Environmental Action Plan commitments to:
 - Monitor and report on embodied carbon in new projects,
 - Collaborate with SSEN's supply chain on addressing challenges to reduce embodied carbon in the network,
 - Establishing baseline and a target to reduce embodied carbon to new projects during RIIO-ED2.
- Delivering our Science Based Targets requirements.
- Delivering stakeholder desires of taking actions to accelerate net zero.

We need to plan the implementation of the tool aligned to the wider sustainability strategy and associated sustainable procurement model that is currently in development and incorporates direct supply chain engagement.

The total ED2 investment for operating the reporting tool are £0.2m, which will be applied to both SEPD and SHEPD operations.