East Pye Solar

Environmental Statement

Volume 1: Chapter 6 – Climate Change

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6.1 Introduction

6.1.1 This chapter of the Environmental Statement (ES) presents the findings of the Environmental Impact Assessment (EIA) of effects on Climate Change as a result of the Scheme.

6.1.2 This chapter identifies and proposes measures to address the potential impacts and likely significant effects on Climate Change, during the construction, operation and maintenance, and decommissioning phases.

6.1.3 The information presented within this chapter has been informed by the Scheme information provided in **ES: Chapter 4 The Scheme [EN0110014/APP/6.1.4]**.

6.1.4 This Chapter has been prepared by appropriately qualified experts. For further details, refer to **ES: Appendix 1.2 Statement of Expertise [EN0110014/APP/6.3.1.2].**

6.1.5 A glossary of abbreviations can be found in **ES: Chapter 0 Contents, Glossary and Abbreviations [EN0110014/APP/6.1.0].**

6.2 Consultation

Scoping Opinion

6.2.1 The Scheme has been subject to consultation throughout the Development Consent Order (DCO) pre-application period. A request for an EIA Scoping Opinion was sought from the Secretary of State (SoS) through the Planning Inspectorate (PINS) in January 2025. An **EIA Scoping Opinion [EN00110014/APP/6.3.2.2]** was adopted by PINS in February 2025, on behalf of the Secretary of State pursuant to Regulation 10 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

6.2.2 The issues raised in the Scoping Opinion relating to Climate Change are summarised and responded to within **Table 6.1** which demonstrates how the matters raised in the Scoping Opinion are addressed in this ES.

6.2.3 The following aspects have been considered within the Climate Change assessment process:

- Lifecycle Greenhouse Gas (GHG) Impact Assessment: the impact of the Scheme considering all embodied carbon GHG emissions associated with the products used over the Scheme's entire lifecycle and all GHG emissions resulting from the Construction, Operation and Decommissioning phase activities.

- Climate Change Risk and Resilience: the resilience of the Scheme to climate change risks; and,
- In-Combination Climate Impacts (ICCI) Assessment: considering combined effects from other environmental disciplines contributing to climate change, their interactions and cumulative impact on the environment.

6.2.4 It is acknowledged that the EIA Scoping Opinion formally scoped out the Climate Change Risk and Resilience Assessment and ICCI Assessment. However, an assessment of Climate Change Risk and Resilience has been included in the ES to accommodate for the PINS request outlining that the ES should explain 'how the proposed development has been designed to be resilient to climate change'. An ICCI summary has also been included to provide a high level overview of in combination effects with related disciplines.

Table 6.1: Relevant Scoping Opinion Comments from Statutory Bodies relating to Climate Change

Consultee and Date	Comment and Scoping Opinion ID No.	How has the comment been addressed in the ES chapter	Location of response in ES Chapter
The Planning Inspectorate, Scoping Opinion, February 2025	ID 3.19.1 Paragraphs 12.8.3 and 12.8.4 and Table 12.3 Greenhouse Gases (GHG) emissions during decommissioning '*The Scoping Report proposes to scope out an assessment of the GHG emissions during decommissioning phase on the basis that the emissions in terms of vehicle fuel use are anticipated to be similar to that identified at the construction stage and the future uncertainties. In the absence of further detail, the Inspectorate cannot agree to scope this matter out at this time. The Inspectorate would expect potential GHG emissions during decommissioning to be characterised within the ES and an assessment of impacts provided where there is the potential for likely significant effects to occur.'*	A preliminary assessment of the potential GHG emissions during decommissioning is provided in **Section 6.5**. Detailed GHG emissions calculations are included within the ES Chapter, so this has been scoped in at PINS' request.	**Section 6.9**– Decommissioning Phase
The Planning Inspectorate, Scoping Opinion, February 2025	ID 3.19.2 Paragraphs 12.8.5 to 12.8.12 and Table 12.3 Climate Change Risk Assessment (CCRA) at all phases *'The Scoping Report proposes to scope out an assessment of CCRA at all phases on the basis that the risk of climate hazards will be managed through CEMP during construction phase and mitigation will be provided through embedded infrastructure design and application of general health and safety practices. The Inspectorate notes that the potential effect of flooding will be assessed within the Flood Risk Assessment to be submitted with the application. The Inspectorate is*	The Applicant notes the response and that a CCRA has been agreed to be scoped out of the ES. To accommodate the request stating that the **'**ES should explain how the proposed development has been designed to be resilient to climate change', it is considered more helpful to include this assessment within the scope of this ES chapter. The ES provides an explanation of how the Scheme has been designed to increase resilience to climate change risks	**Sections 6.9.140** onwards

Consultee and Date	Comment and Scoping Opinion ID No.	How has the comment been addressed in the ES chapter	Location of response in ES Chapter
	content with this approach. However, the ES should explain how the proposed development has been designed to be resilient to climate change risks. The Applicant's attention is drawn to the comments from the Natural England (Appendix 2 of this Opinion) regarding how the Proposed Development may exacerbate climate change impacts to the natural environment.'	alongside **ES: Chapter 4 The Scheme [EN011014/APP/6.1.4]** by incorporating the CCRA to accommodate the request stating **'**ES should explain how the proposed development has been designed to be resilient to climate change'**.** Paragraphs 6.8.4 to 6.8.15 and Para 6.10 onwards in ES Chapter 6 refer to embedded and additional Climate Change mitigation. The findings of the Flood Risk assessment are included in **ES: Appendix 9.1 Flood Risk Assessment**	
The Planning Inspectorate, Scoping Opinion, February 2025	ID 3.19.3 Paragraph 12.8.13 and Table 12.3 In-combination effects *'The Scoping Report proposes to scope out an in-combination climate change impact assessment from the climate chapter of the ES on the basis that climate change impacts relevant to the proposed development will be assessed through the other relevant topics of the ES. Given that climate change impacts relevant to the proposed development will be assessed through the other relevant topics of the ES, the Inspectorate agrees to scope out an in-combination climate change impact assessment from the climate change chapter. The climate change chapter should signpost where in the ES the relevant climate change factors have been assessed.'*	The Applicant notes the response, and that in-combination effects can be scoped out of the ES Climate Change Chapter. In-combination effects are considered in **ES: Chapter 19 In-Combination Effects Assessment [EN0110014/APP/6.1.19]** where climate change factors have been assessed. This Climate Changes ES Chapter signposts where climate change factors have been assessed as well as consideration of the in-combination climate change impacts through high level summary with related disciplines to explain how identified receptors in the surrounding environment are affected by the Scheme in	**Sections 6.12.3** onwards

Consultee and Date	Comment and Scoping Opinion ID No.	How has the comment been addressed in the ES chapter	Location of response in ES Chapter
		combination with future climate change conditions.	
The Planning Inspectorate, Scoping Opinion, February 2025	ID 3.19.4 Paragraphs 12.8.14 and 12.8.15 Cumulative effects *'The Inspectorate does not agree to scope this matter out. The ES should consider how other developments cumulatively may affect the vulnerability of the proposed development to climate change e.g. any changes in flood flows, and cumulative GHG emissions/ savings. The Applicant should seek to agree the approach to the climate change cumulative effects assessment with relevant consultation bodies.'*	**ES: Appendix 9.1 Flood Risk Assessment & Outline Surface Water Strategy [EN0110014/APP/6.3.9.1]** provides detail of any changes in flood flows as a result of climate change with consideration to other developments. Cumulative GHG emissions are considered inherently as part of the assessment as per ISEP guidance. The approach to the cumulative assessment is provided in **Section 6.9** of the PEIR. The climate change ES chapter includes a cumulative effects assessment as requested by PINS.	**Section 6.12**
Alburgh Parish Council, Scoping Opinion, February 2025	No Scoping Opinion ID Provided. *'Climate change adaptation should be scoped in as well as the overall carbon footprint of the project.'*	Climate change adaption has been considered in this assessment and detailed GHG emissions calculations included within this ES Chapter.	**Sections 6.9.140** onwards for Climate Change Adaptation and **Section 6.9.1** for GHG emissions.
Natural England, Scoping Opinion, February 2025	Annex A – 11.4 *'The ES should make clear the project's contribution to […] climate change resilience.'*	The ES chapter considers the project relative to climate change resilience.	**Sections 6.9.140** onwards
Natural England, Scoping Opinion, February 2025	Annex A – 17.1 *'The ES should identify how the development affects the ability of the natural environment (including habitats, species, and natural processes) to adapt to climate change, including its ability to provide adaptation for people. This should include impacts on the vulnerability*	Discussion of impact of climate change on sensitive habitats is included within this chapter.	**Sections 6.12.3** onwards

Consultee and Date	Comment and Scoping Opinion ID No.	How has the comment been addressed in the ES chapter	Location of response in ES Chapter
	or resilience of a natural feature (i.e. what's already there and affected) as well as impacts on how the environment can accommodate change for both nature and people.'		
Natural England, Scoping Opinion, February 2025	Annex A – 17.2 *'Part 2 of EN-1 covers the government's energy and climate change strategy, including policies for mitigating climate change. Section 4.10 sets out generic considerations that applicants and the Secretary of State should take into account to help ensure that energy infrastructure is safe and resilient to climate change. This section further advises that the resilience of the project to climate change should be assessed in the ES accompanying an application.'*	Climate Change Resilience is considered within this ES chapter.	**Sections 6.9.140** onwards
Natural England, Scoping Opinion, February 2025	Annex A – 17.3 *'In preparing measures to support climate change adaptation applicants should take reasonable steps to maximise the use of Nature-based Solutions alongside other conventional techniques (4.10.5);* *Applicants should look for opportunities within the proposed development to embed nature-based or technological solutions to mitigate or offset the emissions of construction and decommissioning (5.3.6);'*	The assessment considers the total GHG emissions and includes discussion on the positive effect of using BESS technology in effectively pairing with Solar energy generation. The majority of the Site is expected to be sown to grassland and managed, this includes the potential for sheep grazing during the operational phase. As sheep are natural grazers, this makes for an effective alternative to manual, chemical, or mechanical vegetation control. Sheep grazing controls the land without the associated carbon emissions of regular maintenance Nature based solutions have also	**Sections 6.9.140** onwards

Consultee and Date	Comment and Scoping Opinion ID No.	How has the comment been addressed in the ES chapter	Location of response in ES Chapter
		been considered to mitigate and/or offset the emissions of Scheme Construction and Decommission phases, through use of permeable surfaces instead of impermeable surfaces for access tracks as discussed in Paragraphs 6.8.8 and 6.8.9.	
Natural England, Scoping Response, February 2025	No Scoping Response ID Provided. '*The ES should identify how the development affects the ability of the natural environment (including habitats, species and natural processes) to adapt to climate change, including its ability to provide adaptation for people. This should include impacts on the vulnerability or resilience of a natural feature (i.e. what's already there and affected) as well as impacts on how the environment can accommodate change for both nature and people.'*	As noted in **Paragraph 12.8.13** and **Table 12.3** of the **ES: Appendix 2.2 EIA Scoping Opinion [EN0110014/APP6.3.2.2]**, PINS has accepted that climate change adaptation is to be scoped out of the assessment. However, a full assessment has been provided in the ES to provide a high level overview of in combination effects with related disciplines.	**Sections 6.9.140** onwards
Shotesham Parish Council, Scoping Opinion, February 2025	**Section 6.6** (PINS Reference: EN0110014) *'The Parish Council is concerned about the potential for climate change to lead to increased risks from extreme wind and precipitation, adding to the flood risk posed by this proposal. Extreme weather may also limit the ability of emergency services to respond to any incidents. We believe that a Climate Change Risk Assessment from construction to decommissioning should be in scope. We also note that East Pye proposes to limit the scope of the Greenhouse Gas Assessment. We consider that the GHG assessment must include the full lifetime of the scheme from offsite mining and construction activities through to eventual decommissioning.'*	The Inspectorate (ID 3.19.2, Paragraphs 12.8.5 to 12.8.12 and Table 12.3) is content with the approach to scope out an assessment of CCRA at all phases on the basis that the risk of climate hazards will be managed and secured through the Outline CEMP during the Construction Phase and mitigation will be provided through embedded infrastructure design and application of general health and safety practices.	**Outline CEMP [EN0110014/APP/7.1]**
Forestry Commission, Scoping Response,	No Scoping Response ID Provided. '*The species and provenance of new trees and*	Climate resilience of species and new trees and woodland is considered in **ES: Chapter 8**	**ES: Chapter 8 Ecology and Biodiversity [EN0110014/APP/6.1.8]**

Consultee and Date	Comment and Scoping Opinion ID No.	How has the comment been addressed in the ES chapter	Location of response in ES Chapter
February 2025	*woodland needs to be considered to ensure a resilient treescape which can cope with the full implications of a changing climate.'*	**Ecology and Biodiversity [EN0110014/APP/6.1.8].**	
Suffolk County Council and Mid Suffolk District Council, Scoping Response, February 2025	No Scoping Response ID Provided. *'The Councils consider it essential that the promoter's assessment of cumulative impacts includes all reasonably foreseeable projects.'*	Cumulative effects have been discussed in **Section 6.11** within this ES chapter, to satisfy the Council's comment.	Section 6.12

Statutory Consultation and Preliminary Environmental Information Report (PEIR)

6.2.5 Statutory consultation was held between 18th June 2025, and 6th August 2025. Relevant responses to the PEIR relating to air quality and how these have been addressed through the ES are set out within **Consultation Report Appendix 10 Section 47 Applicant Response Table [EN0110041. 5.11]** and **Consultation Report Appendix 11 Section 42 Applicant Response Table [EN0110041.5.12].**

6.2.6 Further engagement specific to Climate Change was not considered to be required following the consultation detailed above.

Targeted Consultation

6.2.7 A further round of targeted consultation was undertaken between 22nd October 2025 and 26th November 2025 following changes to the development boundary area of the Scheme presented in the PEIR and during Stage Two Statutory Consultation. All the changes are documented in full in the **Consultation Report [EN0110014/APP/5.1].** These changes did not give rise to any materially new or different likely significant environmental effects compared to those reported in the PEIR. How these have been addressed through the ES are set out within **Consultation Report Appendix 10 Section 47 Applicant Response Table [EN0110014/APP/5.11]** and **Consultation Report Appendix 11 Section 42 Applicant Response Table [EN0110014/APP/5.12].**

6.3 Legislation, Planning Policy and Guidance

6.3.1 A summary of applicable legislation, planning policy and other guidance documents against which the Scheme has been considered relating to Climate Change is set out in **ES Appendix 2.3: Legislation, Planning Policy and Guidance [EN0110014/APP/6.3.2.3]**

6.3.2 An overview of the legislation, planning policy and guidance against which the Scheme has been considered for the Climate Change assessment is set out below.

6.3.3 In addition, the **ES Appendix 7.11: Statement of Need [EN0110014/APP/7.11]** is an accompanying document that demonstrates further compliance of the Scheme with the aforementioned legislation and policies.

International Agreements

6.3.4 The following international agreements are of relevant to this chapter:

- The Kyoto Protocol (Ref 6-1) is a United Nations international treaty adopted in 1997 under the United Nations Framework Convention on Climate Change (UNFCCC).
- The 2015 Paris Agreement (Ref 6-2) declared a long-term temperature target to strengthen the global response to the threat of climate change. This target is to keep a global temperature rise this century *'well below 2 degrees Celsius above pre-industrial levels and to limit the temperature increase even further to 1.5 degrees Celsius'* (the '1.5 Degrees Target').
- The Glasgow Climate Pact (Ref 6-3), adopted at the 2021 United Nations Climate Change Conference (COP26) in Glasgow, Scotland
- The Sharm El-Sheikh Implementation Plan (Ref 6-4), adopted at the 2022 United Nations Climate Change Conference (COP27) in Sharm El-Sheikh, Egypt reaffirmed the goal of the Paris Agreement.

UN Climate Change Conferences (COP)

6.3.5 The COP summits bring parties together to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change (UNFCCC). This includes:

- COP26 (2021). The UK, along with other Nations, adopted the Glasgow Climate Pact (Ref 6-3) at COP26 in November 2021.
- COP27 was held in Sharm el Sheikh, Egypt in November 2022.
- COP29 (2024) took place in Baku, Azerbaijan in November 2024.
- COP30 (2025) took place in Belém, Brazil in November 2025.

UK Legislation and Regulations

6.3.6 The following UK legislation and regulations are of relevant to this chapter:

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

6.3.7 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref 6-5), notably Schedule 4, sections 4 and 5.

Climate Change Act 2008 and 2050 Target Amendment Order 2019

6.3.8 The Climate Change Act (CCA) 2008 (Ref 6-6) established the context for UK Government action on climate change, providing a legally binding framework for the UK to reduce GHG emissions and develop the UK's ability to adapt to climate change. In 2019, the CCA 2008 was amended (Ref 6-7) to include a revision of the previous aim of 80% reduction of GHG emissions compared to 1990 levels by

2050. The CCA 2008 now mandates a net zero target by 2050: '*The net UK carbon account for the year 2050 is at least 100% lower than the 1990 baseline*.'

6.3.9 To reach net zero carbon emissions, the UK Government has set legally binding carbon budgets, capping the amount of GHG emitted in the UK over a 5-year period.

Carbon Budget Order (2009), Carbon Budget Order (2011), Carbon Budget Order (2016), and Carbon Budget Order (2021)

6.3.10 Established under the Climate Change Act 2008, Carbon Budget Orders (CBOs) (2009) (Ref 6-8), Carbon Budget Orders (2011) (Ref 6-9), Carbon Budget Orders (2016) (Ref 6-10) and Carbon Budget Orders (CBOs) (2021) (Ref 6-11) set legally binding limits on the total amount of GHGs the UK can emit over a five-year period, called budgetary periods, towards the goal of net zero by 2050

6.3.11 **Table 6.2** shows the Carbon budget periods and the binding limits on the total amount of GHGs expressed in Million Tonnes of carbon dioxide equivalent ($MtCO_2e$).

Table 6.2: UK National Carbon Budgets

Carbon Budget	Carbon Budget Level	Reduction Below 1990 Level
3rd carbon budget (2018- 2022)	2,544 $MtCO_2e$	37% by 2020
4th carbon budget (2023- 2027)	1,950 $MtCO_2e$	51% by 2025
5th carbon budget (2028- 2032)	1,725 $MtCO_2e$	57% by 2030
6th carbon budget (2033-2037)	965 $MtCO_2e$	78% by 2035
Recommended* 7th carbon budget (2038-2042)	535 $MtCO_2e$	87% by 2024

* 7th Carbon budget under review by UK Government so not yet statutory. Recommended level by the Climate Change Committee (CCC).

6.3.12 The 7th Carbon Budget covering the period from 2038 to 2042 is currently under review and the government has until June 30, 2026, to legislate for it. For the purpose of this assessment, the recommended level for the 7th Carbon Budget by the Climate Change Committee (CCC) has been applied (Ref 6-12).

6.3.13 All assumptions past 2042 have used the draft 7th Carbon Budget.

The Carbon Budget Delivery Plan

6.3.14 The Carbon Budget Delivery Plan (CBDP) (Ref 6-13) was published in March 2023 and sets out the UK Government's detailed proposals to enable the delivery of Carbon Budgets 4, 5 and 6 (i.e. to the end of 2037) in accordance with the UK's 2050 net zero carbon commitment under the CCA 2008.

6.3.15 The CBDP was the subject of a successful legal challenge in *R (Friends of the Earth) v Secretary of State for Energy Security and Net Zero* [2024] EWHC 995 (Admin) (Ref 6-14) as a consequence of which the Secretary of State will be required to publish a revised plan within 12 months. In the absence of any such revised publication, reference is made to the content of the CBDP as it was published below. It is considered that the nature of the legal challenge does not affect the ability to produce this ES Chapter.

Planning Policy

National Planning Policy

6.3.16 The following national planning policy is of relevance to this chapter:

- The National Policy Statements (NPS) are a suite of documents issued by the Secretary of State (SoS), setting out the government's policy for delivery of major energy infrastructure and represent the primary policy tests against which this DCO Application for the Scheme have been considered. Listed below are the details of the elements of NPS considered relevant to the Climate Change assessment:
  - National Planning Statement (NPS) for Energy EN-1. (Ref 6-15), Sections 2.2 (Net zero by 2050), 2.3 (Meeting net zero), 2.4 (Decarbonising the power section), 4.10 (Climate Change Adaptation and Resilience) and 5.3 (Greenhouse Gas Emissions); Paragraph 4.10.4 recognises the role of climate change adaptation in respect of GHG emissions, coastal change and flood risk.
  - NPS for Renewable Energy Infrastructure EN-3 (Ref 6-16) Section 2.10 reaffirms the government commitment to sustained growth in solar capacity to align with the net-zero emissions by 2050 target.
  - NPS for Electricity Networks Infrastructure EN-5 (Ref 6-17) Paragraph 2.3.2 highlights the importance of climate change resilience.
- The National Planning Policy Framework (NPPF) (Ref 6-18). Section 14 highlights the importance of integrating climate change considerations into the planning system by promoting for development that reduces GHG emissions and enhances resilience against future climate risks.
- The Planning Practice Guidance (PPG) (Ref 6-19) supports the NPPF. Regarding climate change, the PPG advises how to identify suitable mitigation measures in the planning process to address the impacts of climate change.
- The UK Government's Clean Power 2030 Action Plan (Ref 6-20) provides a clear policy framework that supports the development of renewable energy projects.

- The Climate Change Act 2008 (Ref 6-6) mandates that the UK Government conducts a Climate Change Risk (CCR) Assessment every five years and creates an adaptation program to address identified risks. The UK CCR Assessment for 2022 (Ref 6-21) was released in January 2022.
- The UK's Nationally Determined Contribution (NDC) (Ref 6-22). The policy outlines the country's commitment to reducing GHG emissions in accordance with the Paris Agreement on climate change.
- Climate Change: Third National Adaptation Programme (2023 – 2028) (NAP3) (Ref 6-23) was published by the Department for Environment, Food and Rural Affairs (Defra) and sets out the key actions for 2023 to 2028 that the government and others will take to adapt to the impacts of climate change in the UK.
- A Green Future: Our 25 Year Plan to Improve the Environment (Ref 6-24), published in 2018, sets out a comprehensive and long-term approach to protecting and enhancing the natural environment in England for the next generation. The document sets out 10 25-year goals; one of which is to manage pressures on the environment by mitigating and adapting to climate change.
- The Clean Growth Strategy (Ref 6-25) sets out the UK's policies and proposals to accelerate the delivery of increased economic growth and decreased emissions.
- The UK Government's Ten Point Plan for a Green Revolution (Ref 6-26) published in 2020, sets out a series of points to help the UK build back better after the impact of the coronavirus pandemic in 2020. This includes Point 4: Accelerating the Shift to Zero Emission Vehicles and Point 5: Green Public Transport, Cycling and Walking.
- The UK Government's Energy White Paper Powering our Net Zero Future, published in 2020 (Ref 6-26), builds on the Ten Point Plan to set out a strategy for providing cleaner, greener energy, supporting a green recovery through new green jobs and delivers opportunities to save money on bills for customers.
- After the creation of the Department for Energy Security and Net Zero in February 2023, Powering Up Britain presents the departments approach to energy and net zero, and comprises of Powering Up Britain: Energy Security Plan (Ref 6-27), and Powering Up Britain: Net Zero Growth Plan (Ref 6-27).
- The Road to Zero (Ref 6-28), published in 2018, sets out the UK Governments ambitions to reduce emissions associated with the transport industry.
- 'Decarbonising Transport a Better, Greener Britain' (Ref 6-29), published in 2021, sets out additional commitments, actions and timings on decarbonising all forms of transport, including measures to increase cycling and walking, and

delivering zero emissions buses and coaches, and zero emission fleets of cars, vans, motorcycle and scooters.

- The Net Zero Strategy: Build Back Greener (Ref 6-30) sets out policies and proposals for decarbonising all sectors of the UK economy to meet the net zero target by 2050.
- Review of Net Zero (Ref 6-31). Review of Net Zero is an independent evaluation of the governments approach to delivering its commitments to net zero to assess the current trajectory and ensure that the accompanying economic opportunities are being maximised.

Local Planning Policy

6.3.17 The Scheme is located within the administrative areas of Norfolk County Council (NCC) and South Norfolk Council (SNC) who are the host authorities. Local planning policies which are relevant to Climate Change and have informed the Climate Change assessment are summarised below:

- The Greater Norwich Local Plan 2024 (Ref 6-32). The objective of the Greater Norwich Local Plan (GNLP) is to significantly reduce all greenhouse gas emissions by 68% by 2030 and by 78% by 2036 compared to 1990 levels and to achieve net zero greenhouse gas emissions by 2050. The Climate Change Statement sets out how the Greater Norwich Local Plan will promote low carbon development and address climate change, as shown in **Table 6.3.**

Table 6.3:The Greater Norwich Local Plan 2024 Climate Change Statement

Measure	GNLP Coverage
Requiring the location and design of development to: **Deliver the highest viable and energy efficiency including the use of decentralised energy;** **Reduce the need to travel, particularly by private car;** **Secure the highest possible share of trips made by sustainable travel.**	Design of development: Policies 1, 2, 3 and 4 Policy 2 requires development to be designed to minimise emissions. The policy also requires development to be designed and orientated to minimise energy use, promote low carbon generation and resource, energy and water efficiency, including promoting recycling and solar gain and reducing overheating.
Support delivery of decentralised, renewable, and low-carbon energy generation and grid infrastructure.	Policies 2 and 4 promote improvements to the energy grid, the development of local, renewable and low carbon energy networks to serve major new developments and an increase in free standing renewable energy generation, such as solar farms.
Increase sustainable transport use and local transport solutions.	Policies 2 and 4 support the further development of low carbon transport networks.

- The Long Stratton Town Council Neighbourhood Plan (Ref 6-34), 'Outdoor Recreation, notably Green Infrastructure and Biodiversity' Policy LSNP – G117.

- The Tasburgh Parish Council Neighbourhood Plan (Ref 6-35), including Policy TAS4 ‘Climate change, flood risk and surface water drainage issues’
- The Tivetshalls Neighbourhood Plan (2022) (Ref 6-36), including Policy TIV14 ‘Surface water drainage’
- South Norfolk Local Plan: Development Management Policies Document (2015) (Ref 6-37), including Policy DM4.1 ‘Renewable Energy’.
- Norfolk County Council: Norfolk Minerals and Waste Local Plan 2023 – 2038 (2025) (Ref 6-72), including Policy MW1 Development Management Criteria, Section 8: Climate change mitigation and adaptation – Strategic Policy, and Policy MW3 Climate change mitigation and adaptation – Strategic Policy
- Norfolk County Council Climate Strategy 2023 (Ref 6-33). The Norfolk County Council Climate Strategy (2023) reflects the county’s commitment to address climate change and reduce carbon emissions. It aims to increase the adoption of renewable energy sources such as solar energy.
- Norfolk County Council Climate Emergency. NCC has not formally declared a climate emergency. However, NCC has made a commitment to achieve net zero carbon emissions on their estate by 2030, and to work collectively with regional partners towards carbon neutrality in their wider areas by 2030.
- SNC published an Environmental Strategy and Delivery Plan 2023-2025 (Ref 6-38) detailing their commitment to contribute towards the Government’s net zero 2050 target by providing regional and national leadership on the energy transition and achieving net zero carbon emissions by 2030 as a council.

Other Guidance

6.3.18 The assessment has been carried out in accordance with the following other guidance documents:

- Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emission and Evaluating their Significance. Institute of Environmental Management and Assessment (2022) Institute of Sustainability and Environmental Professionals (ISEP) (Ref 6-41)
- World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) Greenhouse Gas (GHG) Protocol guidance (Ref 6-40).
- Climate Change Adaption Practitioner Guidance (2022) (ISEP) (Ref 6-41)
- Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2020) (ISEP) (Ref 6-42)
- Greenhouse Gas Reporting Conversion Factors 2025 (Ref 6-43)

6.4 Assessment Assumptions and Limitations

6.4.1 The Climate Change assessment has considered the following assumptions and limitations:

Carbon Budgets

6.4.2 Considering the recommended level by the Climate Change Committee (CCC) for the 7th carbon budget, current carbon budgets are only available up to 2042. As the Scheme is expected to be operational past this; all assumptions past 2042 have used the 7th Carbon Budget. The 7th Carbon Budget covering the period from 2038 to 2042 is currently under review and was not yet adopted by the Government at the time of writing.

Carbon Emissions Factors

6.4.3 Carbon factors and future emissions are based on the best available data which aim to provide the best estimate through professional judgement. Carbon factors have been attained from industry accepted sources including UK Governments Carbon Factors (Ref 6-43).

6.4.4 GHG emissions created within the decommissioning phase have been assessed using the same carbon factors as construction. These carbon factors are dated from 2025 and are a reflection of the use of current fuel types, available waste disposal options and vehicle efficiency. GHG emission calculations are therefore considered to be an overestimation given that the Scheme is not anticipated to be decommissioned until approximately 2091, by which time different technology can be expected to be available. In the context of the UK's commitment to reduce domestic emissions to net zero by 2050, carbon factors for 2091 can be expected to be very different, and lower than, 2025 factors. This approach is therefore conservative.

Indicative Design

6.4.5 It should be noted that, while specific figures are presented with regards to total emissions of CO_2e these are all based on best estimates at the time of writing this ES, so as to be able to provide a useful assessment of potential emissions from the different source of products and activities which form the Scheme. This methodology allows for the main sources of emission from the Scheme to be identified and also those sources which are less significant.

6.4.6 While these specific numbers may be subject to some change following publication of this ES Chapter, the overall conclusion is unlikely to change.

Baseline Emissions

6.4.7 The trajectory of GHG emissions to inform the future baseline is dependent on external factors such as Government policy, technology, and economic shifts which are difficult to predict. The UK Carbon Budgets are legally binding, and the

UK Government has an array of policies and levers to be deployed if the Carbon Budgets are not likely to be met. It is reasonable to assume in the future baseline the UK economy is decarbonising without the Scheme based on this legal context. However, it should also be noted that the Scheme itself is contributing to the need for reducing emissions from energy generation.

6.4.8 For the lifecycle GHG impact assessment, the baseline is a 'business as usual' scenario whereby the Scheme is not implemented. While there are emissions from existing use of the site, to make a conservative assessment, it is considered that there are zero emissions from the current use of the site.

Construction Plant

6.4.9 Anticipated construction plant may include on site machinery, excavators, concrete mixers, large vehicles and generators. This plant is likely to generate some emissions.

6.4.10 Good practice measures have been included in the **Outline CEMP [EN0110014/APP/7.1]** to limit emissions during the Construction Phase. These include:

- Switching vehicles and plant off when not in use (avoid idling) and ensuring construction vehicles conform to UK emissions standards;
- Exploring use of alternative fuels;
- Enforcing site speed limits;
- Providing training to all site personnel on pollution control and methods to minimise emissions; and
- Effective planning to reduce trips and waste.

6.4.11 Based on the relatively small scale and short duration of the construction works required as well as the implementation of emission reduction measures in the **Outline CEMP [EN0110014/APP/7.1]**, it is considered that the fuel use for construction plant represent less than 1% of the total GHG emissions. This is in line with similar solar farm projects, where the construction plant GHG emissions represent less than 1% of the total GHG emissions.

Construction Phase Duration

6.4.12 The Scheme is anticipated to energise in 2031. Based on 2031 energisation, it is anticipated that the earliest the construction phase would commence would be 2028. For the purposes of this assessment, the construction phase is assumed to have a duration of two years. This is expected to be a realistic worst-case assumption for this assessment, as it represents the expected maximum build time and therefore the maximum total emissions and impacts occurring as a result of the construction phase. The final programme will be dependent on the detailed layout design and potential environmental constraints on the timing of construction

activities.

Assessment of Ancillary Products on Site

6.4.13 According to the ISEP guidance, activities that do not significantly change the result of the assessment can be excluded where the expected emissions are less than 1% of the total emissions, and where all such exclusions total a maximum of 5% of the total emissions. In the case of the GHG assessment, the emissions associated with ancillaries such as fencing, portacabins, security system (closed-circuit television (CCTV) camera system), etc. are considered minor and are expected to contribute less than 1% of the total emissions. Anything not explicitly referenced can be assumed to not have been quantified as emissions are anticipated to be negligible. Therefore, these minor emissions are excluded from the quantification, as including them would not significantly impact the overall results. In addition, wherever relevant, conservative assumptions have been made such that the predicted GHG emissions are likely to be at the upper limit of potential emissions from the Scheme. All other inputs and outputs to the relevant processes for which data are available are included in this assessment.

Construction Worker Vehicle Movements

6.4.14 The UK Government 2025 emission conversion factors (Ref 6-43) for 'average petrol car', 'average local bus' and 'All HGVs' including Well-To-Tank (WTT) emissions have been applied to average distance travelled and total worker numbers to calculate GHG emissions associated with worker transport.

6.4.15 The distance is assumed to be equal to the average trip length for business in the UK in 2024 (18.8 miles/ 30.3km) (Ref 6-44), for car and shuttle bus trips. The project's transport consultants (Stantec Ltd) have advised that there will be a peak daily total of 330 peak two-way staff car movements, 58 two-way shuttle movements, and 30 two-way LGV movements.

Transport of Materials

6.4.16 At the time of writing, the manufacturer of the PV panels is assumed to be based in China. It is assumed that the PV panels will be shipped from China and therefore that the manufacture and transport of PV panels and batteries will be from China.

6.4.17 Heavy Goods Vehicle (HGV) and sea freight distances assumed for transportation of materials and waste are outlined below. The country of origin for materials is assumed to be China, and assumptions have been made around the specific ports used, based on proximity to relevant manufacturing facilities within each country. The following assumptions apply:

- HGV transport of materials within China prior to sea freight transportation – 150km (based on the average distance of a number of major manufacturing centres in and around Shanghai to the nearest port);

- Sea freight distance from China to England – 24,582 km (based on the sea freight distance between Shanghai and King's Lynn);
- For HGV transportation of materials, the UK Government GHG 2025 Conversion Factors for 'All HGVs' have been applied, including WTT emissions. It has been assumed that HGVs are 50% laden; this approach is more conservative than assuming HGV are 100% laden on incoming trips and 0% laden on outgoing trips.

6.4.18 For sea freight transportation, the UK Government GHG 2025 Conversion Factors for 'General Cargo –Average' has been applied, including WTT emissions.

Embodied Carbon in Production of Scheme Materials/Components

6.4.19 All assumptions made within the calculations for estimating the embodied carbon of the materials used for the Scheme have been set out within the individual sections detailed in **Section 6.5** (Assessment Methodology).

Product Replacement

6.4.20 The Scheme is expected to be operational from 2031 and to generate more than 100MW of electricity. This assessment considers that the total energy generation of the Scheme accounts for efficiency losses of the PV panels over time based on an initial 2% degradation in the first year and 0.45% for every additional year for a PV Panel lifespan of 40 years.

6.4.21 For the purpose of this assessment, the replacement of PV panels has been considered at 40 years at which point the same assumptions of a 2% loss in the first year and 0.45% loss for every additional year has been used.

6.4.22 Operational maintenance involving the replacement of components during the Scheme's life span is determined by replacement rates observed in similar projects and the expected design life of the components.

6.4.23 Whilst PV panels can have a lifespan of up to 40 years or more, it has been assumed that PV Panels will be replaced once during the lifetime of the Scheme. The PV Panels are anticipated to be replaced over a 12-to-24-month period.

6.4.24 The BESS container batteries could be replaced up to five times during the operation and maintenance phase.

6.4.25 Assumptions on replacement rates have been used to inform the quantitative carbon assessment within the ES are summarised in **Table 6.4** below.

Table 6.4: Estimated Replacement Rates of Components

Component	Comment	Design life / Replacement Frequency	Recyclable
Solar PV Panels	The approximate operational life of PV Panels is 40 years. It is assumed that repowering would be undertaken once during the operation of the Scheme.	40 years – Once during the Operational Phase, aligns with standard project assumption on replacement rates, as set out in Chapter 4.	Yes
Ground mounted PV modules	Replacement is not anticipated during Scheme operation, aligns with standard project assumption on replacement rates, as set out in Chapter 4.	Entire Operational Phase	Yes
DC Cables (low voltage on-site cabling between Solar PV Panels and Conversion Units)	It is not anticipated that the DC cables will need to be replaced during operation. To ensure that a reasonable worse case scenario is assessed for the purposes of the greenhouse gas emissions assessment, an allowance has been made for up to 20% of the DC cabling to be replaced during the Scheme operation due to damage or defects.	20% of cable over entire Operational Phase, assumption that has been made for the purposes of the climate chapter only, to enable an assessment of effects.	Yes
BESS Batteries	Assumed design life of up to 10 years.	Replacement up to 5 times during the Operational Phase, aligns with standard project assumption on replacement rates, as set out in Chapter 4.	Yes
Inverters	Replacement is not anticipated during Scheme operation, aligns with standard project assumption on replacement rates, as set out in Chapter 4.	Entire Operational Phase	Yes
Cables	Replacement is not anticipated during Scheme operation, aligns with standard project assumption on replacement rates, as set out in Chapter 4.	Entire Operational Phase	Yes
Substations	Substations comprise of electrical infrastructure such as the Transformers, Switchgear and control equipment required to facilitate the export of electricity (see Chapter 4). Up to one replacement during operation and maintenance phase (Will only be carried out if required for performance or health and safety reasons).	Once during the Operational Phase, aligns with standard project assumption on replacement rates, as set out in Chapter 4.	Yes

Assessment of Future Baseline for Comparison with 'With Scheme' Scenario

6.4.26 Historically the method used to compare against a future 'without Scheme' is to compare the proposed Scheme with another source of energy generation. This has typically used Combined Cycle Gas Turbines (CCGT) as the dominant controllable technology used in the UK to generate electricity and therefore the technology most likely to be displaced due to new solar generation coming online.

6.4.27 The approach would use a value of emissions per unit of energy from CCGT typically in the format 'gCO_2e/kwh' i.e. grams of carbon dioxide equivalent emissions per kilowatt-hour of energy and compare this against the gCO_2e/kwh from the Scheme.

6.4.28 However, the PEIR, paragraph 7.10.27 on page 32 notes:

'The development is compared to the UK grid average to account for increasing renewable sources that make up the UK grid.'

6.4.29 In the decision letter for the Gate Burton Solar DCO (Ref 6-45), the SoS stated that:

'The Secretary of State considers that comparison to a counterfactual CCGT facility is an inappropriate baseline, noting that 2011 NPS EN-1 requires all combustion power stations with a capacity over 300MW to be constructed Carbon Capture Ready, and he therefore does not consider it viable to use unmitigated emissions as a baseline any longer. The ExA concluded that the net GHG emissions are below zero compared to this baseline and for this, and other reasons, ascribed great positive weight to the GHG savings of the Proposed Development. While the Secretary of State does not accept the applicant's baseline, as the ExA had, with reference to the carbon budget contributions from the Proposed Development, the carbon intensity of the Proposed Development as compared to the UK grid average and all other information within the Applicant's ES, he is satisfied that the Proposed Development would result in considerable carbon savings compared to the UK grid average and supports the trajectory to net zero.'

6.4.30 As such, it is not considered appropriate to use CCGT in this ES chapter as a point of comparison.

6.4.31 Based on this decision, a different approach, using the forecast UK Grid Average emissions of $kgCO_2e$/kWh, was taken. The value for this was sourced from 'Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal' (Ref 6-45). Specifically, 'Table 1' of 'Data Tables 1-19' provides this information.

6.4.32 The grid carbon intensity for the 2031 baseline year is estimated to be 0.065 gCO_2e/kwh.

6.4.33 However, there are significant limitations with only comparing to the grid average emissions. The UK grid emissions factors include transmission and distribution losses, including significant losses due to power station inefficiency. However, they do not account for embodied carbon or 'Well-To-Tank' (WTT) emissions associated with the different means of generating electricity across the grid as this report seeks to do.

6.4.34 As such, when comparing to the future baseline, this chapter has shown a comparison with other energy generating methods and taken a holistic approach with regards to the overall comparison of a future 'without scheme' baseline within the summary of effect.

6.5 Assessment Methodology

6.5.1 This section sets out the scope and methodology for the assessment of the impacts of the Scheme on Climate Change.

6.5.2 To summarise the key issues for the assessment are:

- Greenhouse Gas emissions arising from products developed for the site and used during the construction, operation and maintenance, and decommissioning phases. Elevated greenhouse gases emissions associated with human activities are the primary cause of climate change;
- The effects of a changing climate on the Scheme itself; and,
- How a changing climate will have wider impacts connected to other environmental considerations (e.g. flood risk).

Assessment Scope

6.5.3 **Table 6.5** provides a summary of the potential effects scoped in and out of the ES.

Table 6.5: Climate Change Scoping Summary

Topic	Construction	Operation	Decommissioning
GHGs	**Scoped In**	**Scoped In**	**Scoped In**
Climate Change Risk Assessment (CCRA)	Scoped Out	Scoped Out	Scoped Out
In Combination Climate Change Impacts (ICCI)	Scoped Out	Scoped Out	Scoped Out

Scoped In

6.5.4 The EIA Scoping Report included Scope 1, 2 and 3 GHG emissions during construction and operation within the scope of the Climate Change assessments Chapter. As detailed in **Table 6.1**, the PINS Scoping Opinion response expected that GHG emissions during decommissioning would be characterised in the ES and that an assessment of impacts will be provided where there is the potential for likely significant effects to occur. Consequently, the effects of GHG emissions during decommissioning has been scoped into the ES.

6.5.5 In summary, the ES includes a full assessment of Scope 1, 2 and 3 GHG emissions during construction, operation and decommissioning.

6.5.6 While a CCRA has been scoped out, this Chapter sets out an explanation of how the Scheme has been designed to increase resilience to climate change risks.

Scoped Out

6.5.7 A CCRA is agreed to be scoped out in accordance with PINS' Scoping Opinion. This is on the basis that the risk of climate hazards will be managed through the CEMP, and mitigation will be provided through embedded infrastructure design and application of general health and safety practices. An **Outline CEMP [EN0110014/APP/7.1]** is submitted with the DCO Application. However, the PINS scoping response still calls for an explanation as to how the proposed development is designed to be resilient to climate change, facilitating discussion of how associated risks are mitigated. A CCRA has been included for completeness and to address these comments. Furthermore, the CCRA has informed mitigation measures deemed appropriate for the Scheme.

6.5.8 A Flood Risk Assessment is submitted with the DCO Application in **ES: Appendix 9.1: Flood Risk Assessment & Outline Surface Water Drainage Strategy [EN0110014/APP/6.1.9].**

6.5.9 Although in-combination climate changes effects are approved to be scoped out of this Chapter in accordance with PINS' Scoping Opinion, they have been included to provide a high-level overview of how identified receptors in the surrounding environment are affected by the Scheme in combination with future climate change conditions as well as to provide a consistent approach with similar IGP Schemes. The climate change in-combination impacts relevant to the Scheme has also been assessed through other relevant topics in **ES: Chapter 19 In-Combination Effects Assessment [EN0110014/APP/6.1.19].**

Sources of Information

6.5.10 The following sources of information that have been consulted in the preparation of this chapter:

- UK Carbon Budget Orders 2009 (Ref 6-8), 2011 (Ref 6-9), 2016 (Ref 6-10),

2021 (Ref 6-11) and the 2025 recommended 7th Carbon Budget (Ref 6-12);

- GOV.UK - UK local authority and regional greenhouse gas emissions statistics (Ref 6-50);
- World Business Council for Sustainable Development and World Resources Institute (2004) - The GHG Protocol: A Corporate Accounting and Reporting Standard. Revised Edition (Ref 6-39);
- ISEP (2022) - Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition (Ref 6-40);
- ISEP (2022) - Climate Change Adaption Practitioner Guidance (Ref 6-41);
- ISEP (2020) - Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (Ref 6-42);
- Department for Energy Security and Net Zero (2025) - UK Government GHG Conversion Factors for Company Reporting (Ref 6-48);
- UK Met Office (2018) UK Climate Projections 2018 (UKCP18) (Ref 6-49); and
- UK Met Office (2019) Historic climate data (Ref 6-51).

Study Area

GHG Impact Assessment

6.5.11 In accordance with the latest ISEP guidance (Ref 6-41) the Study Area for the assessment of GHG emissions is considered to be the global climate.

6.5.12 The GHG Impact Assessment is based on the Scheme lifecycle stages shown in **Figure 6.1.** The considered stages include the ‘before use’ stage (A), hereafter referred to as the ‘construction phase’, the ‘use’ stage (B), referred to as the ‘operation and maintenance phase’, and end of life stage (C), referred to as the ‘decommissioning phase’.

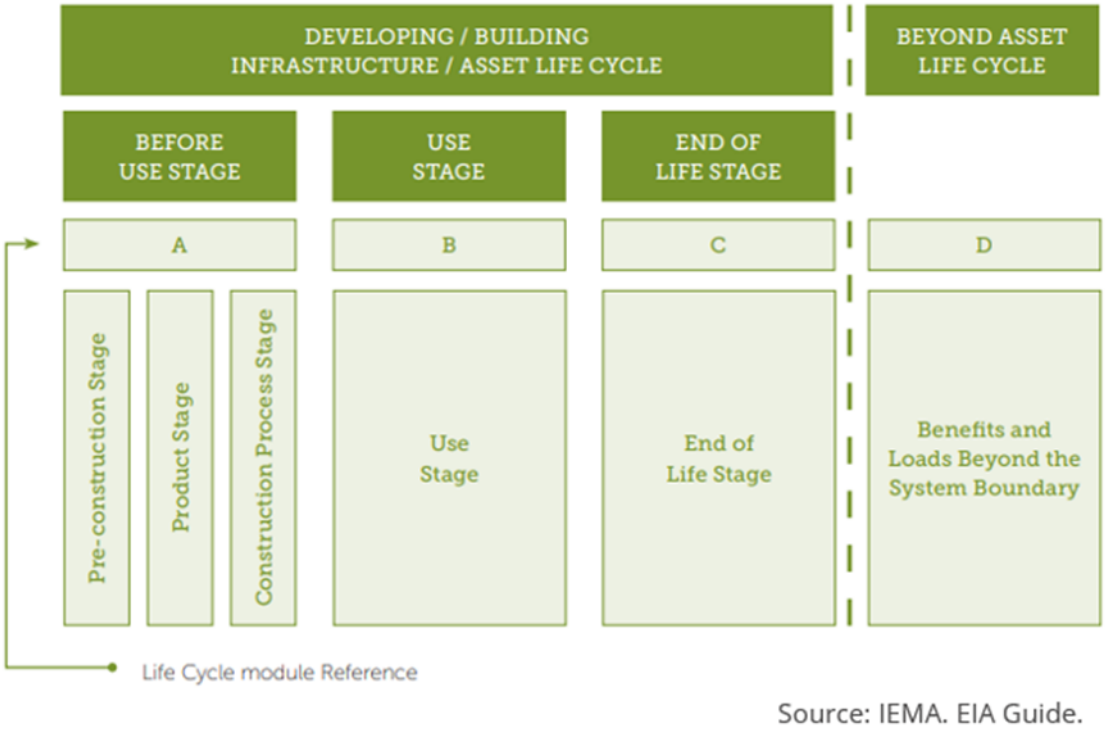

Figure 6.1: Modular approach of life cycle stages and modules (Ref 6-40).

6.5.13 Direct emissions are defined as those directly resulting from the Scheme, e.g. tailpipe emissions from vehicles travelling to the Order Limits. Indirect emissions are those not directly caused by the Scheme but generated as a result of the manufacturing of Scheme components. This includes embodied carbon within construction materials.

6.5.14 Both direct emissions and indirect emissions have been considered in the assessment.

6.5.15 The assessment assumes a Scheme construction start date of 2028. It is expected that the Scheme could be completed by the end of 2030 and energised in 2031. However, the construction period will vary depending on detailed layout design and potential environmental constraints on the timing of construction activities.

6.5.16 The operation and maintenance phase of the Scheme is projected to span 60 years, with a completion year of 2091.

6.5.17 Aligned with **Table 6.6,** the construction stage is within the 5th Carbon Budget (Ref 6-10), with operation within the 5th, 6th and 7th Carbon Budgets (Ref 6-11).

6.5.18 The CCC's recommendation for the 7th Carbon Budget (Ref 6-12) has also been published and is relevant to the temporal scope of the operation stage.

6.5.19 The aforementioned Carbon Budgets have been used to contextualise emissions from the Scheme in line with ISEP guidance.

6.5.20 There is no Carbon Budget currently published for beyond the 2042 (the end of the recommended 7th Carbon Budget), although it is noted that the Scheme will continue to operate and be decommissioned long after that date.

Table 6.6: UK Carbon Budgets

Carbon Budget	Total budget ($MtCO_2e$)	Sectoral Carbon Budget year	Annual Electricity Supply Sectoral Carbon budget ($MtCO_2e$)
4th (2023 – 2027)	1,950	2023	44.01
		2024	44.44
		2025	41.65
		2026	32.36
		2027	26.70
5th (2028 – 2032)	1,725	2028	23.75
		2029	22.40
		2030	18.55
		2031	15.77
		2032	12.09
6th (2033 – 2037)	965	2033	9.86
		2034	8.00
		2035	6.20
		2036	6.01
		2037	5.67
7th (2038 – 2042)*	535	2038	4.98*
		2039	4.79*
		2040	4.60*
		2041	4.04*
		2042	3.48*

** The 7th carbon budget will be set by June 2026. Initial Climate Change Committee advice has given the total carbon budget and energy sector but this is subject to change.*

Potential Impacts

6.5.21 Prior to the implementation of any mitigation (embedded or additional), the Scheme has the potential to affect climate change (beneficially or adversely), during the construction, operation and maintenance, and decommissioning Phases.

6.5.22 The potential beneficial impacts include the generation of renewable energy and the associated reduction in GHG emissions compared to alternative more carbon

intensive methods of energy generation. The potential adverse impacts include emissions from construction activities, transportation, and the embodied carbon in materials used.

6.5.23 The Climate Change assessment follows the general approach to undertaking EIA, explained in **ES: Chapter 2 EIA Methodology [EN0110014/APP/6.1.2]**, albeit it has been modified in to align with the relevant planning policy and appropriate industry standard guidance for assessing GHGs (ISEP document 'Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition' and considering climate change resilience and adaptation in EIA.

6.5.24 Guidance identifies that all new GHG emissions contribute to a negative environmental impact and to climate change, thus might be considered significant. It therefore suggests the assessment of the impact of a development on climate should be based on its potential to emit GHGs.

6.5.25 The methodology for attributing sensitivity of receptors, magnitude of effects and the significance of effects in relation to Climate Change is described further below in this chapter of the ES.

GHG Impact Assessment Methodology

6.5.26 GHG emissions arising over the lifecycle of the Scheme have been assessed through the lifecycle GHG impact assessment. Direct emissions from the Scheme, indirect emissions resulting from the Scheme but arising from activities outside the Order Limits, and embodied carbon within materials and components required for the Scheme are all considered as part of the GHG impact assessment.

6.5.27 In line with the World Business Council for Sustainable Development and World Resources Institute GHG Protocol (Ref 6-39), the potential effects of the Scheme on the climate have been assessed.

6.5.28 The approach to assessing emissions follows the different phases of the Scheme including construction, operation (including maintenance), and decommissioning.

6.5.29 The metric for assessing carbon emissions is units of CO_2 equivalent (CO_2e). This allows the use of Global Warming Potential (GWP) for the emissions of the seven key GHGs (listed below) to be expressed in terms of their equivalent GWP as a mass of CO_2e.

6.5.30 The seven GHG described in the Kyoto Protocol (Ref 6-1) guidelines are considered below:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);

- Sulphur hexafluoride (SF_6);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Nitrogen trifluoride (NF_3).

6.5.31 It should be noted that within this assessment, 'GHG emissions' represent all seven Kyoto Protocol GHGs. The unit of $kgCO_2e$, (kilograms CO_2 equivalent) tCO_2e (tonnes CO_2 equivalent) or MtCO2e (Megatonnes of CO_2 equivalent) captures CO_2 as well as the other GHGs of concern and has been used as the unit to quantify GHGs within this assessment.

6.5.32 The Carbon emission factors from industry accepted sources, such as DESNZ GHG Conversion Factors 2025 (Ref 6-48) have been used for the calculation-based methodology for estimating the anticipated GHG emissions arising during the construction, operation, and decommissioning activities of the Scheme:

Activity data x GHG emissions factor = GHG emissions value

6.5.33 For example, if a construction worker is expected to make a total 1,200km of trips over the construction phase in their petrol car, the 'activity data' for this would be 1,200km. The GHG emissions factor for this, as sourced from the DESNZ 2025 inventory for an average petrol car, is 0.00016272 tCO_2e/km. Therefore, the calculation would be:

1,200km (Activity) x 0.00016272 tCO_2e/km (GHG emissions Factor)

= 0.195 tCO2e (GHG Emissions Value)

GHG Sensitivity of Receptor

6.5.34 For the purposes of this assessment, the receptor for the GHG assessment is the global climate which has been defined as 'high' sensitivity as any additional GHG impacts could compromise the UK's ability to reduce its GHG emissions and therefore meet its future 5-year carbon budgets and Net Zero by 2050 target. This is in line with the latest ISEP guidance, which states that all GHG emissions have the potential to be significant.

6.5.35 GHG emissions have a global effect rather than directly affecting specific local receptors to which levels of sensitivity can be assigned. The global climate has therefore been treated as a single receptor.

GHG Significance of Effect

6.5.36 Standard GHG accounting and reporting practices have been followed to assess the effect of the Scheme on the global climate. The ISEP guidance states that *'it is up to the GHG practitioner's professional judgement to decide which tool is most appropriate for the project at hand with regard to assessing the magnitude of*

GHG impacts'. The GHG accounting method is deemed most appropriate for this part of the assessment.

6.5.37 ISEP guidance (Ref 6-41) states that there are currently no agreed methods to evaluate thresholds of GHG significance, that the application of the standard EIA significance criteria is not considered to be appropriate for climate change mitigation assessments, and that professional judgement is required to contextualise a project's GHG emission impacts.

6.5.38 The guidance explains *that 'the crux of significance therefore is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050.'*

6.5.39 **Table 6.7** presents the different significance levels as per the latest version of ISEP guidance. The guidance emphasises that *'a project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with the UK's net zero trajectory or accepted aligned practice or area-based transition targets, results in a significant adverse effect. It is down to the practitioner to differentiate between the 'level' of significant adverse effects e.g. 'moderate' or 'major' adverse effects.'*

Table 6.7: Significance levels as per ISEP guidance (Box 3) (Ref 6-40)

Significance Level	Definition	Significant
Major adverse	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.	Yes
Moderate adverse	The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.	Yes
Minor adverse	The project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.	No
Negligible	The project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.	No
Beneficial	The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with	Yes

Significance Level	Definition	Significant
	beneficial effects substantially exceeds net zero requirements with a positive climate impact.	

6.5.40 As noted, it is down to the practitioner's professional judgement on how best to contextualise a project's GHG impact. In GHG accounting, it is considered good practice to contextualise emissions against pre-determined carbon budgets.

6.5.41 The UK has a defined national carbon budget and budgets set by industry bodies which have been determined as being compatible with net zero and international climate commitments. For this Scheme, the most appropriate sector carbon budget is for the electricity supply sector. Currently, indicative carbon budgets are available for the electricity supply sector (Ref 6-47). The electricity supply sectoral carbon budgets (**Table 6.6**) are in place to track the sector's pathway to being carbon neutral by 2050. Progress against these budgets is reviewed annually, and future budgets are set 12 years in advance.

6.5.42 The receptor for the GHG Assessment is the global atmosphere. All projects worldwide have the potential to contribute to cumulative impacts on the global climate through their GHG emissions. As per ISEP and precedent, and supported in case law, it is not appropriate to undertake a cumulative assessment for GHG assessments, as the climate is global and so a cumulative assessment would require an assessment of all potential worldwide future developments which is not feasible, and it is not appropriate to seek to only assess some specific schemes. Instead, the appropriate approach is to consider the Scheme's emissions in the context of Carbon budgets as they are considered to be inherently cumulative. Hence, to assess the impact of GHG emissions from the Scheme, the carbon budgets for the electricity supply sector have been used to help establish significance (**Table 6.6**). To provide further perspective, emissions from the Scheme have also been considered in the context of the full UK carbon budgets. The UK carbon budgets are in place to restrict the total amount of GHG emissions the UK can legally emit in a five-year period.

6.5.43 A qualitative approach has been taken for assessing the significance of GHG emissions arising as a result of the Scheme for the years beyond 2042. A quantitative approach is not possible beyond 2042 as, although the carbon budgets are set to decrease over time, there will still be permitted GHG emissions beyond 2050, but with offsetting measures in place to ensure net emissions are zero. The rate at which they will decrease is not known, so beyond 2042, emissions have been compared against the last available Carbon Budget.

GHG Cumulative Effect

6.5.44 As per ISEP and precedent, and supported in case law, it is not appropriate to complete a cumulative assessment for GHG assessments, as the climate is global so it is considered inappropriate and impractical to choose any number of projects in isolation. Carbon budgets can be used as a proxy instead as they are inherently cumulative.

Climate Change Resilience Assessment (CCRA) Methodology

6.5.45 While a CCRA has been scoped out, it is noted from the scoping opinion that an assessment of the Scheme's resilience to Climate Change should be included through explanations of how the proposed development has been designed. Therefore, the below assessment methodology has been followed and included within this chapter.

6.5.46 While the lifecycle GHG Impact Assessment assesses the significance of the GHG impact of the Scheme on the global climate, the CCRA provides a review of the impacts of climate change on the Scheme, as required in line with the ISEP guidance.

6.5.47 For the CCRA, the Scheme during the construction, operation and decommissioning phases is considered the receptor. The CCRA provides a description of how the Scheme will be affected by climate change impacts, taking into consideration the embedded mitigation measures that have been designed into the Scheme so that it will be more resilient to the impacts identified during the review of the UK Climate Projections 2018 (UKCP18) data (Ref 6-49).

6.5.48 The EIA Regulations require information regarding the vulnerability of the Scheme to climate change. An assessment has been developed based on the ISEP Environmental Impact Assessment Guide to: Climate Change Resilience and Adaption' document (Ref 6-41), which assesses the Scheme's resilience to potential impacts caused by climate change.

6.5.49 The risks to the Scheme associated with an increased frequency of extreme weather events, as highlighted by UKCP18 projects have been assessed. The Scheme's resilience against gradual climatic changes over the lifespan of the Scheme, expected to be 60 years, have also been considered.

CCRA - Sensitivity of Receptor

6.5.50 Vulnerable and sensitive receptors have been identified, and the sensitivity of the receptors determined using quantifiable data, where available. The susceptibility and vulnerability of the receptor have been considered alongside its value and importance.

6.5.51 The susceptibility of the receptor has been determined using the following scale:

- **High susceptibility:** receptor has no ability to withstand/not be substantially altered by the projected changes to the existing/prevailing climatic factors (e.g. lose much of its original function and form)
- **Moderate susceptibility:** receptor has some limited ability to withstand/not be altered by the projected changes to the existing/prevailing climatic conditions (e.g. retain elements of its original function and form); and

- **Low susceptibility:** receptor has the ability to withstand/not be altered much by the projected changes to the existing/prevailing climatic factors (e.g. retain much of its original function and form).

6.5.52 The vulnerability of the receptor is determined using the following scale:

- **High vulnerability:** receptor is directly dependent on existing/prevailing climatic factors and reliant on these specific existing climate conditions continuing in future (e.g. river flows and groundwater level) or only able to tolerate a very limited variation in climate conditions
- **Moderate vulnerability:** receptor is dependent on some climatic factors but able to tolerate a range of conditions (e.g. a species which has a wide geographic range across the entire UK but is not found in southern Spain); and
- **Low vulnerability:** climatic factors have little influence on the receptors.

6.5.53 The likely effects of climate change on the Scheme have been evaluated to identify the magnitude i.e., the degree of change from the relevant baseline conditions. Magnitude is based on a combination of likelihood and consequence.

6.5.54 The criteria to assess the likelihood of occurrence and the consequence of the hazard produced by the climate change impact are defined in **Table 6.8, Table 6.9, Table 6.10.** The consequence of the climate risk has been determined using professional judgement and supporting evidence.

Table 6.8: Criteria to Assess Likelihood of CCRA Impact

Level of Likelihood	Definition of Likelihood
Very low	It is highly improbable that the impact will occur during the operational phase or the construction phase of the Scheme. The event has the potential to occur once during the construction, operational and decommissioning phases of the Scheme (64 years) but it is unlikely.
Low	The event occurs once during the construction, operational and decommissioning phases of the scheme (64 years), e.g. once in 64 years.
Medium	The event occurs limited times during the construction, operational and decommissioning phases of the Scheme (64 years), e.g. approximately once every 15 years, typically 4 events.
High	The event occurs several times during the construction, operational and decommissioning phases of the scheme (64 years), e.g. approximately once every five years, typically 12 events.
Very High	The event occurs multiple times during the construction, operational and decommissioning phases of the Scheme (64 years), e.g. approximately annually, typically 64 events.

Table 6.9: Measure of CCRA Consequence

Consequence of Impact	Description
Very large adverse	• Single or multiple deaths involving any persons • Disastrous work interruption • Huge financial loss; and • Devastating environmental implications.
Large adverse	• Major injuries, including permanent disabling injuries of over 14 days • Major work interruption • Serious financial loss; and • Severe environmental implications.
Moderate adverse	• 4 - 14 day lost-time injury(s). Medical treatment required • Substantial work interruption • Considerable financial loss; and • Moderate environmental implications.
Minor adverse	• Injury requiring first aid treatment • Causing interruption of work for 3 days or less • Slight financial loss or cost; and • Slight environmental consequence.
Negligible adverse	• Minor cuts/abrasions requiring minimal treatment • Causing minimal work interruption • No financial loss or costs; and • No environmental consequence.

CCRA Significance of Effect

6.5.55 The receptor significance is evaluated using the sensitivity and magnitude of the effect that are combined in the significance matrix shown in **Table 6.10.**

Table 6.10: Significance matrix

		Measure of Likelihood*				
		Very High	High	Medium	Low	Very Low
Measure of Consequence	**Very Large**	**S**	**S**	**S**	**S**	NS
	Large	**S**	**S**	**S**	**S**	NS
	Moderate	**S**	**S**	**S**	NS	NS
	Minor	**S**	**S**	NS	NS	NS
	Negligible	NS	NS	NS	NS	NS

**NS: Not Significant, S: Significant*

6.5.56 Embedded mitigation measures of the Scheme have been considered as part of the review of potential impacts. These measures are detailed in **Section 6.8**.

In-combination Climate Change Impact (ICCI) Assessment

6.5.57 While ICCI assessment has been scoped out of the ES Chapter, a high-level summary has been included within this chapter of interactions with other disciplines to explain how identified receptors in the surrounding environment are affected by the Scheme in combination with future climate change conditions. The scope of this is in line with the ISEP – 'Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation'.

6.5.58 According to the guidance, an ICCI effect is:

'When a projected future climate impact (e.g. increase in temperatures) interacts with an effect identified by another topic and exacerbates its impact. For example, how an increase in rainfall due to climate change may lead to a higher risk of flooding, this is an ICCI.'

6.5.59 An ICCI Assessment identifies how identified receptors in the surrounding environment are affected by the Scheme in combination with future climate change conditions. Climate change impacts relevant to the Scheme have been assessed through the other relevant topics of the ES. For example, how an increase in rainfall may lead to a higher risk of flooding, has been covered in **ES: Chapter 9 Water Environment [EN0110014/APP/6.1.9]**. These in-combination effects have been summarised within this Climate Change ES chapter.

6.5.60 The related disciplines and the anticipated effects of climate change considered in the ICCI Assessment are detailed in **Table 6.11**

Table 6.11: Climate Change Considerations for ICCI Assessment

Related ES Volume 1 Topic	Anticipated Effect
ES Chapter 9: Water Environment [EN0110014/APP/6.1.9]	Precipitation change. Increased risk of flooding. Reduced drainage.
ES Chapter 8: Ecology and Biodiversity [EN0110014/APP/6.1.8]	Climate change impacting species and habitats.
ES Chapter 11: Transport and Access [EN0110014/APP/6.1.11]	Greenhouse gas emissions from vehicle movements.
ES Chapter 14: Socio-economics [EN0110014/APP/6.1.14]	Change in behaviour as a result of Climate Change
ES Chapter 15: Soils and Agriculture [EN0110014/APP/6.1.15] **ES Chapter 16: Ground Conditions [EN0110014/APP/6.1.16]**	Changing dryness and soil quality as a result of climate change

6.7 Baseline Conditions

The Order Limits

6.7.1 The Scheme is located within the administrative areas of Norfolk County Council (NCC) and South Norfolk Council (SNC) who are the host authorities. A full description of the Order Limits is provided in **ES: Chapter 3 The Order Limits [EN0110014/APP/6.1.3]**.

GHG Impact Assessment

GHG Existing Baseline

6.7.2 Currently (2026), the majority of the Order Limits consists of large, open arable fields that are farmed by a mixture of arable cropping, agri-environmental land management, and areas of outdoor livestock production. The baseline GHG emissions are dependent on the soil and vegetation types present and the fuel used for the operation of any plant and machinery on the Order Limits.

6.7.3 For the lifecycle GHG impact assessment, the baseline is a 'business as usual' scenario whereby the Scheme is not implemented. The baseline comprises existing carbon stock and sources of GHG emissions within the Order Limits from the existing activities on-site. However, as a conservative approach for the assessment, the baseline activities on site have been assumed to be generating zero emissions of CO_2e.

GHG Future Baseline

6.7.4 This section considers changes to the baseline conditions, described above, as far as changes can be established that might occur in the absence of the Scheme coming forward during the time period over which the Scheme would be in place. The future baseline scenarios are set out in **ES: Chapter 2 EIA Methodology [EN0110014/APP/6.1.2]**.

6.7.5 The Scheme is expected to provide a substantial source of renewable electricity for the country. Comparison against forecast UK long-run marginal grid emissions forecasts for 2031 have been considered.

6.7.6 The forecasts used to assess the UK grid emissions as a point of comparison decrease rapidly throughout the 2030s as shown in **Figure 6.2.**

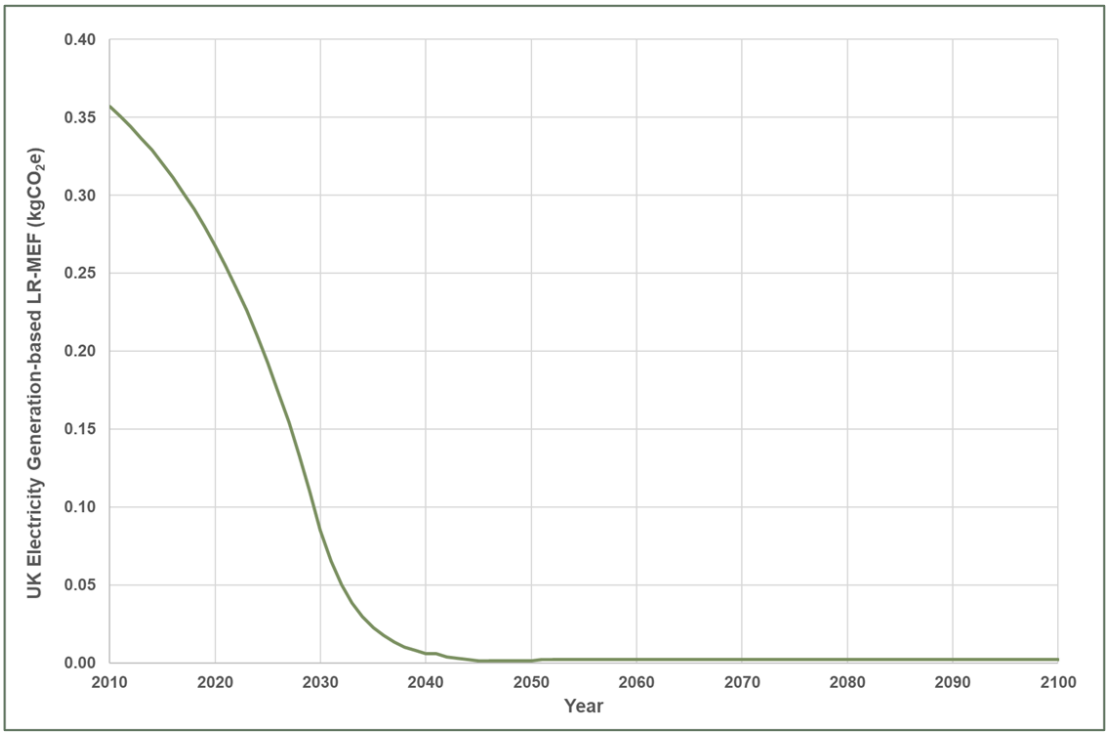

Figure 6.2: UK electricity long-run marginal emissions factors 2010-2100

6.7.7 These factors are inclusive of Combined Cycle Gas Turbine (CCGT) plants and the gradual reduction in their contribution to total grid generation. CCGT was the primary long-run marginal electricity generating method in 2010 (the beginning of this dataset) and thus the marginal emissions factor in 2010 reflects that of a typical CCGT plant (0.357 kgCO2e/kWh before taking into account distribution and transmission losses). However, as the power sector changes to meet the UK's Nationally Determined Contributions (NDC) in 2030, Carbon Budget 6 (CB6) in 2033-37, and net zero by 2050, low carbon generation will increase significantly both as a proportion of total and marginal generation.

6.7.8 The emissions factors within this table are generation weighted averages for each year and do not account for any embodied carbon or lifecycle analysis of the emissions associated with developing any of the energy generating plant.

6.7.9 For reference, the 2025 long-run marginal emissions factor is 0.193 $kgCO_2e/kWh$, while the actual 2025 GHG conversion factor reported in Ref 6-48 is 0.177 $kgCO_2e/kWh$, both of which do not include Well-to-tank (WTT) emissions associated with electricity from the Grid.

6.7.10 Government conversion factors (Ref 6-48) also report Well-to-tank (WTT) conversion factors for the generation and transmission and distribution of UK electricity, which should be used to report the Scope 3 emissions of extraction, refining and transportation of primary fuels before their use in the generation of electricity. In 2025, these were 0.0459 $kgCO_2e/kWh$ for UK grid electricity generation and 0.00397 kgCO2e/kWh for UK grid electricity transmission and distribution. Accounting for all emissions associated with WTT processes gives a

combined emissions factor for 2025 of 0.22687 kgCO_2e/kWh, which is greater than the 2025 long-run marginal emissions factor from Ref 6-48 of 0.193kgCO_2e/kwh.

6.7.11 The forecast for electricity generation output by technology in the transition to net zero by 2050 (shown in **Figure 6.3**) assumes 8.7% of electricity generation (43.1 TWh/annum) in 2033 and 11.0% (83.3 TWh/annum) in 2050 to come from solar PV sources (**Error! Reference source not found.**). The Scheme itself would be c ontributing to that forecast amount.

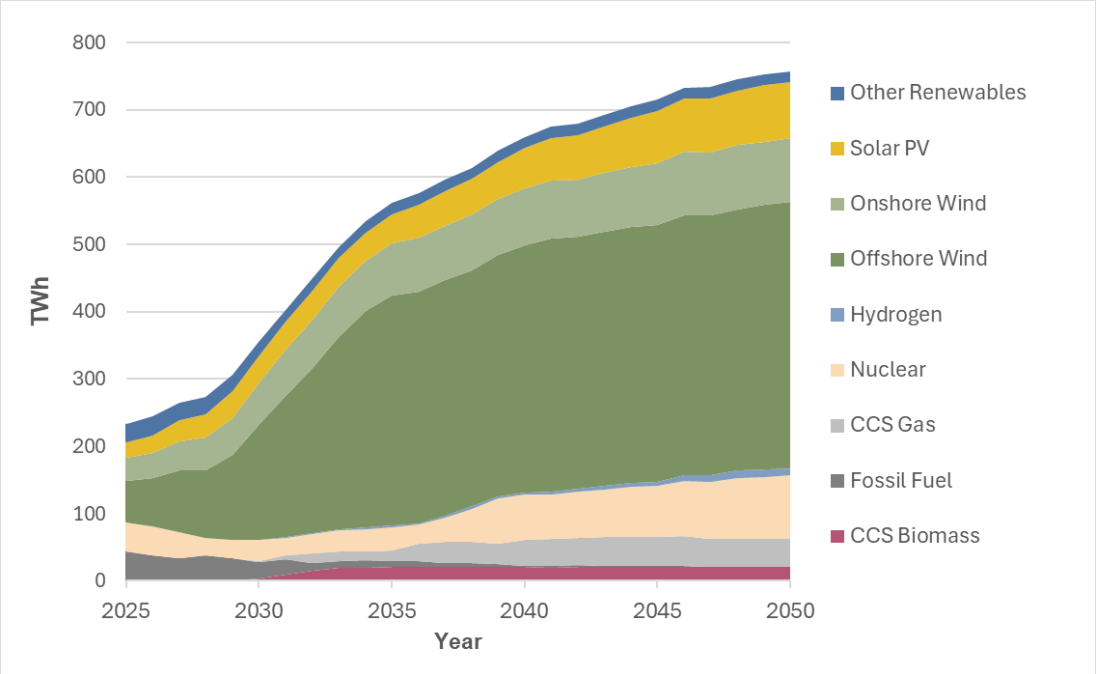

Figure 6.3: Electricity generation output by technology in Holistic Transition (Ref 6-69)

6.7.12 A comparison with other energy generating technologies is presented for completeness.

6.7.13 The UNECE report on Carbon Neutrality in the UNECE Region: Integrated Life-cycle Assessment of Electricity Sources (Ref 6-52) shows the lifecycle emissions from different technologies – these are shown in **Table 6.12** below. Caution is needed when comparing the Scheme with the United Nations assessment results, as the report explains that local conditions impact the carbon intensity of the technologies.

Table 6.12: Lifecycle GHG Emissions of different Electricity Sources

Electricity Source	Technology	Lifecycle GHG Emissions (gCO_2e/kWh)
Coal	Coal Power equipped with a carbon capture and storage (CCS)	147 - 469

Electricity Source	Technology	Lifecycle GHG Emissions (gCO_2e/kWh)
Natural Gas	Natural Gas combined cycle plant with CCS	90 - 220
Nuclear	Nuclear power	5.1 - 6.4
Solar	Concentrated Solar Power (CSP)	27 - 122
	Photovoltaics	8 - 83
Wind	Onshore Wind Power	7.8 - 16
	Offshore Turbines	12 - 23
Hydropower	Hydropower	6 – 147

6.7.14 Consideration was given to the wider impacts of the Scheme including in the context of the carbon budget targets developed for the UK, and the Scheme's overall contribution to climate change.

6.7.15 In the absence of the Scheme, it is considered there will be no change to the future baseline for climate change. The baseline details (including the energy generated by fossil fuels) are not anticipated to change in the absence of the Scheme.

Climate Change Risk Resilience Assessment

CCRA Existing Baseline

6.7.16 The most recent available and completed historic climate data acquired by the Met Office from the closest Met Office Station to the Scheme (Morley St Botolph) for the 30-year climate period of 1991 – 2020 (Ref 6-51) provides the current baseline for the CCRA. Morley St Botolph Met Office Station is located approximately 15.26km north-west of the Order Limits.

6.7.17 Long-term historic average climate data for Morley St Botolph is provided in **Table 6.13** below.

Table 6.13: Historic Climatic Data for the Study Area (1991 – 2020)

Climatic Factor	Month	Value
Average annual maximum daily temperature (°C)	-	14.28
Warmest Month on average (°C)	August	22.38
Coldest Month on average (°C)	February	1.68
Mean annual rainfall levels (mm)	-	676.29
Wettest month on average (mm)	November	69.48
Driest month on average (mm)	April	39.87

CCRA Future Baseline

6.7.18 This section considers changes to the baseline conditions as far as changes can be established, described above, that might occur in the absence of the Scheme coming forward during the time period over which the Scheme would be in place. The future baseline scenarios are set out in **ES: Chapter 2 EIA Methodology [EN0110014/APP/6.1.2]**.

6.7.19 It is anticipated that the future baseline will be different from the current present-day baseline, due to changes in climate. For this assessment, UKCP18 probabilistic projections have been provided for 30-year periods from 2020 - 2099 and obtained for the following climate variables which includes annual and seasonal changes in climatic conditions over the land area of the Scheme:

- Mean annual air temperature
- Maximum annual air temperature
- Minimum annual air temperature
- Mean annual precipitation; and
- Mean annual cloud cover.

6.7.20 A representative 25 km² grid square at the geographical centre of the Order Limits that encompasses the Order Limits location has been used to analyse the UKCP18 probabilistic projections for changes in average climate. Temperature, precipitation, and cloud anomalies are considered relative to the 1991 to 2020 baseline are shown in **Table 6.14.**

6.7.21 There are a range of different climate scenarios also known as Representative Concentration Pathways (RCPs) used in UKCP18 that help inform future trends in emissions. For this assessment RCP 8.5 has been used, which assumes a 'business as usual' pathway for climate change, which represents a worst-case scenario as recommended by the ISEP guidance.

6.7.22 The impact of climate change has been determined over the course of the Scheme's construction (2 years), operational (60 years) and decommissioning (maximum 2 years) phases for the purpose of the EIA.

Table 6.14: Anomalies for probabilistic projections (25km) over UK for RCP8.5

Variable	2020-2049	2050-2079	2070-2099
Mean air temperature anomaly at 1.5 m (°C)	1.07	2.42	3.64
Maximum air temperature anomaly at 1.5 m (°C)	1.17	2.58	3.85
Minimum air temperature anomaly at 1.5 m (°C)	0.97	2.31	3.51
Precipitation rate anomaly (%)	-1.31	-4.37	-3.50

Variable	2020-2049	2050-2079	2070-2099
Total cloud anomaly (%)	-1.89	-4.33	-6.78

6.8 Embedded Mitigation

6.8.1 Prior to the implementation of any mitigation (embedded or additional), the Scheme has the potential to affect Climate Change receptors (positively or negatively), during construction, operational and decommissioning phases. The potential beneficial impacts include the generation of renewable energy and the associated reduction in GHG emissions compared to the existing grid mix. The potential adverse impacts include emissions from construction activities, transportation, and the embodied carbon in materials used.

6.8.2 The Scheme has been designed, as far as practicable, to avoid and reduce impacts and effects on Climate Change and to increase Climate Change resilience through the process embedding measures into the design. In addition, how the Scheme is constructed, operated and maintained, and decommissioned is controlled through measures secured in the DCO in order to manage and minimise potential environmental effects (required as a result of legislative requirements and/or standard sectoral practices). The relevant measures which form the GHG Reduction Strategy as required in the NPS are included within the **Outline CEMP [EN0110014/APP/7.1]** and **Outline OEMP [EN0110014/APP/7.2],** as relevant, rather than forming a separate document.

6.8.3 The following embedded mitigation measures have been incorporated into the Scheme's design.

Embedded Construction Phase Mitigation (2028-2030)

GHG Impact

6.8.4 Embedded mitigation measures will be implemented to reduce the GHG impact of the Scheme. Specific embedded mitigation measures include the following and are also included in the **Outline CEMP [EN0110014/APP/7.1]**.

6.8.5 Measures for reducing Waste are as set out within the Embedded Mitigation for Waste section of **ES: Chapter 18 Other Environmental Matters [EN0110014/APP/6.18]** and the **Outline CEMP [EN0110014/APP/7.1].**

6.8.6 General Practices:

- Adopting the Considerate Constructors Scheme (CCS) to assist in reducing pollution, including GHGs, from the Scheme by employing good industry practice measures e.g. recycling and separating waste and choosing low carbon and recyclable materials where feasible;
- Conducting regular planned maintenance of the construction plant and machinery to optimise efficiency; and

- Retention of existing vegetation as far as practicable. Carbon associated with hedgerows and trees will be locked into the soil.

6.8.7 Reducing vehicle emissions:

- Encouraging the use of lower carbon modes of transport by identifying and communicating local bus connections and pedestrian and cycle access routes to/from the Scheme to all construction staff, and providing appropriate facilities for the safe storage of cycles;
- Switching vehicles and plant off when not in use and ensuring construction vehicles conform to current applicable EU emissions standards adopted by the UK (Ref 6-70); and
- Implementing a Travel Plan, as stated in the **Outline CTMP [EN0110014/APP/7.6]** to reduce the volume of construction staff and employee trips to the Scheme

Climate Change Risk and Resilience

6.8.8 Climate change resilience measures are embedded within the Scheme, particularly in relation to flood risk. These measures are outlined below.

- The flood risk mitigation measures as detailed in **ES: Chapter 9 Water Environment [EN0110014/APP/6.1.9]** and **ES: Appendix 9.1 Flood Risk Assessment & Outline Surface Water Drainage Strategy [EN0110014/APP/6.3.9.1]**, and secured through the **Design Principles, Parameters and Commitments [EN0110014/APP/7.18]**. This also includes mitigation for the possible mobilisation of contaminants from surface water runoff generated by the Scheme.
- As outlined in **Appendix 9.1 Flood Risk Assessment (FRA)** [**EN0110014/APP/6.3.9.1**], a sequential approach has been applied to the Scheme, locating infrastructure within areas of Flood Zone 1 and the lowest flood risk from other sources as far as possible.

6.8.9 Additional climate change resilience measurements will be embedded within the Scheme as secured in the **Outline CEMP [EN0110014/APP/7.1]:**

- Contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions.
- Health and safety plans and risk assessments will be required to account for potential climate change impacts on workers, such as flooding and heatwaves. This will include for the provision of flood defence equipment (e.g. sandbags) and good practice health management measures for staff working in heat such as staying hydrated and sun protection.

- Fire suppression system to rapidly action in case of fire.
- Protecting workers and resources from extreme weather conditions through appropriate PPE and working practices.
- Using equipment's cooling systems where necessary/adapting working practices and equipment used based on weather conditions.

Embedded Operation and Maintenance Phase Mitigation (2031-2091)

6.8.10 Replacement activities, as well as regular planned maintenance of the Scheme, will occur during the operational phase. Where applicable, the construction mitigation measures as outlined above will also be put in place during operation to optimise efficiency and have been outlined in the OEMP, to be prepared in accordance with the **Outline OEMP [EN0110014/APP/7.2].**

6.8.11 Embedded mitigation measures will be in place for operation, as secured through the **Outline OEMP [EN0110014/APP/7.2,** these include:

- Using equipment's cooling systems where necessary/adapting working practices and equipment used based on current weather conditions.
- Protecting workers and resources from extreme weather conditions through appropriate PPE and working practices as secured through the OEMP.
- Monitoring weather forecasts and the news for Environment Agency flood warnings, relevant weather warnings, and water levels of the local waterways.
- BESS systems would include HVAC systems and these would be contained within the individual equipment containers as well as other measures outlined in the **Outline BSMP [EN0110014/APP/7.5]**.

6.8.12 Operational measures relating drainage and surface water management are set out within the **Outline OEMP** [**EN0110014/APP/7.2**].

Embedded Decommissioning Phase Mitigation (2091)

6.8.13 The following mitigation measures have been incorporated into the decommissioning phase:

- Contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions.
- Health and safety plans and risk assessments developed for decommissioning activities will be required to account for potential climate change impacts on workers, such as flooding and heatwaves. This will include for the provision

of flood defence equipment (e.g. sandbags) on site and good practice health management.

- Fire suppression system on site to rapidly action in case of fire.
- Protecting workers and resources from extreme weather conditions through appropriate PPE and working practices.
- Using equipment's cooling systems where necessary/adapting working practices and equipment used based on current weather conditions.

6.8.14 The measures above are secured in the **Outline DEMP** [**EN0110014/APP/7.3**]. Detail about the measures is limited as the decommissioning environment beyond 2091 is likely to be considerably different to today.

6.8.15 The future technological, regulatory, and environmental landscape in 2091 is difficult to predict with certainty, so maintaining flexibility in the decommissioning approach is prudent.

6.9 Assessment of Likely Effects

6.9.1 This section of the Climate Change chapter identifies and characterises potential impacts arising during the construction, operation and maintenance, and decommissioning phases of the Scheme.

6.9.2 Taking into account the embedded mitigation measures as detailed in **Section 6.7**, the potential for the likely effects of the Scheme on Climate Change receptors was assessed using the methodology as detailed in **Section 6.5** of this ES chapter. In the sections below, effects during the construction, operation and maintenance, and decommissioning phases of the Scheme are assessed for Climate Change receptors scoped into the ES chapter.

6.9.3 Any additional mitigation required to reduce these effects is then set out in **Section 6.10** below. Thereafter, an assessment is made of the significance of any residual effects after all mitigation measures have been accounted for.

GHG Impact Assessment

6.9.4 For each lifecycle stage of the Scheme, the associated GHG emissions have been identified and assessed.

6.9.5 A summary of the anticipated GHG emissions arising from the Scheme are shown below:

Table 6.15: Possible Sources of GHG Emissions

Lifecycle Stage	Activity	Primary emission sources
Construction phase	Materials that contain high levels of embodied carbon, extraction and generation of raw materials, complex manufacturing processes and equipment design.	GHGs that are produced during manufacturing and extraction and design.
	Construction activity on-site.	Energy consumption on-site. Commuting construction workers.
	Construction materials that are transported and not integrated in embodied GHG emission. Equipment required is likely to require shipment, due to overseas origin.	Transportation of materials to the Sites and the amount of fuel consumed.
	Construction workers that would need transportation to the Site.	Transportation of workers to the Sites and resulting GHG emissions.
	Waste produced during the construction process that need to be disposed.	GHG emissions produced from the transportation and removal of waste materials.
	Water use	Treatment of wastewater and supply of potable and non-potable water.
Operation and maintenance phase	Scheme maintenance	GHG emissions from maintenance. The operational aspects are expected to be negligible in the context of overall GHG emissions.
	Replacement of materials (i.e. batteries and replacement panels)	GHG emissions that are embodied within the products and the transportation of the materials.
	Water use on site for fire suppression and cleaning panels	Treatment of wastewater and supply of potable and non-potable water.
Decommissioning phase	Decommissioning activity occurring on-site.	Energy consumption of on-site vehicles and generators.
	Removal and transportation of any waste materials.	GHG emissions generated from the transportation and disposal of waste materials.
	Workers that would need to be transported to the Site	Transportation of workers to site and resulting GHG emissions.

6.9.6 The impacts and effects (both beneficial and adverse) associated with GHG emissions changes during the construction, operational, and decommissioning of the Scheme are outlined in the sections below.

6.9.7 Whilst it is important to understand the GHG impacts at each individual lifecycle stage, it is also important to understand the net lifecycle GHG impact of the Scheme due to the long-term cumulative nature of GHG emissions over the assessed lifespan of the Scheme.

6.9.8 The net impact of the Scheme is also identified and assessed, taking into account the renewable energy generation and the benefit of this in the context of the wider energy generation sector, the National Grid average GHG intensity inclusive of future estimated emissions, and associated considerations with the change in

energy demand and downstream emissions as a result of generating renewable energy.

Construction Phase (2028-2030)

6.9.9 For the purposes of the GHG impact assessment, the construction phase is anticipated to take place over 24 months. Subject to being granted development consent and following a final investment decision, the construction of the Scheme is anticipated to commence in 2028 for a period of approximately 24 months. On this basis, it is expected that the Scheme could be completed by the end of 2030 and energised in 2031. However, the construction period will vary depending on detailed layout design and potential environmental constraints on the timing of construction activities. Additionally, the construction period may vary across the Order Limits as larger sub-Sites will have multiple construction activities overlapping at the same time.

6.9.10 For the purpose of assessment, 2031 has been used as the opening year.

6.9.11 The following components are anticipated to be installed during the Construction Phase:

- Solar PV Panels mounted on Mounting Structures;
- A Battery Energy Storage System (BESS) area;
- Inverter Conversion Units (including BESS Site);
- Project and National Grid Substation Infrastructure;
- Grid Connection Infrastructure;
- Cabling and other Associated Development and Ancillary Infrastructure.

6.9.12 Calculations for the embodied carbon within the various products to be used and the PV panels are detailed below.

PV Modules

6.9.13 It is estimated the total number of PV modules for Scheme will be 977,536 on the basis of installation of a tracker system. This is the system which has been used for the purpose of assessment. Should a fixed scheme be proposed, it is not considered that there would be a significant variation in overall emissions from this change although if anything we would expect a decrease in emissions.

6.9.14 Based on indicative product specification details, the total weight of an individual module is anticipated to be 33.5kg. For the purpose of this assessment, it is considered that each module has 144 individual solar cells. The primary materials which go into construction of the PV Panel are silicon, anodized aluminium, and glass.

6.9.15 The Global Silicon Council have produced a document, 'Silicon-Chemistry Carbon Balance: An assessment of Greenhouse Gas Emissions and Reductions' (Ref 6-54) which states that each cell contains approximately 11 g of silicon. Silicon has an embodied carbon value of 6 $kgCO_2e/kg$. Based on these figures, it is calculated that each panel has 1.6 g silicon and an embodied carbon value of 9.5 $kgCO_2e$. The total embodied silicon from PV Panels used by the Scheme is **9,291 tCO_2e**.

6.9.16 The total glass weight of all panels has been estimated as 26,393 tonnes. An embodied carbon value of 1.4028 $kgCO_2e/kg$ has been taken from the DESNZ 2025 (Ref 6-48) GHG conversion factors for glass. This gives a total of **1,371 tCO_2e** for glass used across the Scheme.

6.9.17 The total aluminium weight of all panels is 4,496 tonnes. Using a value of 8.66 $kgCO_2e/kg$ (Aluminium, all data collected) taken from the Inventory of Carbon & Energy (ICE) database (Ref 6-55) this gives a total of 39.8 $kgCO_2e$ per module. The aluminium emissions from all solar modules used by the Scheme are **38,938 tCO_2e.**

6.9.18 It is considered that 9,973 mounting structures weighing 800 kg each will be required, and that all mounting structures will be primarily made of steel.

6.9.19 Using a value of 2.71 $kgCO_2e/kg$, a value of **37,845 tCO_2e** has been estimated for the Mounting Structures.

6.9.20 The total embodied carbon for all PV Panels and Mounting Structures, accounting for the materials used in the Scheme is **87,445 tCO_2e.**

Transformers and Switchgear (contained within both Project Substations and National Grid Substation)

6.9.21 To calculate the embodied carbon associated with the production of the Transformers to be used by the Scheme, the material breakdown of a typical Transformer as reported in a lifecycle assessment produced by Piotrowski & Markowska (2025) (Ref 6-56) was used as a benchmark to estimate material quantities associated with the Transformers required for the Scheme.

6.9.22 Up to three 132kV Project Substations will be located across the Order Limits to collect energy from the Solar PV Arrays and convert the energy to 132kV. There will be up to three 400kV Project Substations located within the Order Limits (i.e. not including a new National Grid Substation)

6.9.23 A new National Grid Substation will be required at the Point of Connection ("PoC") (within Sub-Site 1B) to connect the 400kV Project Substation

6.9.24 For the purpose of this assessment, the following assumption of installed transformers across both the Project Substations and National Grid Substation have been used:

- 2 x 400/33kV

- 5 x 400/33kv 180MVA
- 7 x 132/33kv.

6.9.25 The total weight of each Transformer type is based on specifications of equipment on previous Island Green Power (IGP) solar schemes, such as 'The Droves' scheme.

6.9.26 The materials used in Transformers are oil, steel, electrical steel, copper and plasterboard as set out by Piotrowski & Markowska (2025) (Ref 6-56). The proportions of typical metal are also shown in the source aforementioned. As the total weight is known, the remaining materials have been proportioned out appropriately.

6.9.27 The total embodied carbon for the Transformers and Switchgear is **5,906 tCO_2e.** This is summarised in **Table 6.16.**

Table 6.16: Materials of $kgCO_2e$ in Transformers and Switchgear

Material	Total Weight (tonnes)	$kgCO_2e/kg$	tCO_2e
Steel	732.5	1.640	1,201.3
Electrical Steel	711.0	3.000	2,132.9
Copper	355.5	2.710	963.4
Plasterboard	334.8	1.288	431.4
Oil	840.2	1.40	1177.1
Total			**5,906**

Inverters

6.9.28 It is anticipated that a maximum of 249 inverters (including those from BESS) will be installed during the Construction Phase. Information has been provided by project Waste Consultants, Lanpro.

6.9.29 To calculate the embodied carbon associated with the Inverters, the material components of an Inverter were identified from Dodd et al., (2020) (Ref 6-57) with the overall kg weight per element multiplied by $kgCO_2e/kg$ values taken from the Inventory of Carbon & Energy (ICE) database (Ref 6-55) and summed to obtain the total embodied carbon emissions for all Inverters across the Scheme.

6.9.30 Based on the above, the total embodied carbon emissions of the Inverters are calculated as **18,346 tCO_2e**.

Table 6.17: Embodied Carbon Emissions of Inverters

Material	Total Element Weight (Kilograms (kg))	$kgCO_2e/kg$	Total Embodied Energy of Material tCO_2e
Aluminium	1,780,625	6.670	11,877

Material	Total Element Weight (Kilograms (kg))	$kgCO_2e/kg$	Total Embodied Energy of Material tCO_2e
Copper	683,718	2.710	1,853
Steel	358,519	1.640	588
Plastic	1,018,174	3.310	3,370
Iron	324,461	2.030	659
Total			**18,346**

Electrical Cables

6.9.31 Indicative cable lengths (5,632 km) and weights (569 tonnes of which 2.13 tonnes correspond to medium voltage cables) were estimated for the Grid Connection Cables, on-site cables, and interconnecting cables for the whole of the Scheme.

6.9.32 Total weight per meter was provided by project Waste consultants, Lanpro, for the two main materials based on cables used for similar schemes. These are copper (21 kg/m) and aluminium (10.7 kg/m). The remaining weight is assumed to be polyethylene.

6.9.33 Embodied carbon values for each material have been taken from Piotrowski & Markowska (2025) (Ref 6-56) and are shown below:

- Copper: 2.71 $kgCO_2e/kg$
- Aluminium: 6.67 $kgCO_2e/kg$; and
- Polyethylene: 2.54 $kgCO_2e/kg$.

6.9.34 The total embodied carbon from all electrical cables used by the Scheme is **1,714 tCO_2e**.

BESS

6.9.35 For the purpose of this assessment, a value of 100 $kgCO_2e$ per kWh is considered as a realistic worst-case assumption based on manufacturer guidance. This is a conservative approach, and other recent studies (see Ref 6-60 and Ref 6-61) have reported significantly lower emissions factors.

6.9.36 The assessed MWh battery storage is 2,000 MWh.

6.9.37 Based on the above assumptions the total CO_2e from batteries is **200,000 tCO_2e**.

Shipping of Materials

6.9.38 Based on the provided material weights and making the precautionary assumption that all products would come from China, the below calculations are made.

Shipping distance from Shanghai to King's Lynn is approximated at 24,582 km.

Table 6.18: Shipping GHG Emissions

Shipping Weight (tonnes)	Distance (km)	$kgCO_2e$/tonne/km*	$kgCO_2e$	tCO_2e
71,535	24,582	0.01321	23,229,314	23,229.31

** General Average Cargo Ship (Ref 6-50)*

6.9.39 The total emissions from shipping of materials associated with the Scheme during construction has been estimated as **23,229 tCO_2e.**

Vehicle Movements

6.9.40 An average one way trip distance of 30.26 km per journey has been assumed based on the average trip distance for business from National Travel Survey (Ref 6-44) for the worker transportation calculations. The UK Government 2025 emissions factors (Ref 6-50) for 'Average petrol car' and 'Average Local Bus', including WTT emissions, have been applied to this distance and total worker numbers to calculate GHG emissions associated with worker transport. As the conversion factor for 'Average Local Bus' is 0.10385 $kgCO_2e$/passenger/km, the factor was multiplied by 12 (the number of workers assumed per shuttle bus).

6.9.41 Peak assumptions have been used to provide a worst case assessment, with data sourced from the Transport Consultant. In reality, there are anticipated to be fewer trips than assessed. For the purposes of assessment, there are 330 forecasted daily two-way car trips for staff, 30 forecasted daily two-way LGV worker movements and 58 forecasted daily two-way shuttle bus trips. There is an estimated Construction Phase of 542 days (estimated based on a worst-case scenario of the Construction Phase being 2 years).

6.9.42 Considering the conversion factor for an average petrol car for car movements, an average local bus for the Shuttlebus, and all HGVs for HGV movements during the Construction Phase, the total GHG emissions for construction vehicle movements is detailed in the table below.

Table 6.19: Construction Worker GHG Emissions

Vehicles	Number of Peak Daily Trips	Average Distance (km)	Number of Construction Days	Total Distance Travelled (km)	$kgCO_2e$/km	$kgCO_2e$	tCO_2e
Shuttle Bus	**58**	30.26	542	491,957	1.246	1,185,282	1,185
Cars	**330**	30.26	542	951,117	0.163	880,564	881
LGVs	**30**	30.26	542	5,411,529	0.836	125,749	126
Total (tCO_2e)	**2,192**						

6.9.43 It is estimated that there will be 68,814 two-way HGV trips to the Order Limits during the construction phase associated with the transport of materials for the Scheme (solar sites and cable corridor route). The assessment is set out below and has assumed that all the trips will be from China. The total road distance (215 km) was estimated from industrial areas around Shanghai, and then from King's Lynn to the Order Limits. A conversion factor for 'All HGVs, 50% Laden' from DESNZ (2025) (Ref 6-48) was used to account for variation in HGV types and for differences in HGV load during delivery to and from the Sites.

Table 6.20: Construction HGV GHG Emissions from Transport of Materials

Vehicles	Number of Trips	Average Distance (km)	$kgCO_2e/km$	$kgCO_2e$	tCO_2e
HGV 50% Laden	**68,814**	**130**	**0.84**	7,477,721	7,478

6.9.44 The total emissions from vehicle movements associated with the Scheme during the construction phase has been estimated as **9,669 tCO_2e**.

Waste

6.9.45 Waste streams during the construction phase which have been assessed for their GHG Emissions include:

- Sewage Waste; and
- Excavated Ground material which cannot be reused.

6.9.46 Sewage waste generated during construction has been estimated at 15,068 m^3, as provided by project Waste Consultants, Lanpro. Using a conversion factor of 0.17088 $kgCO_2e/m^3$ for water treatment from DESNZ (2025) (Ref 6-67), the total estimated emissions from sewage waste have been calculated at **2.57 tCO_2e**.

6.9.47 The estimated ground material expected to be excavated which will not be suitable for refill or compaction has been calculated at 320,965 m^3, as provided by project Waste Consultants, Lanpro. Using a typical density value for mixed construction and demolition of 1.2 tonnes per m^3 released by Sustainability Exchange (Ref 6-58) and a conversion factor for average construction of 1.00835 $kgCO_2e$/tonne DESNZ (2025) (Ref 6-67) the total estimated emissions from excavation material waste have been calculated as **449.47 tCO_2e**.

6.9.48 The total waste generated during construction results in an estimated **452.04 tCO_2e.**

Water Use

6.9.49 Water use has been estimated for the below tasks as outlined by project Waste Consultants, Lanpro:

- Water consumed for construction and cleaning of HGV and other equipment in litres; and
- Potable and non-potable water for drinking and sanitary purposes in litres.

Table 6.21: Total Construction Phase Water Use Emissions

Water use during construction (m^3)	$kgCO_2e/m^3$	$kgCO_2e$	tCO_2e
16,871	0.191	3,227	3.227

Energy Use

6.9.50 Electricity for Scheme aspects such as temporary site security during the Construction Phase and Construction Phase office cabin/welfare centres has been scoped out of the assessment based on Scheme similarity to alternate IGP Schemes where it has accounted for <1% of the embodied carbon contribution.

Packaging of Materials

6.9.51 Information relating to the packaging for the PV Panels and Mounting Structures has been provided as set out below. As the volume has been provided but not the weight, typical conversion factors have been used to calculate the total weight and the total emissions from the packaging materials to be used.

6.9.52 Emissions per tonne of material are sourced from DESNZ (2025) (Ref 6-48).

Table 6.22: Total Construction Phase Packaging Materials Use Emissions

Packaging Item	Total Volume (m^3)	Assumed Density Material (tonnes/m^3)	Total Weight (tonnes)	$kgCO_2e$/tonne for material	Total tCO_2e
Pallet Wood	13,198.66	0.7	9239.06	4.68568	43.29
Polyurethane Foam pad for cushioning between modules	9,197.94	0.024	220.75	4.68568	1.03
Corrugated Cardboard, plastic wrap and Kraft cardboard	13,581.13	0.6	8148.68	4.68568	38.18
Corner pieces and edge spacers made of HDPE	167.67	0.965	161.80	4.68568	0.76
Pallet Nails	5.06	7.874	39.86	4.68568	0.19
Cable Drum Wood	1,422.14	0.7	995.50	4.68568	4.66
Total					**88.12**

6.9.53 This gives a value for emissions associated with construction packaging materials of **88.12 kgCO_2e**.

Pylons

6.9.54 The Scheme will deliver up to four new pylons (of which three would be associated with the repositioning of existing pylons and up to 1 new pylon). Up to one temporary pylon will also be required.

6.9.55 The estimated total weights of each pylon tower and wire type expected to be removed during the construction phase are provided in **Table 6.23**, sourced from project Waste Consultants, Lanpro.

6.9.56 To estimate the embodied carbon associated with pylon removal, the 2025 GHG emissions factor for waste disposal of metal (Ref 6-48) was applied to the total weights of each pylon component to be removed during the construction phase.

6.9.57 This gives a value for emissions associated with pylon removal of **107.6 kgCO_2e**.

Table 6.23: Emissions associated with Pylon Removal

Component	Total weight (tonnes)	kgCO_2e/tonne for material	kgCO_2e
L6(c) D STD tower x 3	65.4	1.00835	66.0
L6(c) D60 STD tower	41.3	1.00835	41.6
Total			**107.6**

6.9.58 To estimate the embodied carbon associated with pylon installation, emissions factors for aluminium and steel (all data collected) from the ICE database (V4.0 – Dec 2024) (Ref 6-55) were applied to the data. This gives an estimated embodied energy for pylon installation of **819.9 tCO_2e**.

Table 6.24: Embodied carbon emissions associated with Pylon Installation

Component	Total weight (kg)	kgCO_2e/kg for material	kgCO_2e	tCO2e
L6(c) D STD tower (x3)	87,212	2.6973	235,240	235.2
L6(c) D60 STD tower	41,280	2.6973	111,346	111.3
Keziah Earthwire (160mm$_2$ AACSR) 736kg/km – 1.01km	741	8.6594	6,416	6.4
Araucaria Conductor (700mm^2) 2266kg/km – 1.01km x 18 conductors	41,061	8.6594	355,566	355.6
Total				**819.9**

6.9.59 This gives a total value of **820 tCO_2e** for pylon installation and removal.

Summary of Construction GHG Emissions

6.9.60 During the construction phase, the greatest impact of GHGs is the result of embodied carbon in the materials used for construction. As mentioned previously; the PV Panels are assumed to be sourced from China. The manufacture and supply of PV Panels and BESS will be the largest source of GHG emissions. The summary of GHG emissions during the construction phase is shown in below.

Table 6.25: Construction GHG Emissions

Emissions Source	Emissions (tCO_2e)	% Construction Emissions
Products (BESS)	200,000	57.5
Products (PV arrays including mounting)	87,445	25.2
Transportation of Materials by Sea	23,229	6.7
Products (Inverters)	18,346	5.3
Worker Transportation & Delivery Vehicles	9,669	2.8
Products (Transformers)	5,906	1.7
Products (Cables)	1,714	0.5
Pylons	820	0.2
Waste	452	0.1
Packaging	88	0.0
Water Usage	3	0.0
Total	**347,673**	**100.0**

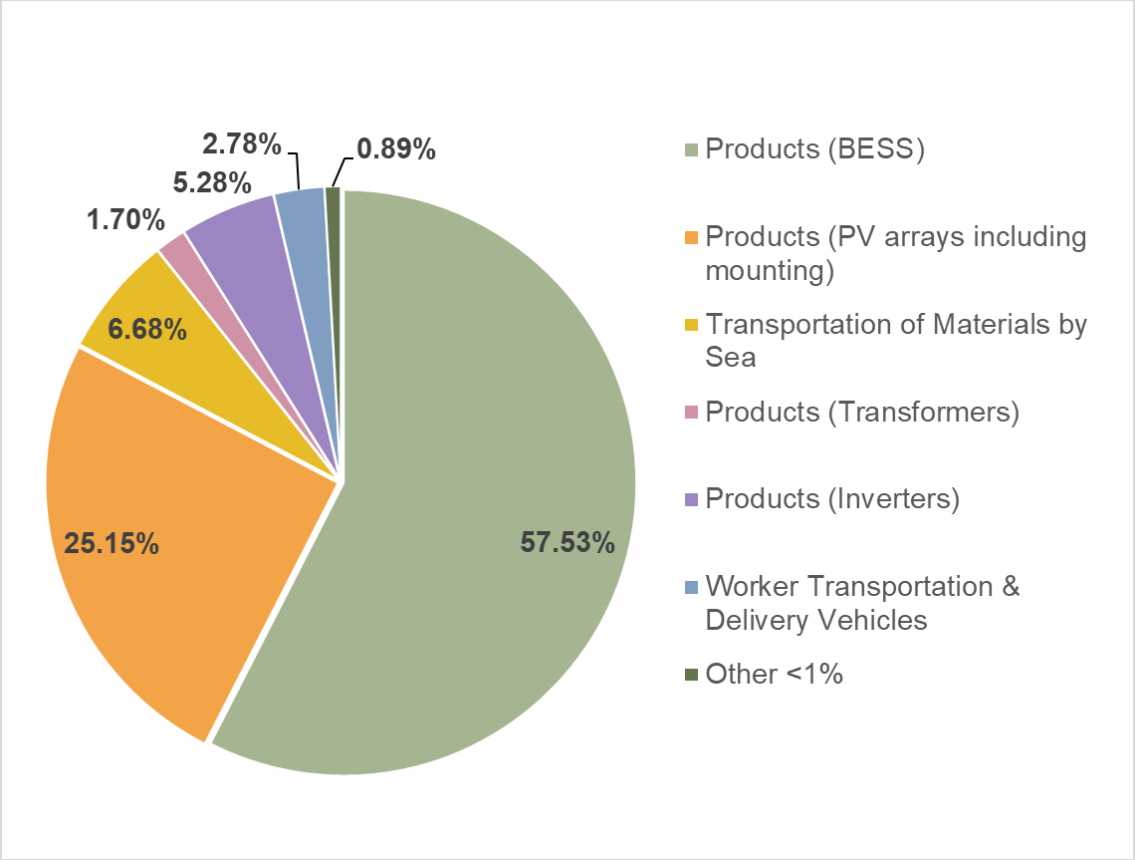

Figure 6.4: Construction GHG Emissions

6.9.61 It has been identified that embodied carbon from the BESS and PV panels will produce the greatest amount of GHG emissions and mitigation efforts have concentrated on these priority areas.

6.9.62 It is acknowledged that the emissions from manufacture and supply of PV Panels and BESS are attributable to China's GHG emissions given the origin source. However, as a worst case scenario these emissions have been included in the assessment from a UK perspective to determine if the Scheme will be environmentally significant on the global climate. It should also be noted that this will result in an overestimation of comparison with the National Grid projection factors which do not take into account overseas emissions or embodied carbon from products.

Significance of Effect (Construction)

6.9.63 Worst case total GHG emissions from the Construction Phase are estimated to equate to around **347,673 tCO_2e.**

6.9.64 GHG emissions from construction activities will be limited to the duration of the construction phase (anticipated to be 24 months (2 years)). The emissions from the Construction Phase will not be evenly weighted between the 2 years, but for the purpose of this assessment it is considered emissions will be evenly weighted between both years and will be made from Q3 2028 until Q3 2030. When

annualised, the total annual construction emissions equate to around **173,837 tCO_2e**.

6.9.65 **Table 6.26** presents the estimated construction emissions against the carbon budget periods during which they arise. Construction emissions fall under the 5th UK carbon budget entirely.

6.9.66 The annual emissions of the construction phase have been compared to the relevant annualised carbon budget in **Table 6.6** to enable assessment of the construction phase in isolation.

Table 6.26: Construction GHG Emissions and UK 5th Carbon Budget

Relevant UK Carbon Budget	Annualised UK Carbon Budget (tCO_2e)	Annual Construction Emissions for the Scheme During Carbon Budget Period (tCO_2e)	Construction Emissions for the Scheme as a Proportion of Carbon Budget
5th Carbon Budget (2028 to 2032)	345,000,000	173,837	0.05%

6.9.67 A comparison against the energy sectoral carbon budgets has also been included by year.

Table 6.27: Construction GHG Emissions and UK Electricity Supply Sector Carbon Budget

Relevant UK Carbon Budget	Annual Electricity Supply Sectoral Carbon budget (tCO_2e)	Annual Construction Emissions for the Scheme During Carbon Budget Period (tCO_2e)	Construction Emissions for the Scheme as a Proportion of Sectoral Carbon Budget
2028/2029	23,750,000	173,837	0.73%
2029/2030	22,400,000	173,837	0.78%

6.9.68 Annual emissions from the construction of the Scheme do not contribute to equal to or more than 0.05% of the 5th carbon budget and less than 1% each year of the total electricity supply sector budget. As the project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards, GHG emissions from the construction of the Scheme are considered to have a **Minor Adverse** effect on the climate, which is considered **not significant.**

Operation and Maintenance Phase (2031-2091)

6.9.69 GHG emissions will be generated as a result of operational activities such as the transportation of operational workers to and from the Scheme, water consumption, and replacement, and maintenance activities.

Sulphur Hexafluoride (SF_6)

6.9.70 Sulphur hexafluoride (SF_6) is a potent GHG that will be used in electrical equipment associated with the Project Substations and National Grid Substation, switchgear and transformers. SF_6 has a very high Global Warming Potential (GWP) of 23,900 compared to CO_2, meaning its potential to contribute to global warming is significantly greater than CO_2 over a 100-year period.

6.9.71 SF_6 is included in the Kyoto protocol (Ref 6-1) as a GHG that should be considered in GHG assessments. While SF_6 has the potential to result in GHG emissions over the lifetime of the Scheme (i.e., during production, operation through leakage, and decommissioning), it has not been possible to quantify the potential fugitive emissions from SF_6 leakage. However, the Scheme will adhere to good practice and guidance.

6.9.72 Switchgear equipment is now supplied to minimise leakages. Additionally, through regular checks of the equipment for gas leaks, it can be expected the leaks to be de minimis.

Maintenance Travel

6.9.73 For the purpose of this assessment, it is assumed that there will be 76,250 maintenance labour days over the 60-year Operational Phase and an additional 75,338 labour days associated with product replacement. Information has been provided by project Waste Consultants, Lanpro. Assuming there are 1.5 workers per car travelling the average commute length of 14.32 km in accordance with National Travel Survey (Ref 6-44) and using the 2025 GHG conversion factor for an average petrol car (Ref 6-48), the operation phase of the Scheme would generate approximately **471 tCO_2e** as a result of workers travelling to and from the Scheme for maintenance and replacement works.

6.9.74 Calculations for worker transportation have been carried out using current conversion emissions factors to estimate emissions over the operational lifetime of the Scheme. However, carbon and emissions associated with energy and fuel use throughout the supply chain are anticipated to be lower in the future as a result of grid decarbonisation and machinery and vehicle electrification in line with the UK's net zero carbon emissions target for 2050.

Replacement of Scheme Components

6.9.75 The lifespan for the proposed BESS containers is 10 to 15 years. For the purpose of this assessment, it is assumed that the design lifespan is 10 years as a worst-case assumption. The BESS containers are expected to require up to five

replacements throughout the operation and maintenance phase. While technology may have improved and some of the assumptions used which underpin the embodied carbon values, as a conservative approach, it has been assumed that the embodied carbon at replacement will be the same as during the construction phase, equivalent to **1,034,103 tCO_2e**, inclusive of transportation emissions (sea and land) as described for the construction phase for each replacement.

6.9.76 It has been assumed that all PV panels will be fully replaced once during the lifecycle of the Scheme. Additionally, a 3% ad hoc replacement was considered based on a 0.05% failure rate per year. This results in a total estimated **63,032 tCO_2e** over the Scheme lifespan, inclusive of transportation emissions (sea and land). The Mounting Structures are not assumed to require replacement.

6.9.77 Transformers are anticipated be replaced up to once during the operation and maintenance phase. This results in a total estimated **7,185 tCO_2e** over the Scheme lifespan, inclusive of transportation emissions (sea and land).

Water Consumption

6.9.78 During operation, to maintain the effectiveness and energy generation efficiency of the PV Panels, they will be cleaned; for the purpose of this assessment, it is considered that the PV Panels will be cleaned once per year. Water will be used for cleaning the PV Panels, HGVs (during any replacement activity) and equipment and for supplying drinking water on site. Over the lifespan of the project, it is estimated that 309,196 m^3 will be used (including water use associated with product replacement and fire suppression).

6.9.79 Based on a water supply conversion factor of 0.1913 $kgCO_2e/m^3$, a total of **59 tCO_2e** will be generated from water use during the operation and maintenance phase of the Scheme.

Operational Waste and Packaging

6.9.80 There is anticipated to be 16,541 m^3 of sewage waste from the Scheme over the entire operation and maintenance phase. Using the wastewater value methodology as per the construction phase this gives a total of **2.56 tCO_2e** over the Scheme's 60-year operational and maintenance phase.

6.9.81 Emissions associated with packaging materials used per annum and during the replacement of products (PV Panels, BESS and Inverters) are set out in the **Table 6.28** below.

Table 6.28: Packaging Materials Embedded GHG Emissions

Packaging Item	Total Volume (m^3)	Assumed Density Material (tonnes/m^3)	Total Weight (tonnes)	$kgCO_2e$/tonne for material	Total tCO_2e
Pallet Wood	10,170.56	0.7	7119.39	4.68568	33.36
Polyurethane Foam pad for cushioning between modules	9,473.88	0.024	227.37	4.68568	1.07
Corrugated Cardboard, plastic wrap and Kraft cardboard	10,496.02	0.6	6297.61	4.68568	29.51
Corner pieces and edge spacers made of HDPE	172.70	0.965	166.66	4.68568	0.78
Pallet Nails	4.13	7.874	32.54	4.68568	0.15
Total					**64.87**

6.9.82 Packaging waste resulting from the replacement of Scheme components is estimated to result in a total of **64.87 tCO_2e** over the Scheme's operation and maintenance phase.

6.9.83 This gives a total value of **67.44 tCO_2e** for operational waste and packaging.

Energy Usage

6.9.84 Energy for Scheme operational aspects such as CCTV and monitoring systems, and for the office cabin/welfare centres has been scoped out of the assessment based on:

- The assumption GHG emissions from energy usage will reduce over the Operational Phase of the Scheme as a result of the decarbonization of the grid; and
- Scheme similarity to alternate IGP Schemes where it has accounted for <1% of the total GHG emissions for the Scheme.

Summary of Operational GHG Emissions

6.9.85 The below summary provides estimated GHG emissions over the whole 60-year operation and maintenance phase. As shown, the production of replacement BESS which are estimated to occur five times during the project's lifespan is the greatest contribution to GHG emissions during operation and maintenance.

6.9.86 It should be noted that all estimated emissions are based on the current best available baseline data. It is anticipated that GHG emissions will reduce from the below sources in future years as technology improves and further policy and legislation, which are assumed to bring further GHG reductions, takes effect.

Table 6.29: Operational GHG Emissions

Emissions Source	Emissions (tCO_2e)	% Operational Emissions
BESS Replacement (inclusive of transportation)	1,034,103	93.59
PV modules Replacement (inclusive of transportation)	63,032	5.70
Replacement of transformers (inclusive of transportation)	7,185	0.65
Worker Transportation	471	0.04
Packaging	65	0.01
Water Usage	59	0.01
Operational Waste	3	<0.05
Total	**1,104,918**	**100.0**

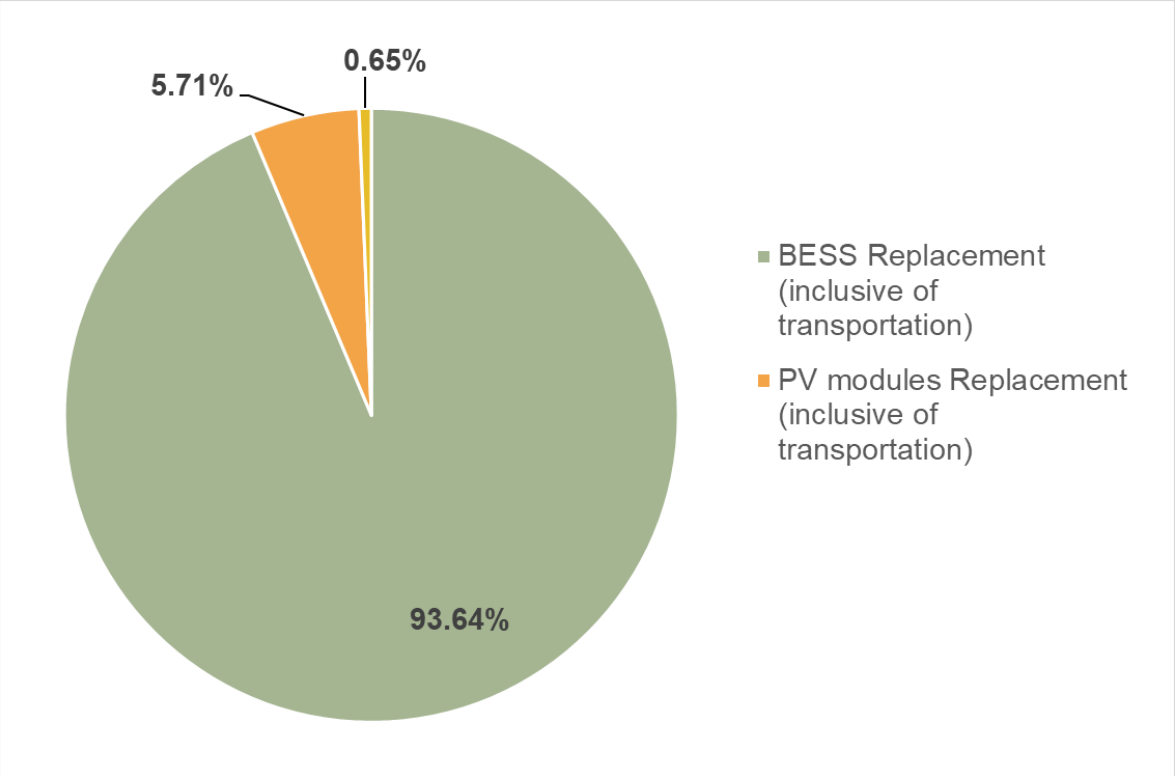

Figure 6.5: Operational GHG Emissions

Ancillary BESS-Driven Carbon Reductions

6.9.87 The BESS is a separate but associated part of the Scheme which will support the operation of the solar part of the scheme.

6.9.88 The BESS is assumed to have a capacity of 2,000 MWh and has the capacity to supply 35,040 GWh to the grid over the Scheme's lifespan.

6.9.89 It is assumed that the BESS will largely be charged with energy generated from low carbon sources, though the exact nature of emissions going into charging it has not been fully assessed. Using a working assumption that the BESS is primarily charged from the solar farm's generation and discharged back into the grid once per day at a typical round-trip efficiency of 85% and has a degradation of 80% per year.

6.9.90 The additional benefits of the BESS can be calculated by comparing the energy provided by the BESS after being charged by the Scheme's energy generation with the projected carbon intensity of the grid in 2031 (Ref 6-48).

6.9.91 As the projected grid carbon intensity does not account for Well-to-Tank (WTT) emissions associated with energy generation, the operational intensity of the Scheme was calculated using all operational emissions except those associated with BESS replacement.

6.9.92 According to these calculations, the BESS could deliver a carbon saving of approximately **957,849 tCO_2e** over the Scheme's lifespan without accounting for any emissions as a result of the energy generation used to charge the BESS.

6.9.93 However, to avoid potential double-counting of emissions savings, these additional carbon savings from operating the BESS have not been included in the overall GHG assessment for the Scheme. The assessment focuses on the primary emissions reductions achieved through energy generation alone.

6.9.94 While these additional BESS-related savings are not factored into the overall assessment, it is important to acknowledge the significant climate change mitigation potential of integrating the BESS as part of the overall solar farm development. The support the BESS provides to the main solar array and the electricity system during its operation will lead to further emissions reductions beyond just the renewable energy generation provided by the Solar scheme without its inclusion.

Significance of Effect (Operation)

6.9.95 Renewable energy generation from the Scheme during the first year of operation is estimated to be around 667,760 MWh/year on the assumption of using a tracker system. To account for product degradation, a 2% degradation factor for the first year has been applied, followed by a 0.45% degradation factor for each subsequent year. This results in an estimated energy generation figure of 600,214 MWh in the final year of operation. The total energy generated by the Scheme would be around 36.33 TWh over the 60-year Scheme Operational Phase. It is possible this is a slightly conservative estimate as future climate projections indicate a reduction in annual cloud cover over time which may have a beneficial impact on the energy generation potential of the Scheme but this has not been taken into account in the calculations.

6.9.96 It is not expected that fixed panels rather than tracked panels would significantly change the overall findings of the GHG assessment.

6.9.97 Accounting for the estimated construction, operation and maintenance, decommissioning phase emissions, the Scheme's total carbon intensity value is 39.67 gCO_2e/kWh.

6.9.98 The available UK grid carbon intensity figure only considers operational emissions from the generation of electricity.

6.9.99 As such, to compare the performance of the Scheme with the grid emissions, the analysis is solely on the emissions associated with the ongoing operational activities. The emissions generated during the initial construction phase and eventual decommissioning phase are not included within this specific comparative assessment, as recommended by ISEP guidance (Ref 6-40).

6.9.100 By aligning the lifetime energy generation figures with the other operational GHG emissions, the Scheme achieves an operational intensity of **29.74** gCO_2e/kWh. This is at a consistent level as the CP2030 emissions expectation for 2031.

6.9.101 It is worth noting that the calculation of the Scheme's carbon intensity has taken a conservative, reasonable worst-case approach. The assessment has incorporated assumptions that err on the side of caution, ensuring that the reported emissions profile is not understated. This approach provides confidence that the Scheme's actual carbon intensity will likely be a reduction from the presented figures.

6.9.102 For context only (noting that in the future all new such power station will need to be carbon capture ready and that it is ultimately intended that Carbon Capture and Storage (CCS) will be applied to existing power stations) it is noted that the most carbon-efficient fossil-fuelled technology available is a gas-fired Combined Cycle Gas Turbine (CCGT) generating facility, which has a representative figure carbon intensity of 350 gCO2e/kWh. It should be noted that NPS EN-1 (December 2025) (Ref 6-15) requires all combustion power stations with a capacity at or over 300 MW to be constructed Carbon Capture Ready. It is also worth noting that there is no current requirement for existing CCGT to retrofit CCS.

6.9.103 In line with ISEP guidance (Ref 6-40), the significance of effect will be concluded on for the whole lifespan of the Scheme in **Sections 6.9.110** onwards.

Decommissioning Phase (2091-2093)

6.9.104 As the decommissioning activities associated with the Scheme will occur far into the future, more than 60 years from the time of writing; there is uncertainty over the total estimate of GHG emissions that will be produced and the available technology. However, the decommissioning phase GHG emissions are expected to be significantly lower than the construction phase. This is because the decommissioning activities do not require the extensive manufacturing, transportation, and installation of new equipment. The main decommissioning activities, such as dismantling, removal, and site restoration, are generally less emission intensive. Additionally, as the economy decarbonises over the coming years in line with national policy, emissions from sources such as worker transport and waste disposal are anticipated to be much lower.

6.9.105 For the purpose of this assessment, it is considered that the worker transportation emissions, the energy used by decommissioning equipment, the waste generated, and the water used produce the same emissions as for the Construction Phase. The HGV movements for removal are considered to emit half the emissions than the construction phase as trips to China will not be required.

6.9.106 The decommissioning phase emissions account for less than 0.5% of the total GHG emissions of the Scheme.

Table 6.30: Decommissioning GHG Emissions

Emissions Source	Emissions (tCO_2e)	% Decommissioning Emissions
Removal of onsite products and materials	3,868	60.53
Worker Transportation	2,066	32.33
Waste	454	7.11
Water Usage	2	0.04
Total	**6,390**	100.00

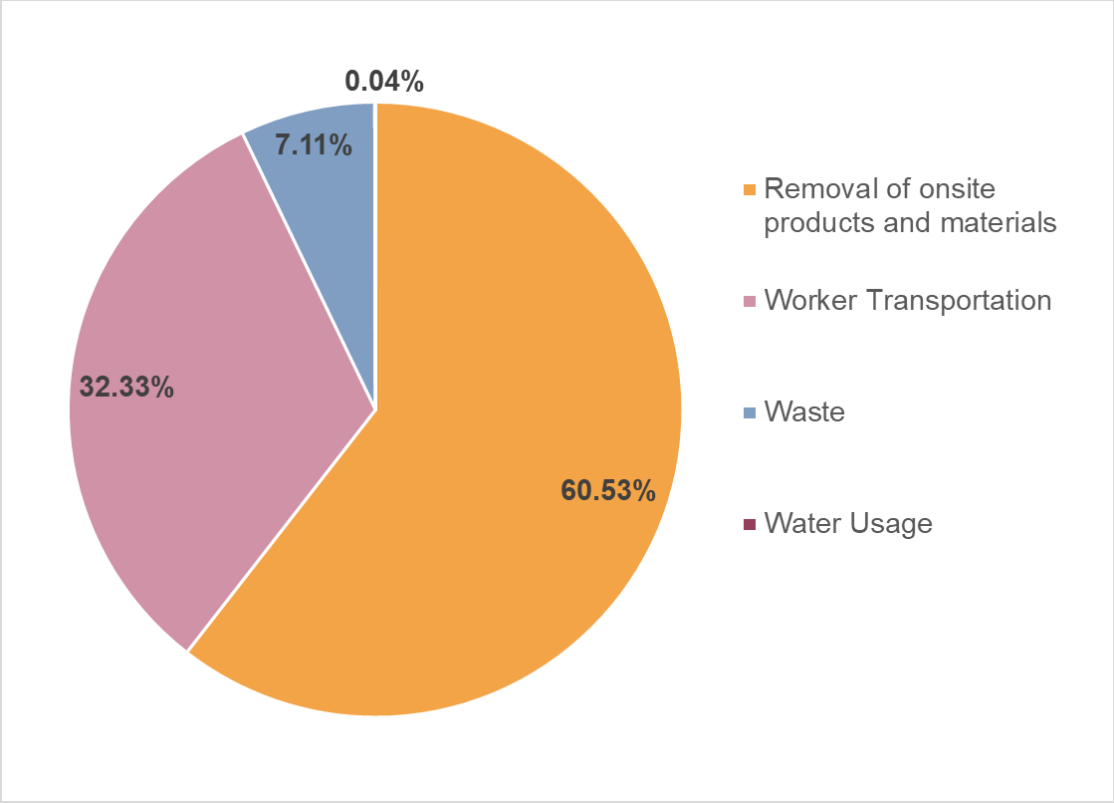

Figure 6.6: Decommissioning GHG Emissions

Significance of Effect (Decommissioning)

6.9.107 The projected lifespan of the Scheme is estimated to be 60 years so it is unknown at this stage what the effects will be in the future. Also, the decommissioning phase GHG emissions will be lower than construction, for example because the products do not need to be produced and there will be technological advancements unknown to date.

6.9.108 Therefore, based on the expected lower emissions profile of the decommissioning phase compared to the construction phase, GHG emissions from the decommissioning of the Scheme are considered to have a **Minor Adverse** effect on the climate. This is based on the project's GHG impacts being fully consistent with applicable existing and emerging policy requirements and good practice design standards at the time of decommissioning. This is **not significant** in EIA terms.

Overall GHG Significance Effect

6.9.109 There are multiple considerations in defining the significance effect of GHG emissions for the Scheme, these all contribute to the conclusions provided in **Section 6.12.**

Significance in Context with Carbon Budgets

6.9.110 UK's 4th, 5th and 6th carbon budgets have been used to contextualise emissions from the Scheme in line with ISEP guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance.

6.9.111 The UK's 5th carbon budget has been used to contextualise the magnitude of GHG emissions from the Scheme in **Table 6.31**, depending on the years in which the emissions are expected to occur. Construction emissions will fall under the 5th (2028-2030) UK carbon budget only. For this comparison, it was considered that construction emissions will occur 50% in 2029 and 25% in 2028 and 2030. In line with ISEP guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance, the electricity carbon budgets have been used to contextualise emissions from the Scheme. On average, the operational phase of the Scheme accounts for 0.53% of the 2028-2030 Electricity Carbon budgets.

Table 6.31: Contextualization of the Construction Phase GHG Emissions with the UK Carbon Budget

Relevant Electricity Supply Sectoral UK Carbon Budgets	Annual Electricity Supply Sectoral Carbon budget ($MtCO_2e$)	Annual Emissions for the Scheme During Carbon Budget Period ($MtCO_2e$)	Emissions from the Scheme as a Proportion of Carbon Budget per annum
2028	23.75	0.087	0.37%
2029	22.40	0.174	0.78%
2030	18.55	0.087	0.47%

Relevant Electricity Supply Sectoral UK Carbon Budgets	Annual Electricity Supply Sectoral Carbon budget ($MtCO_2e$)	Annual Emissions for the Scheme During Carbon Budget Period ($MtCO_2e$)	Emissions from the Scheme as a Proportion of Carbon Budget per annum
Average			**0.54%**

6.9.112 The UK carbon budgets are based on production emissions, rather than consumption. It should be noted that the bulk of manufactured components in this Scheme are manufactured overseas and imported to the UK. Furthermore, the manufacture of these components is the major contributor to the Scheme's GHG emissions.

6.9.113 Given the above acknowledgment, the embodied carbon emissions from products from China as country of origin contribute towards carbon budgets for that region. These emissions have been included as a worst case scenario for the Scheme to understand if the impact is significant or not. However, it should be noted that these are not accounted for in the UK grid projection factors.

Significance in Comparison to Forecast Emissions from Grid 'Without Scheme'

6.9.114 Once in operation, the Scheme will achieve emissions reductions compared to the without-project baseline when comparing the energy intensity of the Scheme with the grid intensity for the earliest year of operation, i.e. in a scenario in which the Scheme does not go ahead and the power it generates is provided by the 2031 grid supply projections which is inclusive of higher carbon generation sources than the Scheme.

6.9.115 The business-as-usual scenario, a scenario without the Scheme, is based on forecast UK grid average energy emissions available from the Department for Energy Security and Net Zero for the year 2031 (0.065 $kgCO_2e/kWh$). This is compared with the scheme intensity of 0.039$kgCO_2e/kWh$. The operational energy intensity allows isolated comparison of the emissions associated with operation of the Scheme compared to the alternative.

6.9.116 However, it should be noted the operational intensity of the Scheme is heavily impacted by the embodied carbon emissions associated with product replacement; in particular, replacement of the BESS, which is predicted to account for 94% of operational phase emissions. These are considered WTT emissions which are not accounted for in the 2031 grid emissions factor.

6.9.117 Over its lifespan, the Scheme will result in an estimated net saving of 1,294,630 tCO_2e in comparison with a scenario whereby the Scheme does not come into effect and emissions from the grid in the baseline year of operation (0.065$kgCO_2e/kwh$) were used. Based on this the GHG emissions from the Scheme in operation will offset emissions in a comparative scenario where energy generation may be from other sources with a higher carbon intensity.

Consideration of each element of the Scheme (Solar/BESS)

6.9.118 The Scheme is comprised of two main elements, the solar scheme itself, inclusive of associated substations and supporting infrastructure, and the supporting BESS.

6.9.119 As highlighted within the operational and construction phase emissions assessment and the preceding section, the primary source of emissions associated with the Scheme over its lifecycle will be from embodied GHG emissions within the battery products associated with the BESS. As these are considered WTT emissions which are not accounted for in the 2031 grid emissions factor, the operational intensity of the Scheme and the 2031 grid projection factor are not directly comparable.

6.9.120 The BESS emissions account for 85% of the total emissions over the lifespan of the scheme, in large part due to replacement of batteries.

6.9.121 Additionally, the emissions associated with BESS replacement have been calculated under the assumption that the same BESS technology will be used for the entire Operational Phase of the Scheme. As the Operational Phase of the Scheme is 60 years and the BESS will likely be replaced up to five times over this period. Thus, it is assumed that the Scheme will be able to utilise more efficient and sustainable BESS technology in future years.

Significance in Comparison with Other Energy Sources

6.9.122 The carbon intensity of the Scheme was calculated using total lifetime GHG emissions from the Construction, Operational, and Decommissioning Phases and is compared to other energy sources below in **Table 6.32**.

Table 6.32: Comparison of the Scheme Energy Intensity with other methods

Electricity Source	Technology	Lifecycle GHG Emissions (gCO_2e/kWh)
Coal	Coal Power equipped with a carbon capture and storage (CCS)	147 - 469
Natural Gas	Natural Gas combined cycle plant with CCS	90 - 220
Nuclear	Nuclear power	5.1 - 6.4
Typical Solar	Concentrated Solar Power (CSP)	27 - 122
	Photovoltaics	8 - 83
Wind	Onshore Wind Power	7.8 - 16
	Offshore Turbines	12 - 23
Hydropower	Hydropower	6 – 147
East Pye Solar Scheme Total Emissions Intensity		**39.67**

6.9.123 It should be noted that these figures are inclusive of embodied carbon within the infrastructure required to generate energy.

6.9.124 As shown, in comparison to other energy generating methods, the Scheme is less emitting than non-renewable sources over the course of its lifetime and is typical of GHG emissions from Solar energy generation.

Downstream Emissions Saving as a result of the Scheme

6.9.125 The Scheme is designed to help achieve the UK's 2050 Net Zero Obligation, reiterated as per the **Statement of Need [EN0110014/APP/7.11]**. It is recognised that there is a wider need beyond offsetting emissions from fossil fuels in electricity generation to reduce emissions from other sources. Once the electricity supply is sourced from zero and low emissions sources, such as the Scheme, a plentiful supply will encourage and enable electrical solutions to displace fossil fuels in many applications outside of the traditional electricity sector.

6.9.126 The government published their Clean Power 2030 Action Plan in December 2024 (Ref 6-20). The Action Plan states that delivering Clean Power 2030:

'Paves the way to decarbonising the wider economy by 2050 as we pursue the electrification of heat in buildings, transport, and industry. By 2050, annual electricity demand is likely to at least double. Clean power by 2030 prepares us for the rapid growth in power demand expected over the 2030s and 40s' [p11].' (Ref 6-20)

6.9.127 The increased power demand will likely be made from:

- Moving towards electrification of the vehicle fleet and no longer selling petrol and diesel cars (Ref 6-62);
- Alternatives to gas heating and cooking in homes (Ref 6-65) (Ref 6-66)**;** and
- Industrial processes, e.g. data centres (Ref 6-64)**.**

6.9.128 These measures to decrease GHG emissions from these sources will increase electrical energy demand. The Scheme seeks to address this requirement through the generation and storage of renewable energy.

6.9.129 While much of the implications and technology around these scientific advancements is evolving, we have focussed on two areas which demonstrate that the energy provided by the Scheme will have downstream emissions reduction effects. This demonstrates the effect of the Scheme on delivering carbon emissions benefits through the electrification of other sectors.

Electrification of Vehicle Fleet

6.9.130 Defra publish an 'Emissions Factors Toolkit' (Ref 6-67) to assist local authorities with quantifying emissions from vehicles with forecast years up to 2050. In the forecast opening year of 2031, using the NAEI forecast in rural England, 78% of the fleet will use some form of internal combustion engine (ICE) technology, i.e., not use battery electric.

6.9.131 DESNZ emissions from an average ICE passenger vehicle accounting for Diesel and Hybrid vehicles is 15.7 kgCO_2e/100km. An analysis of Vehicle Certification data suggests that the average power consumption of an electric vehicle is 17.2 kWh/100km.

6.9.132 The Scheme is predicted to produce 667,760 MWh of energy per year. Given the average power consumption of an EV of 17.2 kWh/100km and the average distance travelled per year of 7,100 km (Ref 6-71), the Scheme would have the capacity to power up to 546,806 EVs per year. While it is accepted that the Scheme itself would not directly lead to the uptake of electric vehicles, it does provide the capacity for EV charging using renewable energy. Using the 2031 UK Grid average for emissions from charging, the emissions saving of switching from ICE vehicles to EV vehicles results in an annual emissions saving of 43,404 tCO_2e for EV.

Replacement of Natural Gas use in Homes

6.9.133 While there is no mandate for the removal of gas systems in UK homes, there are UK Government schemes to encourage low carbon homes and boiler upgrades (Ref 6-66).

6.9.134 The average UK household currently uses 11,500 kWh of natural gas per year (Ref 6-62) for heating and cooking. The energy generated per year by the Scheme could therefore replace the use of natural gas in 58,066 homes annually. Using the 2025 GHG emissions factor for natural gas from the UK grid of 0.18296 kgCO_2e/kWh, this would result in an annual emissions saving of **122,173 tCO_2e**.

6.9.135 Without this scheme, and others like it coming forwards, it is not clear how a sufficient quantity of low carbon electricity could be generated to meet the UK's need to securely supply energy to decarbonise its transport, home heating and other fossil-fuel intensive sectors. This could put the UK's achievement of the legally binding 2050 net zero target at risk.

Overall Significance of Effect

6.9.136 The lifecycle carbon intensity of the Scheme (estimated to be 39.67 gCO_2e/kWh) is mid- range for that generated from the poly-silicon, ground mounted solar energy sources as presented in **Table 6.32**. This is indicative of good practice for a ground-mounted solar PV system and falls considerably below the carbon intensity values for electricity generated by fossil fuel power stations. This demonstrates that the Scheme has been designed and located to minimise its carbon intensity, taking into account the geographical conditions of the Site.

6.9.137 The Scheme will provide electricity capacity to enable lower emissions technologies to be brought forward in non-traditional electricity-use sectors such as transport and home heating.

6.9.138 Whilst the carbon intensity of electricity generated by the Scheme is higher than the lifecycle data for alternative low carbon forms of generation such as nuclear

and onshore wind, it should be noted that NPS EN-1 (Ref 6-15Ref 6-16) emphasises that to ensure reliable electricity systems during the transition to net zero 2050, the UK must adopt a diverse mix of renewable energy sources (including solar projects) to come forward.

6.9.139 Based on the above considerations, it is considered that the overall GHG impact of the Scheme is **beneficial** and **significant**, as the Scheme achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory. The Scheme is playing a part in achieving the rate of transition required by nationally set policy commitments. The Scheme avoids GHG emissions in the without-project baseline.

Climate Change Risk Resilience Assessment

6.9.140 The Climate Change Risk Resilience Assessment has considered the measures which are integrated into the design. These are considered an adequate response to the projected climate change impacts to which the Scheme would be exposed.

6.9.141 Potential climate risks to the construction, operation and maintenance, and decommissioning phases and the likelihood, consequence and significance of these risks are detailed in **Table 6.33** and **Table 6.34.**

6.9.142 Effects occurring during construction and decommissioning are considered short-term and operational effects are long-term, due to the duration of each phase.

6.9.143 Future climate change projections have been reviewed, and the sensitivity of assets have been examined, before commenting on the adequacy of the climate change resilience measures built into the Scheme.

6.9.144 The receptor for the review of climate change resilience is the Scheme itself, including all infrastructure, assets, and workers on-site during construction, operation and maintenance, and decommissioning. The sensitivity of the receptors has been evaluated based on their vulnerability, susceptibility to climate change associated impacts and their overall importance.

Table 6.33: Sensitivity of receptors

Receptors	Vulnerability	Susceptibility	Importance	Overall Sensitivity
Buildings and infrastructure including equipment and building operations	Moderate	Moderate	High	Medium
Human Health including construction workers and site users	Moderate	Moderate	High	Medium

6.9.145 The CCRA has considered the measures which are embedded into the design (see **Section 6.8**). These are considered an adequate response to the projected climate change impacts to which the Scheme would be exposed.

6.9.146 As a result of the proposed resilience measures **no significant** climate change risks during the Construction, Operational, or Decommissioning phase have been identified.

CCRA Construction Phase Impacts

6.9.147 Due to projected changes in climate and increased environmental extremes; sensitive receptors during the construction phase may be vulnerable. The climate risks are summarised in the **Table 6.34** below.

Table 6.34: Construction Phase Climate Risk.

Climate Risk	Receptor	Consequence
Increased probability of extreme weather events	Buildings and Infrastructure	Restriction to site access and working hours causing delay to construction. Damage to materials
Increased temperatures and heatwaves	Human Health	Poor working conditions impacting specific construction activities.
Increase rainfall events	Human Health	Poor working conditions impacting specific construction activities.

6.9.148 The climatic changes expected to take place during the construction phase have the potential to cause delays to the construction schedule due to the occurrence of severe weather events. The extreme weather conditions may also impact the health and safety of the workers on Site. Nonetheless, the Construction Phase takes place within the early stages of the 2020 – 2039 range of climate scenarios as detailed in **Table 6.35**. As a consequence, the potential climate extremes will likely be able to be mitigated through measures secured within the CEMP.

CCRA Operation and Maintenance Phase Impacts

6.9.149 The projected changes in climate and increased environmental extremes are likely to be more severe during the estimated 60 years operation and maintenance phase of the Scheme. The climate risks are summarised in the table below.

Table 6.35: Operation and Maintenance Phase Climate Risk

Climate Risk	Receptor	Consequence
Increased frequency of severe weather events	Buildings and Infrastructure	Damage to infrastructure/assets due to heat stress or storm/flood damage
Increased summer and winter temperatures	Buildings and Infrastructure	Increase in the ambient temperature of energy storage units, resulting in higher ventilation and cooling requirements
Increased summer temperatures	Human Health	Health and safety risk due to increased risk of fire
Increased winter precipitation	Human Health	Health and safety risk due to increase in surface water flooding and standing water leading to land subsidence

CCRA Decommissioning Impacts

6.9.150 During the decommissioning phase, the risks will be the same as those in the construction phase identified in **Table 6.34.**

6.9.151 However, the impacts of climate change are expected to worsen and increase based on the currently available projections. This may increase the vulnerability of sensitive receptors mentioned above for the construction process, this has been factored in and does not change the outcome of the assessment.

Overall CCRA Impact

6.9.152 Based on the above assessment, without appropriate mitigation the Scheme is at high risk to climate change impacts.

6.9.153 Embedded mitigation measures to increase the resilience of the Scheme to climatic changes are outlined in previous sections and summarised in **Table 6.36**:**, Table 6.37 and Table 6.38**. These tables consider the effect on the Scheme itself as well as effects on human health.

6.9.154 The CCRA review has considered the measures which are integrated into the design and based on the outcomes of the assessment, are considered an adequate response to the projected climate change impacts to which the Scheme would be exposed.

6.9.155 As a result of the proposed resilience measures **no significant** climate change risks during the construction, operation and maintenance, and decommissioning phases have been identified.

Table 6.36: Potential Climate Change Impacts and Embedded Mitigation Measures during Construction Phase

Climate hazard	Potential Climate Change Impact	Receptor	Potential Climate Change Risk to the Scheme	Embedded mitigation	Likelihood	Consequence	Significance
High temperatures	Increase in annual temperature	Workers, staff and visitors on site	Risk of overheating to workers	External contractors will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions. As detailed in the **Outline CEMP [EN0110014/APP/7.1].**	Low	Minor adverse	**Not Significant**
		Plant and vehicles, physical structures, materials	Overheating of electrical equipment. Damage to materials.	BESS Equipment has HVAC cooling systems where necessary. The increase in annual temperature remains within tolerance ranges for the materials being used.	Low	Minor adverse	**Not Significant**
High temperatures	Increase in summer temperature	All receptors	Overheating of electrical equipment. Damage to materials. Human Health Risk of overheating to workers.	Contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions. As detailed in the **Outline CEMP [EN0110014/APP/7.1]**.	Low	Minor adverse	**Not Significant**
High temperatures	Increase in heat waves	Workers, staff and visitors on site	Increased heat stress/ heat exhaustion for workers.	The Contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather. As detailed in the **Outline CEMP [EN0110014/APP/7.1]**.	Very Low	Minor adverse	**Not Significant**

Climate hazard	Potential Climate Change Impact	Receptor	Potential Climate Change Risk to the Scheme	Embedded mitigation	Likelihood	Consequence	Significance
		Plant and vehicles, physical structures, materials,	Overheating of electrical equipment. Damage to materials	The Contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather. As detailed in the **Outline CEMP [EN0110014/APP/7.1]** Using equipment's cooling systems where necessary/adapting working practices and equipment used based on weather conditions.	Very Low	Minor adverse	**Not Significant**
High precipitation	Increase to winter rainfall	Plant and vehicles, physical structures, materials, and access routes to sites and access routes to sites.	Viability of and access to sites (such as heavy rain resulting in surface water flooding of local roads, sources of power supply or inundation of sites).	External contractors will monitor weather forecasts and receive Environment Agency's (EA) flood alerts and plan works accordingly, protecting workers and resources from any extreme weather conditions such as storms, flooding. As detailed in the **Outline CEMP [EN0110014/APP/7.1].**	Very Low	Minor adverse	**Not Significant**
Low precipitation	Decrease to summer rainfall	All receptors	Increased construction dust leading to nuisance dust and impacts on human health.	Dust mitigation measures. As detailed in the **Outline CEMP [EN0110014/APP/7.1].**	Low	Minor adverse	**Not significant**
Increase in storm intensity	Stronger winds, heatwaves, heavy precipitation	Plant and vehicles, physical structures, materials, and access routes to sites	Damage to structures / materials / equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks. May include high	The Contractor will monitor weather forecasts and receive Environment Agency flood warnings and alerts and plan works	Low	Moderate adverse	**Not Significant**

Climate hazard	Potential Climate Change Impact	Receptor	Potential Climate Change Risk to the Scheme	Embedded mitigation	Likelihood	Consequence	Significance
			winds increasing dust (and other debris) and storm surge leading to nuisance dust and impacts on human health.	accordingly, protecting workers and resources from any extreme weather conditions. As detailed in the **Outline CEMP [EN0110014/APP/7.1].**			
Increased fire risk	Drier and hotter conditions leading to increased risk of wildfires and uncontrolled fires	Buildings, Infrastructure, Site workers and visitors	Damage to structures/materials/equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks. Threat to human health and safety of workers and visitors	Fire suppression system on site to rapidly action in case of fire as described in the **Outline CEMP [EN0110014/APP/7.1].**	Very Low	Moderate adverse	**Not Significant**

Table 6.37: Potential Climate Change Impacts and Embedded Mitigation Measures during Operational Phase

Climate hazard	Potential Climate Change Impact	Receptor	Potential Climate Change Risk to Proposed Development	Existing or embedded mitigation measure	Likelihood	Consequence	Significance
High temperatures	Increase in summer temperature	All receptors (infrastructure, buildings, workers and staff)	Increase in air conditioning requirements. Overheating of electrical equipment. Human health risk of overheating to workers.	BESS systems would include HVAC systems, and these would be contained within the individual equipment containers. Workers and staff to forecasts and plan works accordingly. As detailed in the **outline OEMP [EN0110014/APP/7.2]**.	Low	Moderate adverse	**Not Significant**
High temperatures	Increase in heat waves	All receptors (infrastructure, buildings, workers and staff)	Increase in air conditioning requirements. Overheating of electrical equipment. Human health risk of overheating to workers.	BESS systems would include HVAC systems and these would be contained within the individual equipment containers. Workers and staff to forecasts and plan works accordingly. As detailed in the **outline OEMP [EN0110014/APP/7.2]**.	Low	Moderate adverse	**Not Significant**

Climate hazard	Potential Climate Change Impact	Receptor	Potential Climate Change Risk to Proposed Development	Existing or embedded mitigation measure	Likelihood	Consequence	Significance
High precipitation	Increase to winter rainfall	All receptors (infrastructure, buildings, workers and staff)	Surface water flooding and standing waters. Deterioration of structures or foundations due to increase in soil moisture levels. Damage to building surfaces/ exposed utilities from increased drying/wetting and increase frost penetration.	All sensitive and electrical equipment on the PV panel will be elevated by legs or mounted on raised frames.	Very Low	Moderate adverse	**Not Significant**
Low precipitation	Decrease to summer rainfall	All receptors (infrastructure, buildings, workers and staff)	Water shortages. Deterioration of structures or foundations due to decrease in soil moisture levels.	Water expected to be stored on site for fire suppression.	Very Low	Minor adverse	**Not Significant**
Increase in storm intensity	Stronger winds, heatwaves, heavy precipitation	Plant and vehicles, physical structures, materials, and access routes to sites	Surface water flooding and standing waters. Deterioration of structures or foundations due to increase in soil moisture levels. Damage to building surfaces/ exposed utilities from increased drying/wetting and increase frost	The **outline OEMP [EN0110014/APP/7.2]** accompanying the DCO Application, describes water management measures to control surface water run-off and drain hardstanding and other structures.	Very Low	Minor adverse	**Not Significant**

Climate hazard	Potential Climate Change Impact	Receptor	Potential Climate Change Risk to Proposed Development	Existing or embedded mitigation measure	Likelihood	Consequence	Significance
			penetration or tree falls. Strong winds damaging structures directly or via falling trees and debris which may impact human health.				
Increased fire risk	Drier and hotter conditions leading to increased risk of wildfires and uncontrolled fires	Buildings, Infrastructure, Site workers and visitors	Damage to structures/materials/equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks. Human health risk to safety of workers and visitors.	Fire suppression system on site to rapidly action in case of fire as described in the **outline OEMP [EN0110014/APP/7.2]**.	Very Low	Moderate adverse	**Not Significant**

Table 6.38: Potential Climate Change Impacts and Embedded Mitigation Measures during Decommissioning Phase.

Climate hazard	Potential Climate Change Impact	Receptor	Potential Climate Change Risk to Proposed Development	Existing or embedded mitigation measure	Likelihood	Consequence	Significance
High temperatures	Increase in annual temperature	All receptors	Overheating of electrical equipment. Damage to materials. Human health risk of overheating to workers.	Contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions. As outlined in the **Outline DEMP [EN0110014/APP/7.3]**	Low	Minor adverse	**Not Significant**
High temperatures	Increase in summer temperature	All receptors	Overheating of electrical equipment. Damage to materials. Human health risk of overheating to workers.	Contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions. As outlined in the **outline DEMP [EN0110014/APP/7.3]**.	Low	Minor adverse	**Not Significant**
High temperatures	Increase in heat waves	Workers, staff and visitors on site	Increased heat stress/ heat exhaustion for workers.	The Contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather. As outlined in the **outline DEMP [EN0110014/APP/7.3]**.	Very Low	Minor adverse	**Not Significant**
		Plant and vehicles, physical structures, materials,	Overheating of electrical equipment. Damage to materials.	The Contractor will monitor weather forecasts and plan works accordingly, protecting workers and	Very Low	Minor adverse	**Not Significant**

Climate hazard	Potential Climate Change Impact	Receptor	Potential Climate Change Risk to Proposed Development	Existing or embedded mitigation measure	Likelihood	Consequence	Significance
				resources from any extreme weather. As outlined in the **outline DEMP [EN0110014/APP/7.3]**.			
High precipitation	Increase to winter rainfall	Plant and vehicles, physical structures, materials, and access routes to sites and access routes to sites.	Viability of and access to sites (such as heavy rain resulting in surface water flooding of local roads, sources of power supply or inundation of sites).	External contractors will monitor weather forecasts and receive Environment Agency's (EA) flood alerts and plan works accordingly, protecting workers and resources from any extreme weather conditions such as storms, flooding. As outlined in the **outline DEMP [EN0110014/APP/7.3]**.	Very Low	Minor adverse	**Not Significant**
Increase in storm intensity	Stronger winds, heatwaves, heavy precipitation	Plant and vehicles, physical structures, materials, and access routes to sites	Damage to structures / materials / equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks. May include high winds increasing dust (and other debris) and storm surge which may lead to nuisance and impacts on human health.	The Contractor will monitor weather forecasts and receive Environment Agency flood warnings and alerts and plan works accordingly, protecting workers and resources from any extreme weather conditions. As outlined in the **outline DEMP [EN0110014/APP/7.3]**.	Low	Moderate adverse	**Not Significant**

6.10 Additional Mitigation Measures

Additional Construction Phase Mitigation Measures

6.10.1 While worst case assumptions have been made for the purpose of the GHG vehicle type around use of HGVs for transport of construction materials, wherever possible vehicles with lower carbon emissions should be used. This should be achievable as technology improves and lower emission HGV become more available.

6.10.2 The Scheme incorporates embedded GHG mitigation measures that prioritise the use of low-carbon design materials and construction practices.

6.10.3 The embedded GHG mitigation measures include construction phase waste reduction, the use of low-carbon materials, and transport emission controls, as well as climate resilience measures such as flood risk management. The assessment of the Scheme's design and operational parameters demonstrates that the current measures are adequate. Specifically, the Scheme is expected to save GHG emissions compared to the grid in 2025, supporting the UK's transition to net zero emissions. Based on the conclusions of the assessment, no additional mitigation measures are required in terms of Climate Change.

6.10.4 Monitoring the weather is essential and it is described in the **Outline OEMP [EN0110014/APP/7.2].** This includes regularly monitoring weather forecasts and the news for Environment Agency flood warnings, relevant weather warnings, and water levels of the local waterways. Monitoring weather forecasts will be integral to planning works accordingly and safeguarding against extreme weather conditions. As detailed in the **Outline OEMP [EN0110014/APP/7.2], Outline CEMP [EN0110014/APP/7.1]** and the **Outline DEMP [EN0110014/APP/7.3],** this proactive approach ensures the safety of workers and the protection of infrastructure. Additionally, external contractors appointed by the Applicant will be responsible for monitoring weather forecasts and receiving Environment Agency flood warnings and alerts. This ensures that all works are planned and executed in a manner that minimises risks associated with adverse weather. By responding appropriately and in a timely manner to varying weather conditions, the Scheme can effectively mitigate potential disruptions and ensure the continuity and safety of its operations.

6.10.5 As no significant effects have been identified above for receptors during any phase of the Scheme once embedded mitigation is taken into account, no additional mitigation measures for the Scheme are required.

6.11 Residual Effects

6.11.1 This section summarises the residual effects of the Scheme on following the

adoption of embedded and additional mitigation (if additional mitigation is proposed).

Residual Effects for GHG Impact Assessment

6.11.2 This section summarises the residual significant effects of the Scheme on Climate Change following the implementation of embedded and additional mitigation.

6.11.3 During the construction, operation and maintenance, and decommissioning phases of the Scheme, GHG emissions will be generated by products, transport, energy, and fuel-use used by the Scheme.

6.11.4 For the construction and decommissioning phases, residual effects are defined as **Minor Adverse (not significant)**

6.11.5 The residual effects for the operation and maintenance phase are defined as **significant and beneficial**.

6.11.6 In addition to the numeric assessment, the Scheme will also enable additional downstream benefits through the facilitating future uptake of low emissions technology outside of traditional electricity uses.

Conclusions

6.11.7 The GHG assessment findings indicate the Scheme will yield **significant beneficial** impacts on total GHG emissions.

Residual Effects for CCRA

6.11.8 The CCRA has considered the measures which are integrated into the Scheme design. These measures are considered adequate to address the projected climate change impacts to which the Scheme would be exposed.

6.11.9 The design incorporates climate resilience through embedded design mitigation measures.

6.11.10 The Scheme's design and integrated mitigation measures effectively address climate change risks. No significant climate change risks during the Construction, Operational, or Decommissioning Phases have been identified.

6.12 Cumulative Effects Assessment

6.12.1 This section presents an assessment of cumulative effects between the Scheme and other existing and/or approved developments.

6.12.2 As set out in **ES: Chapter 2 EIA Methodology [EN0110014/APP/6.1.2],** a

Cumulative Effects Assessment (CEA) has been undertaken as part of the EIA in accordance with PINS Advice on Cumulative Effects Assessment (September 2024) and has considered two types of cumulative effects.

- In combination effects: the combined effect generated by individual effects on a particular receptor; and
- Cumulative effects: effects generated by the Scheme and other planned or approved developments on the same receptor

In-Combination Effects

6.12.3 Section 6.5 of this chapter sets out a bespoke assessment of in-combination affects in line with the ISEP – 'Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (Ref 6-42)'. In addition, in-combination climate change effects have been considered alongside other topics as set out in **ES: Chapter 19 In-combination effects [EN0110014/APP/6.1.2].**

Cumulative Effects

6.12.4 This section presents an assessment of cumulative effects between the Scheme and other proposed and committed plans and projects.

6.12.5 This assessment has been made with reference to the methodology and guidance set out in **ES: Chapter 2 EIA Methodology [EN0110014/APP/6.1.2].** of this ES and shortlist of cumulative plans and projects identified in **ES: Appendix 2.4 Cumulative Schemes [EN0110014/APP/6.3.2.4]**.

6.12.6 For individual receptors, this cumulative effect assessment identifies where the assessed effects of the Scheme could interact with effects arising from other plans and/or projects on a spatial and/or temporal basis.

6.12.7 The receptor for the GHG Assessment is the global atmosphere. All projects worldwide have the potential to contribute to cumulative impacts on the global climate through their GHG emissions. As per ISEP and precedent, and supported in case law, it is not appropriate to undertake a cumulative assessment for GHG assessments, as the climate is global so would be require an assessment of all potential worldwide future developments which is not feasible, and it is not appropriate to seek to only assess only some specific schemes. Instead, the appropriate approach is to consider the Scheme's emissions in the context of Carbon budgets as they are inherently cumulative.

6.12.8 The receptor for the Climate Resilience Review is the Scheme itself. As the effects being judged are to the project itself there can be no cumulative effects to other receptors.

6.13 Conclusion

6.13.1 This chapter has set out and assessed the likely effects of the Scheme in relation to Climate Change. Likely effects have been assessed for the construction, operation and maintenance and decommissioning phases of the Scheme.

6.13.2 **Table 6.39** sets out a summary of the Climate Change environmental effects.

Table 6.39: Summary of Residual Effects for Climate Change

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Scale and Nature of Effect	Significant/Not Significant
Construction Phase					
Global Climate	High	GHG emissions arising principally from the embodied carbon of materials. Particularly embodied carbon of PV Panels and batteries.	Minor	Minor Adverse residual effect, as every GHG emission poses a risk to the global climate.	**Not Significant**
Scheme (Plant and vehicles, physical structures, materials, and access routes to sites) and Workers, staff and visitors on site	Moderate	Stronger winds, heatwaves, heavy precipitation and increased risk of fires/wildfires.	Minor	Minor adverse	**Not significant.**
Operation and Maintenance Phase					
Global Climate	High	GHG emissions arising principally from the embodied carbon of materials that need to be replaced during the Scheme lifespan. Particularly batteries and PV Panels. Offset of emissions in	Beneficial	Beneficial	**Significant**

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Scale and Nature of Effect	Significant/Not Significant
		comparison to a 'without scheme' baseline where energy may be produced by other more highly emitting methods. The scheme will facilitate future uptake of low emissions technology outside of traditional electricity uses.			
Scheme (Plant and vehicles, physical structures, materials, and access routes to sites) and Workers, staff and visitors on site	Moderate	Stronger winds, heatwaves, heavy precipitation and increased risk of fires/wildfires.	Minor	Minor adverse	**Not significant.**
Decommissioning Phase					
Global Climate	High	GHG emissions arising principally from the embodied carbon of materials. Particularly embodied carbon of PV Panels and batteries.	Minor	Minor Adverse residual effect, as every GHG emission poses a risk to the global climate.	**Not Significant**
Scheme (Plant and vehicles, physical structures, materials, and access routes to sites) and Workers, staff and visitors on site	Moderate	Stronger winds, heatwaves, heavy precipitation and increased risk of fires/wildfires.	Minor	Minor adverse	**Not significant.**

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