Eastern Green Link 4:

Scottish Onshore Scheme

Volume 2: Main Report

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13.1 Introduction

This chapter sets out the methodology, baseline conditions, assessment of effects, and mitigation considerations for the Scottish Onshore Scheme in relation to climate change.

The climate assessment has been carried out in accordance with the Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating Their Significance (Ref 1), hereafter referred to as the IEMA Guidance. Consideration was given to the following aspect of the climate change assessment:

- Greenhouse gas (GHG) assessment - Impact of GHG emissions arising from the Scottish Onshore Scheme on the climate, including how it will affect the UK and Scotland in meeting its national carbon budgets.

The Climate Change Risk and Resilience Assessment (CCRA) and In-Combination Climate Change Impact (ICCI) assessment have been scoped out of the climate change assessment, in line with the approach agreed at the scoping stage. This reflects the limited potential for the Scottish Onshore Scheme to be materially impacted by climate-related hazards.

This chapter should be read in conjunction with the description of the Scottish Onshore Scheme in **Chapter 2: Project Description.** Other relevant topic chapters within this Environmental Impact Assessment Report (EIAR) include:

- Chapter 7: Ecology and Nature Conservation;
- Chapter 10: Access, Traffic and Transport; and
- Chapter 12: Geology and Ground Conditions.

13.2 Legislation and Policy

Legislation

Legislation relevant to the climate change assessment is presented in Table 13-1: Relevant Climate Change Legislation**.**

Table 13-1: Relevant Climate Change Legislation

Legislation	Legislation details
United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement (Ref 2)	The Paris Agreement is a legally binding agreement within the UNFCCC dealing with GHG emissions mitigation, adaptation, and finance, which started in 2020. It requires all signatories to strengthen their climate change mitigation efforts to keep global warming to well below 2°C this century and to pursue efforts to limit global warming to 1.5°C.
Town and Country Planning (Environmental	The EIA Regulations state that an EIA (where relevant) must include:

Legislation	Legislation details
Impact Assessment) (Scotland) Regulations 2017 (Ref 3)	"a description of the likely significant effects of the development on the environment resulting from... the impact of the project on climate (for example, the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change".
Climate Change Act 2008 and Climate Change Act (2050 Target Amendment) (Ref 4)	In June 2019, the Climate Change Act was amended, requiring the Government to reduce the UK's net emissions of GHGs by 100% (net zero) relative to 1990 levels by 2050.
Climate Change (Emissions Reduction Targets) (Scotland) Act 2024) (Ref 5)	The Climate Change (Emissions Reduction Targets) (Scotland) Act 2024 revises Scotland's legislative framework for reducing GHG emissions. It removes the interim 75% reduction target for 2030 and proposes the introduction of five-year statutory carbon budgets to replace annual targets. While the Act retains the legally binding 2045 net-zero target, the proposed five-year carbon budgets are not yet legally binding and remain subject to further legislative approval.
Carbon Budget Orders 2021 (Ref 6)	The UK carbon budgets are in place to restrict the amount of GHG emissions the UK can legally emit in a five-year period. The UK is currently in the Fourth Carbon Budget period, which runs from 2023 to 2027. The Third, Fourth, and Fifth Carbon Budgets were set in line with the UK's previous target of an 80% reduction in emissions by 2050. The Sixth Carbon Budget is the first to align with the UK Government's legally binding commitment to achieve net zero emissions by 2050. The Sixth Carbon Budget, which reflects the amended net zero target, was published by the Climate Change Committee (CCC) for consideration by the UK Government in December 2020. In April 2021, the UK Government accepted the CCC's recommendation to cap emissions at 965 million tonnes of carbon dioxide equivalent ($MtCO_2e$) and laid the Carbon Budget Order 2021 before Parliament. The CCC published its advice on the Seventh Carbon Budget in February 2025, recommending a budget of 535 $MtCO_2e$. However, this budget has not yet been formally accepted by the UK Government or ratified by Parliament and is expected to be confirmed later in 2025.

Policy

Policy relevant to the climate change assessment is presented in **Table 13-2: Relevant Climate Change Policy.**

Table 13-2: Relevant Climate Change Policy

Policy	Policy Detail
Update to the Climate Change	This document updates the 2018 Climate Change Plan to reflect the setting of new ambitious targets to end Scotland's contribution to

Policy	Policy Detail
Plan 2018 – 2032 (Ref 7)	climate change by 2045. It also reflects on how Scotland emerged from COVID-19, recognising that there is a chance to rebuild the economy to deliver a greener, fairer, and more equal society. In line with the previous plan, the focus is on the period up to 2032.
Draft Energy Strategy and Just Transition Plan (Ref 8)	Scotland's Draft Energy Strategy and Just Transition Plan aims to achieve a zero-carbon energy system by 2045. The plan includes a goal for the addition of 20 GW of renewable electricity by 2030, accelerated decarbonisation of industry, transport, and heat, and the establishment of a national public energy agency.
Clean Power 2030 Action Plan (Ref 9)	The Clean Power 2030 Action Plan sets out the UK Government's strategy to deliver a fossil fuel-independent electricity system by 2035. It emphasises the need to expand transmission infrastructure to reduce grid congestion and enable greater use of renewable energy. With 739 GW of projects currently in the grid connection queue, delays are causing curtailment of clean generation and reliance on fossil fuel backup.
National Planning Framework 4 (NPF4) (Ref 10)	The Scottish Ministers adopted NPF4 on 13 February 2023. NPF4 sets out how the Scottish Government's planning and development approach will help achieve a net-zero, sustainable Scotland by 2045.
Fife 2024 Strategy and Action Plan (Ref 11)	The Climate Fife 2024 Strategy and Action Plan aims to reduce GHG emissions through a range of targeted initiatives. Fife is committed to achieving net-zero emissions by 2045. Key measures include transitioning to low-carbon energy systems, decarbonising public buildings and transport, and promoting zero-waste initiatives.

13.3 Consultation

Response to Scoping Opinion

The Scoping Opinion issued by Fife Council on 17 February 2025 confirmed agreement with the approach to climate change assessment set out in the Scoping Report. No additional comments specific to climate change were received from statutory or non-statutory consultees.

On this basis, this chapter focuses solely on the assessment of GHG emissions associated with the construction and operation of the Scottish Onshore Scheme. The scope and methodology follow recognised best practice, including guidance from the IEMA (Ref 1), PAS 2080:2023 (Ref 12) and the RICS Whole Life Carbon Assessment guidance (2nd edition) (Ref 13).

Additional Consultation

No additional consultation was undertaken in relation to the climate change assessment.

13.4 Methodology

Introduction

This section provides a summary of the methodology used for the GHG assessment.

Guidance and Standards

The climate change assessment has been carried out in accordance with the following good practice guidance documents:

- IEMA Guidance (Ref 1);
- PAS 2080:2023 Carbon Management in Infrastructure (Ref 12);
- Royal Institution of Chartered Surveyors (RICS) Whole Life Carbon Assessment (WLCA) for the Built Environment (Ref 13), hereafter referred to as the RICS WLCA Guidance; and
- The GHG Protocol (Ref 14).

Study Area

The Study Area for the GHG assessment includes:

- Direct GHG emissions arising through works on the Scottish Onshore Scheme site as a result of the construction and operation within the Application Boundary as shown on **Figure 1-4** within **Chapter 1: Introduction**; and
- Indirect GHG emissions occurring off-site encompass embodied carbon in materials, transportation, upstream activities (such as well-to-tank processes and transmission and distribution losses), as well as the processing and disposal of waste.

Assessment Methodology

General Approach

To identify the magnitude of GHG impact over the life cycle of the Scottish Onshore Scheme, GHG emissions are calculated in line with the GHG Protocol (Ref 14) and reported following the principles outlined in PAS 2080:2023 Guidance (Ref 12). GHG emissions from construction activities, embodied carbon in materials, and the operation of the Scottish Onshore Scheme have been quantified in this EIAR using a calculation-based approach, in line with the GHG Protocol (Ref 14):

Activity data x GHG emissions factor = GHG emissions values

Activity data is a quantifiable measure of activity, such as operating hours or volumes of fuel used. Emission factors convert the activity data into GHG emissions. Activity data was sourced from data provided by the Applicant. Where specific data was not available, a combination of assumptions and industry benchmarks was used to fill data gaps. Where this was not possible, then a qualitative approach to assessing the GHG impacts was followed, in line with the IEMA Guidance (Ref 1).

Emission factors were sourced from the Department for Energy Security and Net Zero (DESNZ) 2025 emission factor database (Ref 15), and the Bath University Inventory of Carbon and Energy database (Ref 16), both publicly available sources. In addition, emission factors were sourced from a comparable infrastructure project in the UK to inform the assessment of electrical equipment at the converter station.

In line with the GHG Protocol (Ref 14), the GHG assessment is reported as tonnes of carbon dioxide equivalent (tCO_2e) and has considered the seven Kyoto Protocol gases:

- Carbon dioxide (CO_2);

- Methane (CH_4);
- Nitrous oxide (N_2O);
- Sulphur hexafluoride (SF_6);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Nitrogen trifluoride (NF_3).

These gases are broadly referred to in this EIAR under an encompassing definition of 'GHGs', with the unit of tCO_2e (tonnes CO_2 equivalent) or $MtCO_2e$ (mega tonnes of CO_2 equivalent).

Table 13-3: Potential effects from the GHG Assessment of the Scottish Onshore Scheme. summarises the key anticipated GHG emissions sources associated with the Scottish Onshore Scheme by life cycle stage, in line with PAS 2080:2023 Guidance (Ref 12). Additionally, the RICS WLCA Guidance (Ref 13) have been integrated to inform the scope and reporting framework of the GHG assessment.

Table 13-3: Potential effects from the GHG Assessment of the Scottish Onshore Scheme.

Life cycle stage	PAS 2080:2023 Module	Activity	Primary emission sources
Pre-construction stage	A0	Surveys and site visits. Design activities Business travel to and from Site	Activities in A0 include, but are not limited to, non-physical processes before construction, such as preliminary studies, impact assessments, risk assessments, stakeholder engagement, design and technical studies, product/material tests, site surveys and acquisition of land and design.
Product stage	A1-A3	Raw material extraction and manufacturing of products are required to build the equipment for the Scottish Onshore Scheme. Transportation of materials for such processes/ manufacturing (where available).	Embodied GHG emissions from energy use in the extraction of materials and manufacture of components and equipment. GHG emissions from the transportation of products and materials during their processing and manufacture. Due to the nature of the equipment, this could require shipment of certain aspects over significant distances.
	A4	Transportation of construction materials to the	Transport of construction materials is included under the construction process stage, where these are not

Life cycle stage	PAS 2080:2023 Module	Activity	Primary emission sources
Construction process stage		Scottish Onshore Scheme. Due to the nature of the equipment required, this could require shipment of certain aspects over significant distances.	included in embodied GHG emissions.
	A5	On-site construction activity. Transport of construction workers. Disposal of any waste generated during the construction processes. Land Clearance Enabling works	GHG emissions from energy (electricity, fuel, etc.) consumption for plant and vehicles, and generators on site. Fuel consumption from transport of materials to site (where these are not included in embodied GHG emissions). GHG emissions from fuel use for worker commuting. GHG emissions from disposal of waste. GHG emissions from fuel consumption for transportation of waste. Land use change during construction.
Operation stage	B1-B8	Energy use from the operation of the Scottish Onshore Scheme. Maintenance activities	GHG emissions from this grid electricity use. GHG emissions from conversion losses. Fuel use for maintenance activities. GHG emissions associated with maintenance activities (e.g. replacement components and fuel use).

Life cycle stage	PAS 2080:2023 Module	Activity	Primary emission sources
			GHG emissions associated with the transportation of workers to and from the site.
Beyond System Boundary	D1-D2	Potential benefits and loads from material reuse, recycling, and energy recovery beyond the system boundary. Potential benefits and loads from exported utilities beyond the system boundary.	Module D covers potential benefits and loads beyond the system boundary, including emissions associated with material recovery, reuse, recycling, and energy recovery at end-of-life. It is estimated separately to avoid double counting, particularly for recovered materials. While Module D provides insight into potential recovery benefits, it has limitations as a metric for circularity or future resource efficiency. For this assessment, Module D primarily includes: Recovery and recycling of construction materials (e.g. steel, concrete); Energy recovery from non-reusable materials; and Avoided emissions from displaced conventional electricity generation (e.g. Combined Cycle Gas Turbine (CCGT)).

Determining the magnitude of change

In line with IEMA Guidance (Ref 1), the Scottish Onshore Scheme GHG emissions were compared against existing carbon budgets for the UK and Scotland. The Scottish Onshore Scheme's impact on GHG emissions was assessed by comparing it to net-zero trajectories and evaluating its alignment with UK and Scottish decarbonisation policies.

The UK carbon budgets are in place to restrict the amount of GHG emissions the UK can legally emit in a five-year period. The Third, Fourth and Fifth Carbon Budgets reflect the previous 80% reduction target by 2050. The Sixth Carbon Budget is the first to align with the legislated UK Government 2050 net-zero commitment (Ref 6). The Seventh Carbon Budget

was published by the CCC on 26 February 2025 and sets out the recommended UK emissions limits for the period 2038–2042 (Ref 17).

This GHG assessment, therefore, uses the IEMA Guidance (Ref 1) to assess the significance of effects, with the UK Carbon Budgets and Scottish GHG reduction targets providing context to the GHG emissions as detailed in **Table 13-4: UK Carbon Budgets and indicative carbon budgets based upon the CCC balanced Net-Zero Pathway** and **Table 13-5: Scottish Carbon Budgets**.

Table 13-4: UK Carbon Budgets and indicative carbon budgets based upon the CCC balanced Net-Zero Pathway

Carbon budget	UK Carbon Budget ($MtCO_2e$)	Indicative Carbon Budgets based upon the CCC's balanced Net-Zero Pathway ($MtCO_2e$)	Electricity Generation Carbon Budget based upon the Seventh Carbon Budget ($MtCO_2e$)	Industry Carbon Budget based upon the Seventh Carbon Budget ($MtCO_2e$)
4th (2023 – 2027)	1,950	-	162	224
5th (2028-2032)	1,725	-	68	158
6th (2033-2037)	965	-	29	103
7th (2038-2042)	535	-	22	54
8th (2043-2047)	-	220	10	28
9th (2048-2050)	-	20	3	11

To illustrate the Scottish Onshore Scheme's trajectory towards net zero by 2050, it is recommended that the CCC's Balanced Net Zero Pathway be utilised post-2042, in the absence of any formally published carbon budgets beyond the Seventh Carbon Budget. Beyond 2050, the UK is expected to maintain net-zero emissions.

The Balanced Net Zero Pathway is recommended to be divided into five-year periods from 2038 onwards to align with the existing UK national carbon budget timeframes. The proposed indicative budget periods derived from this pathway include the Eighth and Ninth Carbon Budgets, extending to 2050 in line with the UK's 1.5°C trajectory, as detailed in **Table 13-4:.**

However, it should be noted that the carbon budgets beyond 2037 - including the Seventh Carbon Budget - have not yet been formally adopted by the UK Government or ratified by Parliament. As such, they can only be used as indicative reference points to contextualise the Scottish Onshore Scheme's alignment with the national net-zero trajectory.

To contextualise the estimated GHG emissions from the Scottish Onshore Scheme, sector-specific carbon budgets have been used in line with IEMA Guidance (Ref 1), which

recommends applying relevant sectoral budgets to assess the significance of emissions and their alignment with national targets.

For operational emissions, the Electricity Generation sectoral budget from the recently published Seventh Carbon Budget (Ref 17) has been selected, as it reflects the sector in which the Scottish Onshore Scheme will operate and to which its operational emissions will contribute.

For construction-phase emissions, the Industry sectoral budget, also published in the Seventh Carbon Budget (Ref 17), has been used. This is considered the most appropriate budget, as it captures the embodied and construction-related emissions associated with the Scottish Onshore Scheme, including those from materials production, transport, and construction activities.

In addition to the UK Government's carbon budgets, the Scottish Government has set its own carbon reduction target of achieving net zero by 2045. To support this target, five-yearly carbon budgets have been developed, informed by emissions trajectory advice published by the CCC in May 2025 (Ref 18) and aligned with Scotland's legislated 2045 net-zero target. It should be noted that these carbon budgets must be legislated for by the Scottish Parliament before they become legally binding. The relevant carbon budgets are detailed in **Table 13-5**:.

Table 13-5: Scottish Carbon Budgets

Carbon budget	Scottish Carbon Budget ($MtCO_2e$)
1st (2026-2030)	175
2nd (2031-2035)	126
3rd (2036-2040)	81
4th (2041-2045)	24

Although not yet legally binding, Scotland's carbon budgets were used as indicative reference points to contextualise the Scottish Onshore Scheme's alignment with Scotland's net-zero trajectory.

Significance of Effects

The IEMA Guidance (Ref 1) states that there are currently no agreed methods to evaluate quantified levels 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. **Table 13-6: Definition of levels of Significance** states the significance criteria that will be applied to the Scottish Onshore Scheme.

IEMA Guidance (Ref 1) states mitigation should be considered from the outset and throughout the project's lifetime, whilst also helping to deliver proportionate EIAs. Once the magnitude of GHG emissions is determined, mitigation measures should be proposed.

A project's impact can shift from significant adverse to non-significant effects by incorporating mitigation measures that substantially improve on business-as-usual and meet or exceed the science-based GHG emissions trajectory of ongoing but declining GHG emissions towards net zero.

Table 13-6: Definition of levels of Significance

Significance Level	Effects	Description	Example in the guidance
Significant	Major adverse	A project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with the UK and Scotland's Net-Zero trajectory or accepted aligned practice or area-based transition targets. It is down to the practitioner to differentiate between the 'level' of significant adverse effects e.g. 'moderate' or 'major' adverse effects.	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 GHG emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
	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.
Not significant	Minor adverse	A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that. Although it may still have some residual emissions, it is making sufficient progress to align with and contribute to the relevant transition scenario, helping Scotland and the UK stay	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.

Significance Level	Effects	Description	Example in the guidance
		on track to achieve net zero by 2045 and 2050, respectively. This includes a target of at least a 75% reduction by 2030, which could potentially avoid significant adverse impacts.	
	Negligible	A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory and has minimal residual emissions. This project is playing a part in achieving the rate of transition required by nationally set policy commitments.	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 GHG emissions.
Significant	Beneficial	A project that causes GHG emissions to be avoided or removed from the atmosphere. Only projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect.	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 beneficial effects substantially exceeds net-zero requirements with a positive climate impact.

Limitations and Assumptions

In cases where specific information about energy usage, materials, or the GHG emissions of important aspects of the assets is unavailable, assumptions are made. These assumptions are based on industry estimates, professional best practices, and estimates provided by the Applicant.

Key assumptions applied in the GHG assessment are presented in **Table 13-7: Key assumptions applied in the GHG Assessment**. The life cycle modules are labelled in accordance with both PAS 2080:2023 Guidance (Ref 12) and RICS WLCA Guidance (Ref 13), which also informed the key assumptions used in the assessment.

Table 13-7: Key assumptions applied in the GHG Assessment

Life cycle module		Emission Source	Key assumptions
A: Before Use Stage	A0 Preconstruction Stage	A0 Emissions from site surveys, design, and business travel.	Currently, there is no robust methodology for calculating A0 emissions. However, they are expected to be minimal, contributing less than 1% to the total GHG emissions of the Scottish Onshore Scheme. According to the IEMA Guidance (Ref 1), GHG emissions anticipated to be below 1% of the total project emissions can be excluded from the assessment. Therefore, emissions from A0 have been scoped out on this basis.
	A1-3 Product Stage	A1-3 Raw materials supply and manufacture	The high-voltage direct current (HVDC) and high-voltage alternating current (HVAC) underground cables, landfall infrastructure, enabling works, and earthworks were based on design data provided by the Applicant. The quantities of raw materials required for the converter station and its electrical equipment were estimated based on benchmark data from a comparable infrastructure project in the UK. It was assumed that converter station buildings cover 50% of the total site footprint. Of the remaining area, 20% was assumed to be concrete hardstanding and 80% gravel, both at a thickness of 200 mm.
	A4-5 Construction Process Stage	A4 Material transport	The RICS assumptions regarding material transport distances and modes were applied, with construction materials assumed to be delivered to the site using average-laden heavy goods vehicles (HGVs).
		A5.1 Pre-construction demolition	As no pre-construction demolition activities took place during the construction phase, emissions associated with A5.1 have been scoped out of the assessment.
		A5.2 Construction activities	Earthworks emissions were estimated based on the volumes excavated and filled. Fuel consumption from horizontal directional drilling was estimated using benchmark data from a comparable infrastructure project in the UK. No land use data were available to inform the assessment.
		A5.3 Waste	For materials without a corresponding RICS waste category, an average wastage rate of 6% was applied. For converter station electrical

Life cycle module		Emission Source	Key assumptions
			equipment, a waste factor of 0% was assumed, reflecting the manufactured nature of these goods, with no offcuts or spillages expected. End-of-life scenarios for each material were based on RICS WLCA Guidance (Ref 13).
		A5.4 Worker transport	An average 60 km round-trip commute was assumed for construction workers, with one employee per average-sized car (fuel type unknown). It was also assumed that an average of 100 construction workers would be on-site, based on comparable infrastructure projects. The construction site was assumed to operate five days per week.
B: Use Stage	B1-8 Use Stage	B2 Maintenance	RICS assumptions were applied to estimate maintenance GHG emissions. Maintenance GHG emissions are estimated as 1% of A1-A5 GHG emissions.
		B3 Repair	RICS assumptions were applied to estimate repair GHG emissions. Repair GHG emissions are assumed to be equivalent to 25% of B2 GHG emissions and 10% of A1–A3 GHG emissions for electrical equipment.
		B4 Replacement	The assessment assumed that no asset replacement is planned within the 40-year lifespan; therefore, replacement (B4) emissions are assumed to be zero.
		B6 Operational Energy Use	For transmission, it is assumed that cables have been designed for a 100% load factor, ensuring they are appropriately sized for the anticipated load. Only transmission losses were considered in the quantitative assessment of operational emissions, estimated at 3% per 1,000 km based on published research (Ref 19). The assessment assumed that grid decarbonisation will occur in line with the trajectory modelled by DESNZ (Ref 20). All other operational energy consumption was assessed qualitatively.
C: End of Life Stage	C1-C4 End of Life Stage		In line with the approach to decommissioning set out in **Chapter 2: Project Description**, decommissioning has not been assessed in the GHG assessment. It was assumed that refurbishment and plant

Life cycle module	Emission Source	Key assumptions
		replacement would extend the operational life of the Scottish Onshore Scheme, and that any future decommissioning would follow the relevant legislation and guidance in place at the time.
D: Out of System Boundary	D1-D2 Out of System Boundary	GHG emissions associated with D1–D2 (Beyond the System Boundary) were scoped out of the assessment, as these relate to processes outside the Scottish Onshore Scheme's direct control or influence and are not included in the reported results.

Sensitive Receptors

The global climate was identified as the receptor for the purposes of the GHG assessment. The sensitivity of the climate to GHG emissions is 'high'. The rationale is as follows:

- GHG emission impacts could compromise the UK's Carbon Budget Delivery Plan (Ref 6) including sectoral budgets for electricity generation and industry as outlined in the Seventh Carbon Budget (Ref 17), and hinder progress towards both UK and Scottish net-zero targets;
- Any additional GHG impacts could compromise the UK's and Scotland's ability to reduce its GHG emissions and, therefore, the ability to meet its future legally binding carbon budgets;
- The extreme importance of limiting global warming to below 2°C above industrial levels, while pursuing efforts to limit such warming to 1.5°C as set out in the Paris Agreement (Ref 2) and a recent report by the Intergovernmental Panel on Climate Change (IPCC) highlighted the importance of limiting global warming below 1.5°C (Ref 21); and
- Disruption to global climate already has diverse and wide-ranging impacts on the environment, society, economic and natural resources. Known effects of climate change include increased frequency and duration of extreme weather events, temperature changes, rainfall and flooding, and sea level rise and ocean acidification. These effects are largely accepted to be negative, profound, global, likely, long-term to permanent, and are transboundary and cumulative from many global actions.

13.5 Baseline Environment

The current and future baseline for the GHG assessment of the Scottish Onshore Scheme is a 'business as usual' scenario in which the Scottish Onshore Scheme is not constructed or operated. The baseline comprises the existing carbon stock and sources of GHG emissions associated with ongoing site activities within the Application Boundary.

The current land use within the Scottish Onshore Scheme Application Boundary is predominantly agricultural, including arable land, managed hedgerows, and trees. Vegetation is present in the form of individual trees, tree rows, and small woodland areas, indicating a relatively high carbon sink potential. GHG emissions associated with the baseline land use are expected to be low and are primarily dependent on soil and vegetation types, as well as fuel use from agricultural vehicles and machinery.

The lifecycle GHG emissions determined in this assessment are considered to be additional to this baseline, in accordance with the methodology described in **Section 13.4**. This represents the worst-case scenario and is in line with GHG assessment best practice.

13.6 Embedded Mitigation

Design Mitigation

The following measures have been embedded into the design of the Scottish Onshore Scheme to reduce, and where possible avoid, its impact on the climate:

- Sensitive routeing and siting of infrastructure and temporary works to avoid areas of high environmental value and reduce land disturbance;
- Use of site-won aggregates in construction to minimise transport-related emissions;
- Specification of materials with low embodied carbon, in line with SP Energy Networks' Sustainability Strategy (Ref 22);
- Adoption of low-carbon construction techniques; and
- Implementation of circular economy principles throughout the design and procurement process.

Control and Management Measures

The following plans and procedures will be developed post-consent to support the effective management of construction and operation, and to reduce GHG emissions:

- Preparation of a Construction Environment Management Plan (CEMP) and an Operational Environmental Management Plan (OEMP), setting out mitigation and monitoring measures.

13.7 Assessments of Effects

Construction

For the purpose of the climate change assessment, the construction phase of the Scottish Onshore Scheme is assumed to be from 2027 to 2033.

The GHG emissions associated with the construction phase of the Scottish Onshore Scheme have been calculated in line with the methodology, assumptions and limitations detailed in **Section 13.4**. The results are provided in **Table 13-8: Construction phase GHG emissions**. The life cycle modules are labelled in accordance with both PAS 2080:2023 Guidance (Ref 12) and RICS WLC Guidance (Ref 13).

Table 13-8: Construction phase GHG emissions

Life cycle Module		Emission Source	GHG Emissions (tCO_2e)
A: Before Use Stage	A1-3 Product Stage	A1-3 Raw materials supply and manufacture	80,241
	A4-5 Construction Process Stage	A4 Material transport	18,391
		A5.2 Construction activities	3,214
		A5.3 Waste	74
		A5.4 Worker transport	1,968
Total tCO_2e over the Construction period			**103,889**

The total GHG emissions attributed to the construction phase of the Scottish Onshore Scheme are estimated to be 103,889 tCO_2e, as shown in **Table 13-8**. The largest contributor to these emissions is the embodied carbon in raw materials, estimated at 80,241 tCO_2e. The second largest contributor is the transport of materials to the site, estimated at 18,391 tCO_2e.

Additional sources of GHG emissions include construction activities, worker transport, and waste.
To contextualise this impact, these construction GHG emissions are compared to the UK carbon budgets, which coincide with the construction phase. This comparison is presented in **Table 13-9: Comparison of construction phase GHG emissions with UK carbon budgets.** For additional context, the Scottish Onshore Scheme has also been contextualised against the Scottish Carbon Budgets and the Industry sectoral budgets. These are presented in **Table 13-10: Comparison of construction phase GHG emissions with Scottish carbon budgets** and **Table 13-11: Comparison of construction phase GHG emissions with the UK-Wide Industry Sectoral Budget.**

The potential construction GHG emissions of the Scottish Onshore Scheme are estimated to contribute less than 0.047% of any carbon budget reported below. For this comparison, the construction GHG emissions are assumed to be distributed evenly across the years of the construction period.

Table 13-9: Comparison of construction phase GHG emissions with UK carbon budgets

UK Carbon Budget Period	UK Carbon Budget (tCO_2e)	Construction GHG Emissions (tCO_2e)	% of Carbon Budget
4th (2023 – 2027)	1,950,000,000	14,841	0.0008%
5th (2028 – 2032)	1,725,000,000	74,206	0.0043%
6th (2033 – 2037)	965,000,000	14,841	0.0015%

Table 13-10: Comparison of construction phase GHG emissions with Scottish carbon budgets

Scottish Carbon Budget Period	Scottish Carbon Budget (tCO_2e)	Construction GHG Emissions (tCO_2e)	% of Carbon Budget
1st (2026 – 2030)	175,000,000	59,365	0.0339%
2nd (2031 – 2035)	126,000,000	44,524	0.0353%

Table 13-11: Comparison of construction phase GHG emissions with the UK-Wide Industry Sectoral Budget

Relevant UK Carbon Budget Period	Sector Specific Carbon Budget (tCO_2e)	Construction GHG Emissions (tCO_2e)	% of Carbon Budget
4th (2023 – 2027)	224,080,000	14,841	0.0066%
5th (2028 – 2032)	158,190,000	74,206	0.0469%
6th (2033 – 2037)	103,980,000	14,841	0.0143%

Operation

For the purposes of the climate change assessment a reference operational period of 40 years was assumed, in accordance with asset lifespans.

GHG emissions associated with the operational phase of the Scottish Onshore Scheme have been calculated in line with the methodology, assumptions and limitations detailed in **Section 13.4**. The results are provided in **Table 13-12: Operation phase GHG emissions**. The life cycle modules are labelled in accordance with PAS 2080:2023 Guidance (Ref 12).

Table 13-12: Operation phase GHG emissions

Life cycle Module	Emission Source	GHG Emissions (tCO_2e)
B: Use Stage	B2 Maintenance	1,039
	B3 Repair	3,014
	B6 Operational energy use	3,783
Total tCO_2e over the Operational phase		**7,836**

The total GHG emissions associated with the Scottish Onshore Scheme in the operational phase are estimated to be 7,836 tCO_2e, as shown in **Table 13-12**. These emissions arise from operational activities. The largest contributor is transmission losses (B6 Operational energy use), estimated at 3,783 tCO_2e. Other sources include maintenance activities (1,039 tCO_2e) and repair activities (3,014 tCO_2e).

No data was available to quantify GHG emissions from operational energy use for the Scottish Onshore Scheme, with the exception of transmission losses. However, energy consumption is expected to be minimal, as the primary function of the Scottish Onshore Scheme is to facilitate the transmission of electricity rather than to consume it. Operational energy use is limited to powering control systems and auxiliary services, such as lighting when required, all of which are highly efficient and consume only a minimal amount of electricity. These GHG emissions are anticipated to be negligible due to the continued decarbonisation of the electricity grid and are therefore not expected to have a material impact on the operational GHG emissions of the Scottish Onshore Scheme.

To contextualise this impact, these operational GHG emissions are compared to the UK carbon budgets which coincide with the operational phase. This comparison is presented in **Table 13-13: Comparison of operational phase GHG emissions with UK carbon budgets** For additional context, the Scottish Onshore Scheme has also been contextualised against the relevant Scottish Carbon Budgets and sector-specific electricity generation carbon budgets. These are presented in **Table 13-14: Comparison of operational phase GHG emissions with Scottish carbon budgets** and **Table 13-15: Sector-specific UK-wide electricity generation carbon budgets relevant to the operational period.**

The potential operation GHG emissions of the Scottish Onshore Scheme are estimated to contribute less than 0.0170% of any respective carbon budget reported below. For this comparison, the operational GHG emissions are assumed to be distributed evenly across the years of the operational period. As discussed in **Section 13.4**, the UK and Scotland are expected to remain net zero after 2045 and 2050, respectively

Table 13-13: Comparison of operational phase GHG emissions with UK carbon budgets

UK Carbon Budget Period	UK Carbon Budget (tCO_2e)	Operational GHG Emissions (tCO_2e)	% of Carbon Budget
6th (2033 – 2037)	965,000,000	784	0.0001%
7th (2038 – 2042)	535,000,000	980	0.0002%
8th (2043 – 2047)	195,000,000	980	0.0005%
9th (2048 – 2050)	17,000,000	588	0.0035%

Table 13-14: Comparison of operational phase GHG emissions with Scottish carbon budgets

Scotland Carbon Budget	Scottish Carbon Budget (tCO_2e)	Operational GHG Emissions (tCO_2e)	% of Carbon Budget
2nd (2031-2035)	126,000,000	2,239	0.0018%
3rd (2036-2040)	81,000,000	5,597	0.0044%
4th (2041-2045)	24,000,000	5,597	0.0069%

Table 13-15: Sector-specific UK-wide electricity generation carbon budgets relevant to the operational period

Relevant UK Carbon Budget	Sector Specific Carbon Budget (tCO_2e)	Operational GHG Emissions (tCO_2e)	% of Carbon Budget
6th (2033 – 2037)	29,170,000	784	0.0027%
7th (2038 – 2042)	21,890,000	980	0.0045%
8th (2043 – 2047)	10,180,000	980	0.0096%
9th (2048 – 2050)	3,480,000	588	0.0169%

Overall GHG Impact

Although the Scottish Onshore Scheme will result in increased GHG emissions, it's important to consider the Scottish Onshore Scheme's role in wider UK and Scottish policy to decarbonise the electricity grid. This consideration is crucial when assessing its impact on the climate.

The Scottish Onshore Scheme will support the ongoing expansion of renewable energy generation within the UK energy system by providing the necessary infrastructure to support the increased transmission of low-carbon electricity. This will contribute to the decarbonisation of the electricity generation sector as renewables increasingly replace higher-carbon energy sources. This aligns with the UK Government's target for a fossil fuel-independent electricity system by 2035 and reflects the policy objectives set out in the Clean Power 2030 Action Plan (Ref 9), which identifies transmission infrastructure as a key component in enabling grid decarbonisation.

Embedded mitigation measures to limit GHG emissions will be delivered through documents such as the CEMP and OEMP, which serve as implementation frameworks for the relevant

mitigation controls. While the CEMP and OEMP are not mitigation measures in themselves, they contain and secure the measures necessary to reduce GHG emissions during construction and operation. These controls are aligned with relevant existing and emerging policy requirements and adhere to best practice design standards for minimising the GHG impact.

As discussed above, the Scottish Onshore Scheme's GHG impact during construction and operation has been quantitatively assessed against the relevant carbon budgets and net-zero targets. The Scottish Onshore Scheme is in line with the UK and Scotland's policies to decarbonise the electricity grid and transition to net zero by 2045 and 2050, respectively. The Scottish Onshore Scheme's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. Therefore, in accordance with IEMA guidance (see **Section 13.4**), the GHG emissions associated with the Scottish Onshore Scheme's construction and operation are assessed as **Minor Adverse** and **Not Significant**. A project with 'not significant' effects is fully in line with measures necessary to achieve the UK and Scotland's trajectory towards net zero.

In addition, SP Energy Networks' commitment to the Science-Based Targets initiative (SBTi) supports the effective management of residual GHG emissions. This commitment aligns with national policy objectives and reinforces the Scottish Onshore Scheme's contribution to the transition to net zero.

SP Energy Networks' Sustainability Strategy (Ref 22) further aligns with the UK and Scottish Government net-zero targets, setting out clear goals to reduce the organisation's GHG emissions in line with the 1.5 °C target of the Paris Agreement. As part of this commitment, SP Energy Networks will require its strategic suppliers to set science-based targets within five years, with 80 % of its supply chain by value aligned to SBTs by 2028.

13.8 Additional Mitigation

Compensation and Enhancement Measures

As no significant adverse effects have been identified in relation to climate change, no additional mitigation, compensation, or enhancement measures are considered necessary beyond the embedded design and management controls outlined in **Section 13.6**.

Long Term Monitoring

Given that no significant climate-related effects have been identified, and that appropriate embedded mitigation and management measures are already in place, no long-term monitoring specific to climate change is considered necessary.

13.9 Residual Effects

Table 13-16: Summary of Effects: Construction and **Table 13-17: Summary of Effects: Operation** provide a summary of the residual effects for construction and operation.

Table 13-16: Summary of Effects: Construction

Receptor	Description of Effects	Effects	Additional Mitigation	Residual Effects	Significance
Global Atmosphere	Impact of GHG emissions arising during the construction of the Scottish Onshore Scheme on the climate.	Minor Adverse	Not required	During the construction of the Scottish Onshore Scheme, there will be unavoidable GHG emissions due to the use of materials, energy, fuel, and transportation. However, additional GHG savings are expected to be achieved by implementing the Mitigation Measures listed in **Section 13.6**.	Minor Adverse - Not Significant

Table 13-17: Summary of Effects: Operation

Receptor	Description of Effects	Effects	Additional Mitigation	Residual Effects	Significance
Global Atmosphere	Impact of GHG emissions arising during the operation of the Scottish Onshore Scheme on the climate.	Minor Adverse	Not required	During the operation of the Scottish Onshore Scheme, there will be unavoidable GHG emissions due to the use of materials, energy, fuel, and transportation. However, additional GHG savings are expected to be achieved by implementing the Mitigation Measures listed in **Section 13.6**.	Minor Adverse - Not Significant

13.10 Summary

Overall, the GHG impact of the Scottish Onshore Scheme will be **Minor Adverse** and **Not Significant**. The Scottish Onshore Scheme will bring long-term benefits to the UK and Scotland by upgrading energy-related infrastructure. This is essential for integrating new sources of renewable power and increasing the electricity grid's capacity to facilitate the electrification of the broader economy. This, in turn, will support the transition away from fossil fuels and help achieve net-zero GHG emissions across the UK and Scotland.

13.11 References

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