Liverpool Bay CCS Ltd

HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT - OFFSHORE

Environmental Statement
Volume 3, appendix O: Greenhouse Gas Assessment

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Liverpool Bay CCS Limited
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Greenhouse gas assessment

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Glossary

Term	Meaning
Environmental Product Declaration (EPD)	A declaration that quantifies environmental information on the lifecycle of a product.
Life Cycle Assessment (LCA)	The systematic analysis of the potential environmental impacts of products or services during their entire life cycle.
Project	The HyNet Carbon Dioxide Transportation and Storage Project.
Proposed Development	The offshore components of the Project which are subject of this Environmental Statement, as described in volume 1, chapter 3.
The Applicant	This is Liverpool Bay CCS Ltd.
UK Grid Carbon Intensity	Carbon intensity is a measure of how clean UK Grid electricity is. It refers to how many grams of carbon dioxide (CO_2) are released to produce a kilowatt hour (kWh) of electricity.

Acronyms and Initialisations

Acronyms and Initialisations	Description
CCS	Carbon Capture and Storage
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
Defra	The Department for Environment, Food and Rural Affairs
DESNZ	The Department for Energy Security and Net Zero, preceded by the Department for Business, Energy, and Industrial Strategy (2016 to 2023) and the Department of Energy and Climate Change (2008 to 2016)
EIA	Environmental Impact Assessment
EPD	Environmental Product Declaration
ES	Environmental Statement
FOC	Fibre Optic Cable
GHG	Greenhouse Gas
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LCA	Life Cycle Assessment
LDAR	Leak Detection and Repair
MDS	Maximum Design Scenario
MHWS	Mean High Water Springs
O&M	Operations and Maintenance
OP	Offshore Platform
PDE	Project Design Envelope
PoA	Point of Ayr
UK	United Kingdom
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute

Units

Units	Description
“	Inch (length)
%	Percent
kg/hr	Kilogram per hour (fuel consumption rate)
km	Kilometres (distance)
km/h	Kilometres per hour (speed)
knots	Unit of speed, equal to one nautical mile per hour. Conversion factor of 1.852 utilised to convert knots to km/h
m	Metres (distance)
m^3	Cubic metres (volume)
Mt	Million tonnes (weight)
t	tonnes (weight)

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1 GREENHOUSE GAS ASSESSMENT

1.1 Introduction

This document forms appendix O of volume 3 of the Offshore ES prepared for the HyNet Carbon Dioxide Transportation and Storage Project. The ES presents the findings of the Environmental Impact Assessment (EIA) process for the offshore components of the HyNet Carbon Dioxide Transportation and Storage Project, hereafter referred to as the Proposed Development.

This greenhouse gas (GHG) technical report sets out the methodology and calculations of the GHG emissions for the Proposed Development. These calculations inform the assessment of the climate change impacts in volume 2, chapter 13: Climate Change of the Offshore ES. This appendix should be read in conjunction with the chapter as supporting information.

GHG emissions have been estimated by applying published emissions factors to activities in the baseline and to those required for the Proposed Development. The emissions factors relate to a given level of activity, or amount of fuel, energy or materials used, to the mass of GHGs released as a consequence. This appendix presents the technical calculations which relate to the potential magnitude of impact as assessed within the climate change chapter (volume 2, chapter 13) of the Offshore ES.

1.2 Scope

The GHGs considered in this assessment are those in the 'Kyoto basket' of global warming gases expressed as their CO_2-equivalent (CO_2e) global warming potential (GWP). This is denoted by CO_2e units in emissions factors and calculation results. GWPs used are typically the 100-year factors in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (IPCC, 2013) or as otherwise defined for national reporting under the United Nations Framework Convention on Climate Change (UNFCCC).

The appendix scope considers the Proposed Development during the construction, operation and maintenance, and decommissioning phases.

1.3 Methodology

GHG emissions caused by an activity are often categorised into 'scope 1', 'scope 2' or 'scope 3' emissions, following the guidance of the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol suite of guidance documents (WRI and WBSCD, 2004).

- Scope 1 emissions: direct GHG emissions from sources owned or controlled by the company, e.g. from combustion of fuel at an installation.
- Scope 2 emissions: caused indirectly by consumption of purchased energy, e.g. from generating electricity supplied through the national grid to an installation.
- Scope 3 emissions: all other indirect emissions occurring as a consequence of the activities of the company, e.g. in the upstream extraction, processing and transport of materials consumed or the use of sold products or services.

This assessment has sought to include emissions from all three scopes, where this is material and reasonably possible from the information and emissions factors available, to capture the impacts attributable most completely to the Proposed Development. These emissions shall not be separated out by defined scopes (scopes 1, 2 or 3) in the assessment.

Such emissions include those resulting from the manufacturing and construction of the offshore platforms (OP), cabling, pipelines and injection wells, in addition to fuel use by vehicle movements. They have been calculated via a range of methodologies, including published benchmark carbon intensities and life cycle analysis (LCA) literature, and the application of material or fuel emission intensities to material or fuel quantities.

Key sources relied upon for the assessment are as follows:

- UK Government GHG Conversion Factors for Company Reporting (Department for Energy Security and Net Zero (DESNZ) and Department for Environment, Food and Rural Affairs (Defra), 2023);
- Valuation of Energy Use and Greenhouse Gas: Supplementary guidance to the HM Treasury Green Book (Department for Business, Energy and Industrial Strategy (BEIS), 2022);
- Environmental Product Declaration of Fibre Optical Cable (Sterlite Technologies Limited, 2020);
- Inventory of Carbon & Energy (ICE) database (Jones and Hammond, 2019); and
- OneClick LCA (2021).

1.3.1 Embodied carbon

An LCA comprises an evaluation of the inputs, outputs and potential environmental impacts that occur throughout the lifecycle of a particular project, in this case electricity transmission infrastructure associated with offshore wind farms, encompassing either a cradle-to-gate (project site) or a cradle-to-grave (accounting for in use and decommissioning) approach. This can be further broken down into the following LCA phases of development:

- materials and construction (A1-A5);
- operation and maintenance (B1-B5); and
- decommissioning (C1-C4).

Where appropriate information on material quantities / design information has been unavailable, data has been extracted from peer reviewed reports, or estimated based on approximate material quantities and associated materials carbon intensity figures, to provide estimate figures for each stage of this LCA.

1.4 Assumptions and limitations

The majority of the construction-stage GHG emissions associated with the manufacturing of components are likely to occur outside the territorial boundary of the UK and hence outside the scope of the UK's national carbon budget, policy and governance. However, in recognition of the climate change effect of GHG emissions (wherever occurring), and the need to avoid 'carbon leakage' overseas when reducing UK emissions, emissions associated with the construction stage have been presented within the assessment and quantification of GHG emissions as part of the Proposed Development.

The specific design of associated infrastructure, and related bill of quantities disclosing material weights and volumes that would be used by the Proposed Development have not yet been specified. Thus, there is a degree of uncertainty regarding all the project stage GHG emissions resulting from the manufacturing and construction of the Proposed Development. We have sought to limit the impact this might have by contextualising with alternative methodologies and data sources where available.

Detailed LCAs are not yet available for all items associated with the Proposed Development, as such, where not available, a conservative estimate of construction materials or fuels has been scaled by relevant emissions factors. Where used to calculate the embodied carbon associated with materials, emissions factors do not account for emissions associated with the manufacture of products, and as such may underestimate embodied carbon emissions.

1.5 Baseline GHG emissions

The current baseline environment for the Proposed Development comprises three OPs and connecting submarine pipelines and cables. These OPs form part of the Douglas OP Complex, comprising three bridge-linked platforms including a wellhead platform, a central process platform, and an accommodation platform, and Lennox OP, Hamilton North OP, and Hamilton Main OP, all unmanned oil and gas wellhead platforms.

Such infrastructure has been used in the extraction and transport of natural gas from gas reservoirs in Liverpool Bay to the Point of Ayr (PoA) gas terminal. As emissions associated with such activity are attributed to the existing Douglas OP, with changes to its operation and decommissioning not included within the scope of this application, current baseline emissions are considered to be zero.

Land within the study area that is not currently occupied by OP foundations, pipelines and cables, consists of various subtidal habitats of mixed sediments (including coarse sediment, sandy mud, fine sand, muddy sand, and deep sand) supporting diverse benthic communities.

1.6 Assessment of construction effects

1.6.1 Embodied Carbon

The following sections detail the methodology used to calculate the construction stage emissions associated with the Proposed Development.

The construction stage emissions cover the LCA stages A1-A5, materials and construction, i.e., emissions associated with the extraction, processing and manufacturing of materials. In addition, emissions associated with the transport of materials and technology to site (within the UK) has been analysed.

Embodied carbon displayed for individual construction segments below covers A1-A3 stage, with A4-A4 being captured within the 'vehicle movements' section of the assessment of construction effects.

1.6.2 Offshore Platforms

1.6.2.1 New Douglas platform foundations and substructure

The New Douglas OP foundation and substructure is overwhelmingly a steel-based structure. In the absence of detailed material quantities, the shipping lift weight (provided by the Applicant's design team) has been scaled by the carbon factor for galvanised steel (2.76 tCO_2e/tonne), taken from the ICE database (Jones and Hammond, 2019).

The foundation is made up of four jackets, which are four-legged steel structures, with an estimated weight of 2,940 tonnes per leg. The total weight for four jackets is 11,760 tonnes, resulting in 32,458 tCO_2e when scaled by the above-mentioned emissions factor.

Each jacket leg will be secured via two driven steel piles. The total weight of the eight piles to be installed equals 850 tonnes, as provided by the Applicant's design team. This weight was then scaled by the emissions factor for galvanised steel referenced previously, resulting in 2,346 tCO_2e associated with the driven steel piles required for the New Douglas platform foundations.

The total emissions associated with the construction of the New Douglas OP foundations and substructure is 34,804 tCO_2e.

1.6.2.2 Topsides

In addition to the New Douglas OP topside. The repurposed satellite OP topsides (Hamilton North, Hamilton Main, and Lennox) are proposed to be replaced.

In the absence of detailed material information at this stage in the Proposed Development design, the carbon factor for galvanised steel referenced above has been selected and scaled by the weight of each topside. This estimate provides good coverage of the likely emissions associated with the construction of the OP topsides, as steel is overwhelmingly the most significant material used. As displayed in Table 1.1, the total GHG emissions associated with the OP topsides is 15,842 tCO_2e.

Table 1.1: New Douglas And Replacement Satellite OP Topsides

Repurposed OP topsides	Dry weight (tonnes)	tCO_2e
New Douglas Topside	2,290	6,320
Hamilton Main	1,100	3,036
Hamilton North	950	2,622
Lennox	1,400	3,864
Total	**5,740**	**15,842**

1.6.2.3 Offshore platform equipment

The potential impact of the proposed transformers to be installed on the OPs has been estimated using an intensity for the manufacturing GWP of 2,190 $kgCO_2e$ per MVA (ABB, 2003). This was scaled by the total combined transformer ratings proposed, totalling 20 MVA, to give an estimated embodied carbon value of 43.8 tCO_2e.

In the absence of further detail regarding material quantities or product specifications associated with the equipment to be installed on the OPs at this stage in the Proposed Development's design (i.e. electrical heaters and controls, battery room, UPS system etc), it is considered that by assuming the total lift weight of the topsides will be comprised of steel, as detailed above, this is likely an overestimate and will provide adequate coverage for the GHG emissions associated with the equipment to be installed on the OPs.

1.6.3 Cables and cable protection

1.6.3.1 Cables

All offshore cabling will be 3-core 33 kV armoured cables, with bundled Fibre Optic Cable (FOC). Details of cable distances are listed below in Table 1.2.

Table 1.2: Cable Distances

Cable Distances	km
Douglas to Hamilton	10.87
Douglas to Hamilton north	14.89
Douglas to Lennox	32.34
POA terminal to Douglas cable 1	33.99
POA terminal to Douglas cable 2	33.95
Total	**126.04**

Quantities of aluminium or copper for the closest comparable cable (30kv) were estimated based on the total length of each relevant cable, informed by technical product information for submarine cables (ABB, 2010). Emissions factors for each material (2.71 $kgCO_2e/kg$ for copper, 6.67 $kgCO_2e/kg$ for aluminium, Jones and Hammond, 2019)) were then scaled by the estimated quantities. Given the cable core will likely only comprise of one core metal, the core metal resulting in the greatest quantity of emissions (aluminium) has been brought forward within the assessment.

Emissions associated with the materials comprising the FOC were informed by an emissions factor provided within a FOC product EPD (1996.3 $kgCO_2e/km$ for a FOC, Sterlite Technologies Limited, 2020), which was scaled by the cable lengths listed within Table 1.2.

Embodied carbon associated with the cables totals 27,322 tCO_2e. Material quantities applied to this calculation can be seen below in Table 1.3.

Table 1.3: Cable Material Quantities

Cable Type	Cable length (km)	Cable weight factor (tonne/km)		Material emissions factor (tCO_2e/km)			Total embodied carbon (tCO_2e)
		Copper	Aluminium	Copper	Aluminium	FOC	
33 kV	126.04	47.2	32.2	127.912	214.774	1.9963	**27,322**

1.6.3.2 Cable protection

Cable protection will comprise both concrete mattresses and rock protection. Total volume (m^3) of concrete mattresses and total weight (kg) of rock protection are as follows:

- Total concrete mattresses required: 9,905 m^3.
- Total rock protection required: 134,400 tonnes.

For the concrete mattresses, the total volume of material required was scaled by a GHG emissions factor of 301 $kgCO_2e/m^3$ for concrete (Jones and Hammond, 2019), totalling 2,981 tCO_2e.

To account for rock protection, an Environmental Product Declaration (EPD) was selected on OneClick LCA (2021) for 'rock aggregate' to account for the quantity of rock protection which is being used to protect the cables. Applying a GHG emissions factor of 0.0024 $kgCO_2e/kg$, rock protection results in an estimated 323 tCO_2e.

Total GHG emissions associated with the cable protection (both concrete mattresses and rock protection) equals 3,304 tCO_2e.

1.6.4 Pipeline

Whilst much of the existing pipeline infrastructure will be repurposed to transport CO_2, the following lengths of new pipeline will be required to connect to the New Douglas OP:

- PL1030, existing 20" gas to Point of Ayr (approximately 592 m);
- PL1039, existing 20" gas export from Hamilton Main (approximately 175 m);
- PL 1041, existing 14" gas export from Hamilton North (approximately 68 m);
- PL1035, existing 16" gas export from Lennox (approximately 128 m); and
- PL1036A, existing 12" gas injection to Lennox (approximately 195 m).

A steel pipe weight chart (Octal Steel, 2023) was used to inform the weight in kg/metre for the varying diameters of pipes utilised. Maximum potential pipe wall thickness was assumed in all cases to provide a conservative estimate of the GHG emissions associated with the pipeline construction.

OneClick LCA (2021) was utilised to establish an appropriate EPD for steel pipes intended for oil transportation from Nippon Steel, with a carbon intensity of 1.86 $kgCO_2e/kg$ per metre of pipeline.

Table 1.4: New Pipeline Construction Emissions (A1-A3)

Pipeline	Length (m)	Weight per distance (kg/m)	Weight (kg/metre)	Associated GHG Emissions (tCO_2e)
PL1030	592	211.4	211	233
PL1039	175	211.4	211	69
PL1041	68	133.0	133	17
PL1035	128	123.3	123	29
PL1036A	195	109.0	109	40
Total				387

GHG emissions associated with the construction of new pipelines totals 387 tCO_2e, summarised within Table 1.4.

1.6.5 Injection wells

Emissions from the construction of injection wells can be broken into two main categories, plant fuel consumed during the drilling of wellbores, and emissions associated with the materials associated with well completion, predominantly steel and cement.

The following information, listed within Table 1.5, provided by the Applicant's design team has informed the calculations of plant fuel consumption and emissions associated with materials used. Methodology regarding each is detailed below.

Table 1.5: Well Design Information

Well Number	Well Purpose	Location	Well Type	Drilling Days Required	Completion Days Required
1	Injector well	Hamilton Main	Side track	15	20
2	Injector well	Hamilton Main	Side track	15	20
3	Injector well	Hamilton Main	Side track	15	20
4	Injector well	Hamilton Main	Side track	15	20
5	Injector well	Hamilton North	Side track	15	20
6	Injector well	Hamilton North	Side track	15	20
7	Injector well	Lennox	Side track	25	20
8	Injector well	Lennox	Side track	25	20
9	Monitoring Well	Hamilton Main	New well	35	20
10	Monitoring Well	Hamilton North	New well	35	20
11	Monitoring Well	Lennox	Side track	25	20
12	Sentinel Well	Hamilton North	Recompletion (no drilling, only replacing the completion)	N/A	20
13	Sentinel Well	Lennox	Recompletion (no drilling, only replacing the completion)	N/A	20

Below the quantification of GHG emissions associated with the construction of wells is separated into the drilling and completion stages.

1.6.5.1 Drilling stage

Emissions from the drilling stage arise from the fuelling of drilling rigs, requiring typically between 20-30 m^3 of diesel fuel per day (IPIECA, 2013). To provide a conservative estimate, the top end of typical daily diesel fuel consumption for an offshore drilling rig of 30 m^3 has been utilised within the emissions calculations.

An emissions factor for fuel oil has been selected, which is described as heavy diesel oil intended for industry and shipping, the GHG emissions factor of which is 3.17 $kgCO_2e$/litre (DESNZ and DEFRA, 2023). The well-to-tank emissions factor (0.7 $kgCO_2e$/litre) has also been accounted for, providing a combined emissions factor of 3.87 $kgCO_2e$/litre (DESNZ and DEFRA, 2023).

The following two density factors have been taken from the UK Government GHG Conversion Factors for Company Reporting for fuel oil (DESNZ and DEFRA, 2023) to convert the estimated fuel consumption from m^3 to litres, as required to apply the emissions factor:

- 972.76 kg/m^3; and
- 1028 litres/tonne.

With the above density factors applied, 30 m^3 of fuel oil equates to 30,000 litres. This was then scaled by the total required number of drilling days (235), resulting in 7.05 million litres required for the drilling of all wells for the Proposed Development.

When scaled by the appropriate emissions factors, GHG emissions associated with fuel required to drill the wells amounts to 27,286 tCO_2e.

1.6.5.2 Completion stage

The Applicant's design team have provided assumptions in relation to the amount of material required for the completion stage of each type of well, based on previous project experience. A breakdown of material assumptions can be found below in Table 1.6.

Table 1.6: Drilling Department Well Completion Material Estimates

Well type	Steel required (tonnes)	Cement required (tonnes)
New Well	301.51	2,429.3
Lennox – Sidetrack	201.95	193.75
Hamilton – Sidetrack	92.11	80.69
Sentinel Well – Recompletion	34.71	0

The following emissions factors for steel and cement have been selected from the ICE database (Jones and Hammond, 2019) and applied to the provided material estimates above in Table 1.6:

- Steel UO pipe – 3.02 tCO_2e/tonne.
- CEM I, Ordinary Portland Cement – 0.912 tCO_2e/tonne.

The total weight of steel and cement required for the completion of all wells associated with the Proposed Development are laid out below in Table 1.7, alongside associated GHG emissions.

Table 1.7: Well Completion Stage Associated Emissions

Well type	Number required	Total steel (tonnes)	Total cement (tonnes)	Steel (tCO_2e)	Cement (tCO_2e)	Total (tCO_2e)
New well	2	603.02	4,858.60	1,821	4,431	6,252
Hamilton – Sidetrack	6	552.63	484.16	1,669	442	2,111
Lennox – Sidetrack	3	605.85	581.24	1,830	530	2,360
Sentinel	2	69.42	0	210	0	210
Total	**13**	**1,830.92**	**5,924.01**	**5,529**	**5,403**	**10,932**

As displayed in

Table 1.7, GHG emissions associated with well completion amounts to 10,932 tCO2e.

1.6.5.3 Total

Total GHG emissions associated with the construction of wells is 38,218 tCO2e.

1.6.6 Vessel movements

Indicative vessel movements for the construction phase were used to calculate emissions associated with their movements during the construction phase.

Emissions associated vessel movements were calculated by estimating their total main engine energy requirement through multiplying the engine size of the vessels by anticipated activity hours informed by vessel speed and distance from port. Vessel information was sourced from specifications of likely vessel types.

A conservative assumption was made with regards to the distance vessels would travel. The furthest likely construction port to be considered for the construction of the Proposed Development is Rotterdam Harbour, in the Netherlands, approximately 1,500 km away. To depict a worst-case scenario, it has been conservatively assumed that any large vessel movements are travelling from this port. Smaller vessels, such as crew transfer vessels, guard vessels and survey vessels, are conservatively assumed to be travelling from Belfast port, approximately 300 km away.

The total main engine energy requirement was then scaled by the emission factor for marine gas oil (0.258 $kgCO_2e/kWh$) (DESNZ, 2023), totalling 17,852 tCO_2e over the construction period.

1.7 Assessment of operational effects

1.7.1 Platform operational energy demand

Energy modelling, provided by the Applicant to inform the assessment, details annual energy demand associated with the New Douglas and satellite platforms. Energy demand modelled for the electrical heating duty and balance of plant for each of the New Douglas and satellite platforms, was totalled per annum. To provide a conservative estimate of energy demand, the maximum power load profile was used.

The OPs' energy demand will be met by grid electricity, which is expected to decarbonise in line with the UK's climate targets and ambitions. Therefore, operational emissions associated with energy consumption were calculated by scaling modelled energy demands by the projected grid average electricity conversion factors over the Proposed Development's lifetime, which accounts for the projected decarbonisation of grid electricity (BEIS, 2022) to give lifetime operational emissions of 30,386 tCO_2e (2025 to 2050).

1.7.2 Operation and maintenance vessel movements

Indicative marine vessel and helicopter movements have been used to calculate emissions associated with their movements during the operation and maintenance phase.

1.7.2.1 Vessel movements

It is anticipated that during the operation and maintenance phase of the Proposed Development, there would be a maximum of 15 return trips of 'Jack-up Vessels' and 15 'other vessels' per annum. This amounts to 30 return trips per annum, or a total of 750 return trips over the Proposed Development's 25-year operational lifetime.

The calculation of emissions associated with the proposed maintenance vessel movements follow the methodology detailed at section 1.6.6and totals 20,635 tCO_2e over the Proposed Development's operational lifetime.

1.7.2.2 Helicopters

It is anticipated that 300 helicopter return trips will be required per annum as the likely maximum in relation to operation and maintenance activities. This amounts to a total of 7,500 trips across the Proposed Development's lifetime.

Helicopter movements and their associated emissions were calculated by determining the anticipated fuel consumption, informed by their predicted movements. An indicative number of return trips and assumed distance from a potential helicopter base, alongside average fuel consumption (430 kg/hr) and fuel economy data (145 knots) (obtained from manufacturers specifications) were used to estimate fuel consumption.

A table of the calculations can be found below in Table 1.8.

Table 1.8: Helicopter Movements Emissions Intensity

CHC AW139		
Fuel Consumption	430	Kg/hr
Cruise Speed	145	Knots
Cruise Speed	268.54[1]	Kilometres/hour
Fuel Consumption	1.601	Kg/Kilometre
Emissions intensity	4.071	$kgCO_2e$/kilometre

[1]Coversion factor of 1.852 utilised to convert knots to kilometres/hour.

With an emissions intensity now established, Blackpool was used as a conservative worst-case assumption as to where the helicopters would travel from, with a return journey distance of 96 km.

Emission factors for aviation turbine fuel (2.5 $kgCO_2e$/l) (DESNZ and Defra, 2023) were then scaled by the fuel consumption to give associated emissions, totalling the following:

- 0.4 tCO_2e emitted for a single return journey;
- 117 tCO_2e per annum;
- 2,932 tCO_2e over the Proposed Developments 25-year operational lifetime.

As such, total emissions associated with helicopter movements during the operation and maintenance phase of the Proposed Development is 2,932 tCO_2e.

1.7.3 Material replacement

In the absence of detailed information, it has been conservatively assumed that the new lengths of cable and pipeline will be replaced once over the Proposed Development's 25-year lifetime. The calculation of emissions associated with such material use is consistent with that detailed at section 1.6, and totals 43,444 tCO_2e and 387 tCO_2e for cable and pipeline replacement respectively.

1.7.4 Operational CO_2 transportation and storage

1.7.4.1 Venting

There will be a requirement for periodical venting of CO_2 equipment during planned maintenance activities, such as pigging operations, inspection of equipment, inspection and replacement of filter cartridges, and vent maintenance. Indicative venting emissions have been provided by the Applicant's design team, which total an average of 89.15 tCO_2 per year, or 2,318 tCO_2e over the Proposed Development's operational lifetime.

1.7.4.2 CO_2 storage

The Proposed Development is enabling the re-purposing of depleted hydrocarbon reservoirs for CO_2 storage, by providing the necessary infrastructure to transport CO_2 from industrial sources captured and transported onshore, to the storage reservoirs offshore.

As informed by the Applicant's design team, the Project has the potential to capture approximately 4.5 $MtCO_2$ per year from 2027, reaching a total of between 110,250,000 tCO_2 and 116,040,000 tCO_2 reinjected CO_2 over the Proposed Development's lifetime. The former has been used to inform the assessment in order to provide the most conservative approach of CO_2 removed and stored.

1.8 Assessment of decommissioning effects

The majority of emissions during this phase relate to the use of plant for decommissioning, disassembly, transportation to a waste site, and ultimate disposal and/or recycling of the equipment and other site materials.

While detailed information is not yet available regarding the decommissioning of the new Douglas platform and repurposed satellite platforms at the end of the Proposed Development's operational phase, it is anticipated that the decommissioning of the Proposed Development would be undertaken in accordance with all the environmental legislation and technology available at the time. The components of the OPs, cables and pipelines, are considered to be highly recyclable. When disposing of such elements, recycling is the preferred option. This not only prevents materials from being sent to landfills, but also reduces the need for the extraction of primary materials. Material which cannot be recycled might be used for incineration or energy from waste. As such, emissions associated with the disposal of materials at the end of their lifetime is considered to be immaterial and may even result in future avoided emissions.

The calculation of emissions associated with the proposed decommissioning vessel movements follows the methodology detailed at section 1.6.6 and totals 2,833 tCO_2e.

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