22 CLIMATE CHANGE

22.1 Introduction

This section of the EIA Report describes the existing environment in relation to climate change and details the assessment of the potential impacts during the construction and operational phases of the proposed scheme.

The climate change assessment comprises a calculation of greenhouse gas (GHG) emissions likely to arise from construction and operational activities associated with the proposed scheme.

22.2 Policy and consultation

22.2.1 Legislation

United Nations Framework Convention on Climate Change

The United National Framework Convention on Climate Change (UNFCCC) is an intergovernmental environmental treaty and entered into force on 21 March 1994. The main objective is the *"stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."*

A regular series of international meetings of the UNFCCC have taken place since 1997 resulting in several important and binding agreements: the Copenhagen Accord (2009); the Doha Amendment (2012); and the Paris Agreement (2015). At the 22nd Climate Change Conference of the Parties (COP22) in November 2016, the UK ratified the Paris Agreement to enable the UK to *"help to accelerate global action on climate change and deliver on our commitments to create a safer, more prosperous future"* (BEIS, 2016).

The Doha Amendment included a commitment by parties to reduce greenhouse gas emissions by at least 18% below 1990 levels in the eight-year period from 2013 to 2020. The UK Climate Change Act 2008 has an interim 34% reduction target for 2020, which if achieved will allow the UK to meet and exceed its Kyoto agreement target. This interim target for the UK is likely to be met in 2020.

During the United Nations Climate Change Conference in Paris in 2015 (known as 'COP21') the following were key areas of agreement (UNFCCC, 2016):

- limit global temperature increase to below 2ºC, while pursuing efforts to limit the increase to 1.5ºC above the pre-industrial average temperature;
- parties aim to reach global peaking of GHG emissions as soon as possible to achieve the temperature goal;
- commitments by all Parties to prepare, communicate and maintain a Nationally Determined Contribution;
- contribute to the mitigation of GHG emissions and support sustainable development;
- enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change;
- transparent reporting of information on mitigation, adaptation and support which undergoes international review; and,
- in 2023 and every five years thereafter, a global stocktake will assess collective progress toward meeting the purpose of the Agreement.

The UK ratified the Paris Agreement in November 2016. At the recent COP24, held in Katowice, Poland in December 2018, a set of rules for the Paris climate process were agreed.

Kyoto Protocol

The Kyoto Protocol is an international agreement adopted in 1997 and was enacted in 2005. The Protocol is linked to the UNFCCC objective to reduce atmospheric concentrations of GHG to reduce the rate and extent of global warming. The Protocol applies to the reduction of six greenhouse gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

The Protocol acknowledges that the economic development of a country is an important factor in the country's ability to combat climate change. Therefore, countries have an obligation to reduce their current emissions, as they are historically responsible for the current concentrations of atmospheric GHGs.

The Climate Change Act 2008

The UK Climate Change Act 2008 provides a framework for the UK to meet its long-term goals of reducing GHG emissions by 34%, relative to a 1990 baseline by 2020 and by 80% in 2050 ("climate mitigation"). The Climate Change Act was enacted as part of the UK's responsibility and obligations as a signatory of the Kyoto Protocol 1997 (which did not become binding until 2005). The UK target covers the six main GHGs referenced in the Kyoto Protocol.

The UK Climate Change Act requires the government to set legally-binding 'carbon budgets' to provide a constraint of GHG emissions in a given time period. Carbon budgets are caps on the quantity of GHG emissions emitted in the UK over a five-year period. The first five carbon budgets have been placed into legislation and will run up to 2032.

In June 2019, the Government announced an amendment to the Climate Change Act 2008 (Climate Change Act 2008 (2050 Target) Amendment Order 2019) to change the reduction target from at least 80% to be 'net zero'.

The Climate Change Act requires the UK Government to produce a Climate Change Risk Assessment (CCRA) every five years. The CCRA assesses current and future risks to, and opportunities for, the UK from climate change (to inform "climate adaptation" actions). In response to the CCRA, the UK Climate Change Act also requires Government to produce a National Adaptation Programme (NAP) (both discussed further below).

UK Climate Change Risk Assessment 2017

The Government produced its latest CCRA in 2017, the second assessment to be produced for the UK following the first release in 2012. The report concludes that among the most urgent risks for the UK are flooding and coastal change risks to communities, businesses and infrastructure. It identifies suggestions for reducing these risks, including the consideration of climate change in developing new infrastructure.

National Adaptation Programme

The National Adaptation Programme (NAP) sets the actions that the UK government will undertake to adapt to the challenges of climate change in the UK as identified in the CCRA. The NAP details the range of climate risks which may affect the natural environment, infrastructure, communities, buildings and services. Key actions are set out in the NAP which aim to address the identified high-risk areas, which include:

- flooding and coastal change risks to communities, businesses and infrastructure;
- risks to health, well-being and productivity from high temperatures;
- risks in shortages in the public water supply for agriculture, energy generation and industry;
- risks to natural capital; and,
- risks to domestic and international food production and trade.

22.2.2 National Planning Policy

National Planning Policy Framework

The revised NPPF (Ministry of Housing, Communities and Local Government, 2019) was adopted in February 2019, which advises that the planning system should support the transition to a low carbon future. With respect to planning for climate change, the NPPF states:

"Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures"

The NPPF also states:

"New development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and,

b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards."

22.2.3 Local planning policy

RCBC declared a climate emergency in 2018 and has committed the borough to become carbon neutral by 2030. This declaration will be reflected in an Environmental Strategy, as well as wider environmental priorities for the Borough.

Redcar and Cleveland Local Plan

The Redcar and Cleveland Local Plan was adopted on 24th May 2018 by RCBC. The following policies are of relevance to climate change.

2. Sustainability and design

"Policy SD4: General Development Principles
In assessing the suitability of a site or location, development will be permitted where it:

[…]

e. avoids locations that would put the environment, or human health or safety, at unacceptable risk;
All development must be designed to a high standard. Development proposals will be expected to:

[…]

l. be sustainable in design and construction, incorporating best practice in resource management, energy efficiency and climate change adaptation.
"2.34 Applicants for major developments will be required to submit a Design and Access Statement to demonstrate how good design has been taken into account in drawing up the development proposal, including adaptation to climate change, reducing carbon emissions and water consumption, and setting out how waste will be managed"

"Policy SD7: Flood and water management

Flood risk will be taken into account at all stages in the planning process to avoid inappropriate development in areas at current or future risk. Development in areas at risk of flooding, as identified by the Environment Agency flood risk maps, will only be granted where all of the following criteria are met:

a. the proposal meets the sequential and exception tests (where required) in relation to the National Planning Policy Framework;
b. a site specific flood risk assessment demonstrates that the development will be safe, including the access and egress, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall; and
c. new site drainage systems are well designed, taking account of events that exceed the normal design standard (e.g. consideration of flood flow routing and utilising temporary storage areas).

All development proposals will be expected to be designed to mitigate and adapt to climate change, taking account of flood risk by:

d. ensuring opportunities to contribute to the mitigation of flooding elsewhere are taken;
e. prioritising the use of sustainable drainage systems (SuDs);
f. ensuring the full separation of foul and surface water flows; and
g. ensuring development is in accordance with the Redcar and Cleveland Strategic Flood Risk Assessment.

2.56 The NPPF states that planning should proactively help the mitigation of, and adaption to, climate change including the management of water and flood risk. It is important that inappropriate development is avoided in areas currently at risk from flooding, or likely to be at risk as a result of climate change, or in areas where development is likely to increase flooding elsewhere. Any risk must be assessed by using the Environment Agency flood maps and the Council's Strategic Flood Risk Assessment…".

7. Natural environment

"Policy N4: Biodiversity and Geological Conservation

Protect and enhance the geodiversity and biodiversity of the Tees Valley ensuring the conservation, restoration and creation of key landscapes and habitats, including mitigating and adapting to the impacts of climate change.

7.38 The Tees Valley Nature Partnership have identified five broad landscape types within the Tees Valley, four of which are present in Redcar and Cleveland…
[…]
7.39 TVNP priorities are to:

1. *Protect and enhance the geodiversity and biodiversity of the Tees Valley ensuring the conservation, restoration and creation of key landscapes and habitats, including mitigating and adapting to the impacts of climate change."*

9. Transport and accessibility

"9.5. The interface between transport and planning is of great importance…The Redcar & Cleveland Local Transport Plan 2011 – 2021 (LTP3) prepared by the Council sets out strategies to address a number of regeneration and transport priorities. These are:

to promote the reduction of transport's emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change;
[…]

9.7 The key objectives for the transport strategy component of the Local Plan are to:

minimise the impact of the movement of people and goods on the environment and climate change;"

22.3 Methodology

The climate change assessment comprised an assessment of GHG emissions arising from construction and operational phase activities associated with the proposed scheme.

22.3.1 Guidance

The assessment was carried out in accordance with the approach detailed in the GHG Protocol (World Resources Institute and World Business Council on Sustainable Development 2015), and Institute for Environmental Management and Assessment (IEMA, 2017). The IEMA guidance provides guidelines for, and requirements of, an assessment of GHG emissions within an EIA, as well as considerations for significance criteria.

22.3.2 Study area

GHG emissions arising from the construction and operational phase of the proposed scheme were predicted within a defined 'project boundary', in accordance with the GHG Protocol (World Resources Institute and World Business Council on Sustainable Development 2015). The 'project boundary' was defined as the proposed scheme footprint, and the routes that marine vessels and road vehicles travel to and from the proposed scheme footprint.

22.3.3 Data sources

The assessment was undertaken with reference to several sources, as detailed in **Table 22.1.**

Table 22.1 Key information sources

Data source	Reference
Greenhouse Gas Reporting, Conversion Factors 2020	BEIS, 2020a
Emissions of Carbon Dioxide for Local Authority Areas	BEIS, 2020b
ICE Database, 2019	ICE, 2019
GloMEEP	GloMEEP, 2018, Port Emissions Toolkit, Guide Number 01, Assessment of Port Emissions

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22.3.4 Consultation

The methodology for the climate change assessment was provided to RCBC. This included details of the GHG emissions sources considered in the assessment, emission factors and significance criteria. No response was received from RCBC to our proposed methodology and therefore we have assumed that the method was acceptable.

22.3.5 Impact assessment methodology

The GHG assessment was undertaken in accordance with the methodology defined in the GHG Protocol, developed by the World Resources Institute and World Business Council on Sustainable Development (2015).

The term 'GHG' in this assessment encompasses three gases, namely CO_2, CH_4 and N_2O. Emissions of other 'Kyoto' gases are not considered significant in the context of the proposed scheme and they are excluded from consideration. Where practicable, the results in this assessment are expressed in carbon dioxide equivalent (CO_2eq) which recognises that different gases have notably different global warming potential[11].

22.3.5.1 Construction phase

The construction phase GHG assessment quantified GHG emissions, considered to be net contributions to the global system, from the following sources:

- embedded carbon in materials used on site;
- fuel consumption from marine vessels, dredgers and road traffic; and,
- fuel consumption by plant and equipment.

As most of the construction plant and equipment are likely to be diesel powered, GHG emissions associated with the consumption of electricity during the construction phase are anticipated to be minimal and were not be considered in the assessment.

The approach to determine GHG emissions from each of the sources considered in the assessment is provided below.

Embodied emissions in materials

Embodied GHGs are the total emissions generated to produce a built asset. "Cradle to (factory) gate" GHG emissions, which encompass the extraction, manufacture and production of materials to the point at which they leave the factory gate of the final processing location, were calculated for main construction materials associated with the proposed scheme. GHG emissions were derived from quantities or volumes of known materials that will be used in construction.

The quantities of each type of construction material to be used on site have been estimated and the relevant emission factors sourced from the Inventory of Carbon and Energy (ICE) database (ICE, 2019). The emission factors from the ICE database are 'cradle-to-factory' and, therefore, do not include the transportation of materials to site. Volumes of new materials to be used on site that were considered in the assessment are provided in **Table 22.2**.

[11] *Global Warming Potential of a GHG is a measure of how much heat is trapped by a certain amount of gas in the atmosphere relative to carbon dioxide.*

Table 22.2 Construction materials to be used for the proposed scheme

Infrastructure	Construction material in the ICE database	Volume of construction materials (m^3 unless otherwise stated)			Emission factor (kg CO_2e / kg)
		Phase 1	Phase 2	Total	
Piles	Concrete (1:1:2 Cement: Sand: Aggregate)	11,866	11,014	22,880	0.209
Imported fill	General Aggregates and Sand	111,006	102,960	213,966	0.005
Surfacing (crushed stone)	General Stone	7,848	7,848	15,696	0.079
Rock blanket	General Stone	81,000	105,300	186,300	0.079
Concrete	General Concrete	12,963	12,034	24,997	0.103
Platform pile	Concrete (1:1:2 Cement: Sand: Aggregate)	5,974	5,974	11,948	0.209
Platform deck	General Concrete	4,500	4,500	9,000	0.103
Receiving platform piles	Concrete (1:1:2 Cement: Sand: Aggregate)	7,037	6,225	13,262	0.209
Receiving platform deck	General Concrete	11,700	10,350	22,050	0.103

Emissions associated with the movement of materials to the site were quantified from the road vehicle source group, detailed in **Table 22.3**. These vehicle movements also include the removal of unusable materials from site for disposal at an appropriately licensed facility. It is envisaged that concrete arisings from demolition works would be crushed on site and reused as fill as part of the proposed scheme. It is also assumed that excavated soils could be re-used on-site or the adjacent SIZ development without requiring disposal into landfill.

Road transport movements

Road transport movements during the construction phase will be associated with workers travelling to the site via car and HGV movements. An average trip length of 50km (each way) for HGV movements, and 10 km (each way) for cars has been assumed, which are considered to be the likely average travel distances for workers and supplies. Emission factors were obtained from the Department for Business, Energy and Industrial Strategy (BEIS) (BEIS, 2020a).

The construction phase traffic movements used to calculate GHG emissions are provided in **Table 22.3**.

Table 22.3 Construction phase traffic movements

Vehicle	Average daily trips	Annual trips	Average trip length, each way (km)	Annual distance (km)
Cars	200	52,000	10	1,008,000
HGVs	41	10,660	50	1,033,200
*Assumed 5 day working week, with no bank holiday or public working holiday (8 days).				

Emission factors for each vehicle type considered in the assessment were obtained from BEIS, in kg CO_2e per km travelled. The forecast change in the fleet composition of diesel, petrol and electric cars was obtained from the Department for Transport (DfT 2019) WebTAG data. In the absence of suitable empirical data, it has been assumed that the fleet composition of HGVs would not change over the temporal scope of the assessment to provide a precautionary approach.

On-Site plant and equipment

Emissions associated with fuel consumption from on-site plant and equipment during construction have been calculated from those known at the time of assessment, as listed in **Table 22.4**. The engine power for each vehicle and equipment has been obtained from manufacturer specifications.

The engines for each of the plant and equipment were assumed to operate at 80% load for the full duration of the working day (24 hours a day) during the whole construction phase. This is likely to be conservative, as it is unlikely that a number of plant and equipment would be used for the full duration of the construction phase. It was assumed that all construction plant would be diesel powered. Emission factors for the assessment were obtained from BEIS (2020a).

Table 22.4 Site vehicles to be used during the construction phase (indicative of market equipment)

Vehicle	Plant and equipment operation (weeks)	Assumed engine power (kW)
Jack up with crawler crane (Marlin or similar)	50	230
Slave barge (400t)	50	294
Safety/workboat	50	588
Concrete crusher	50	149
Piling rig	200	390
Excavator	327	70
Dump truck	247	34.8
Crane	180	260
Roller	80	137
JCB	64	93

Capital dredging

Capital dredging will be carried out within part of the Tees Dock turning circle, within parts of the existing navigation channel and within areas not currently subject to maintenance dredging to create a berth pocket. This would include dredging of marine sediments and excavation of soils / landside material within the river bank to create the berth pocket.

The total dredged volume for marine sediments is predicted to be approximately 1,800,000m^3. Dredging will be undertaken using a combination of a TSHD and a backhoe dredger. Different backhoe dredgers will be used for soft and hard materials. It is envisaged that up to three barges will be required to support with the transport of sediment dredged using the backhoe dredger to the offshore disposal site.

Information for the calculation of GHG emissions from dredging are provided in **Table 22.5.**

Table 22.5 Specifications of dredgers and barges to be used during the construction phase

Parameter	TSHD	BHD- soft material	BHD – hard material
Service time (hr/week)	168	168	168
Operational time (hr/week)	140	120	120
Number of dredgers	1	1	1
Number of barges	0	2	2
Installed power dredger (kW)	8,313	1,600	1,600
Installed power barge (kW)	0	1,800	1,800
Total installed power (kw) (including dredger and barge)	8,313	5,200	5,200
Power load factor estimate – dredger	50%	75%	80%
Power load factor estimate – barge	0%	45%	27%
Weekly fuel consumption (m^3)	158	92	74
Duration of deployment (weeks)	4	8	8
Total fuel consumption (l)	586	686	637

Construction vessel deliveries

In addition to the workboats associated with demolition listed in **Table 22.4**, and dredgers and barges listed in **Table 22.5**, there will be emissions associated with delivery of materials such as piles and rock for use in the proposed berth pocket to create the rock blanket.

The calculation of GHG emissions from construction vessels was carried out in accordance with the Port Emissions Toolkit, published by the GloMEEP Project Coordination Unit (GloMEEP, 2018). Emissions were calculated from vessels cruising to the site using propulsion and auxiliary engines, where in the absence of available information regarding the origin of delivered material, an average trip length of 300km per delivery was assumed. In addition, emissions were also calculated from vessels using auxiliary engines whilst at the berth offloading or loading material.

It was assumed that the rock blanket material would be delivered to the proposed berth pocket on the Stema Barge II or similar, and all other deliveries would be from General Cargo vessels of less than 5,000 dead weight tonne (DWT). Load factors, engine sizes for general cargo vessels and GHG emission factors were obtained from the Port Emissions Toolkits (GloMEEP, 2018).

Parameters to calculate GHG emissions from construction vessel deliveries are provided in **Table 22.6**.

Table 22.6 Parameters to calculate emissions from construction vessel deliveries

Vessel	Number of deliveries	Total distance travelled (km)	Propulsion engine capacity (kW)	Auxiliary engine capacity (kW)	Emission factors (g / kWh)			
					CO_2 (propulsion engines)	CO_2 (auxiliary engines)	N_2O	CH_4
Stema Barge II (or similar)	13	3,900	3,840	845	683	722	0.03	0.01
General Cargo	16	4,800	1,008	222	683	722	0.03	0.01

22.3.5.2 Operational phase

GHG emissions were calculated from marine vessels predicted to be using the proposed scheme during operation. Assuming a worst-case scenario from a vessel size perspective (whereby the scheme is utilised for the offshore wind industry), the proposed scheme has been designed to accommodate a vessel with an overall length of up to 169m, breadth of up to 60m and laden draft of 11m. In addition to the vessels used to support with the manufacturing and staging of wind farm components, it is envisaged that other, smaller installation vessels would also utilise the quay including general cargo vessels.

It has been estimated that up to 390 offshore wind vessel calls would take place at the facility on an annual basis. This includes approximately 300 vessel calls per year associated with offshore wind staging and 90 vessel calls per year associated with offshore wind manufacturing activities.

For the purposes of the assessment, parameters from the North Sea Atlantic, an offshore support vessel which operates in the North Sea, were used in the assessment. It was assumed that each vessel would be cruising for a period of 24 hours, and hotelling at the berth for 24 hours per vessel call.

GHG emissions from operational phase vessels were calculated in accordance with the Port Emissions Toolkits (GloMEEP, 2018), as detailed for construction phase vessel movements. Parameters used to calculate emissions from vessels in the operational phase are detailed in **Table 22.7.**

Table 22.7 Parameters to calculate emissions from vessels in the operational phase

Vessel	Number of movements	Propulsion engine capacity (kW)	Auxiliary engine capacity (kW)	Emission Factors (g / kWh)			
				CO_2 (propulsion engines)	CO_2 (auxiliary engines)	N_2O	CH_4
North Sea Atlantic (or similar)	390	9,000	1,200	683	722	0.03	0.01

In addition, four mobile cranes are anticipated to be used during the operational phase of the proposed scheme, which will be responsible for loading and unloading of materials on vessels situated at the berth. It has been assumed that the cranes would operate at 80% load for 14 hours per day, and would be diesel powered. Parameters to calculate emissions from cranes during the operational phase are provided in **Table 22.8**. Emission factors for the consumption of diesel by cranes were obtained from BEIS (2020a).

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Table 22.8 Parameters to calculate emissions from cranes in the operational phase

Vessel	Engine Size (kW)	Operational Hours	Gas Oil Emission Factor (kg CO2 / kWh)
Crawler Crane	750	5,110	0.257
Mobile Harbour Crane	400	5,110	0.257

Due to uncertainties in the uptake of cold ironing within the shipping sector, indirect (Scope 2) GHG emissions from the consumption of electricity by vessels at the berth were not considered in the assessment. As detailed in **Table 22.7**, it was assumed that vessels would use auxiliary engines whilst situated at the berth, which is likely to release more GHG emissions than cold ironing. Therefore, the assessment approach is considered to be conservative.

22.3.6 Significance criteria

There is no single preferred method to evaluate the significance of GHG emissions arising from a 'project'. IEMA guidance advises that all releases of GHGs might be considered to be significant, but professional judgement should be used to contextualise a project's GHG budget (IEMA, 2017).

GHG emissions arising from the project were therefore compared to existing regional GHG emissions, and the national UK carbon budgets.

22.4 Existing environment

22.4.1 Regional GHG emissions

The Department for Business, Energy and Industrial Strategy's (BEIS) *Emissions of carbon dioxide for Local Authority areas* online database discloses the UK's CO_2 net emissions in 2018 were estimated at 373,235 kt CO_2 (BEIS, 2019b). **Table 22.9** presents annual CO_2 emissions in the Redcar and Cleveland region from 2005 to 2018.

Table 22.9 Redcar and Cleveland Region CO_2 Emission Estimates 2005-2018 (kt CO_2) (BEIS, 2020a).

Year	Industry and commercial	Domestic	Transport	Total
		Annual kt CO_2		
2005	9,992.2	333.5	220.5	10,543.1
2006	9,609.1	330.3	218.7	10,154.5
2007	9,809.5	315.8	221.3	10,342.6
2008	9,005.3	311.5	214.0	9,526.5
2009	7,999.9	282.2	204.4	8,482.2
2010	3,756.2	301.3	201.8	4,254.6
2011	3,292.0	261.6	198.2	3,746.9
2012	7,725.6	284.8	193.7	8,198.9
2013	9,309.4	277.3	191.2	9,772.3
2014	8,559.7	232.0	193.7	8,979.7
2015	6,614.7	224.9	191.9	7,025.5

Year	Industry and commercial	Domestic	Transport	Total
		Annual kt CO_2		
2016	2,347.4	215.3	194.3	2,751.2
2017	2,307.7	202.8	196.3	2,700.5
2018	2,213.1	198.0	197.9	2,602.5

Industry and Commercial was the largest contributing sector to GHG emissions within the Redcar and Cleveland region between 2005 and 2018. During 2018 the Industry and Commercial sector released 2,213.1 kt CO_2 whilst Domestic and Transport sectors contributed 198.0 kt and 197.9 kt respectively.

The data in **Table 22.9** shows that annual CO_2 emissions within the Redcar and Cleveland region have decreased by 75% from 2005 to 2018, with reductions in Industry and Commercial the largest driver of this change. This is a larger reduction than the wider UK average, which had a reduction of 35% over the same time period (BEIS, 2020b).

22.5 Potential impacts during the construction phase

Construction phase GHG emissions from the activities considered in the assessment are provided in **Table 22.10.**

Table 22.10 Predicted GHG emissions during construction

Source	CO_2e emissions (tonnes)
Construction dredger	6
Construction vessels	453
Construction plant estimate	2,474
Construction vehicles	1,063
Construction materials	58,536
Total	**62,532**

It is anticipated that the proposed scheme would generate approximately 62,500 tonnes of CO_2e during the construction phase.. The largest source of emissions is from embodied emissions within materials used during construction works, comprising approximately 94% of total emissions.

Construction of the proposed scheme is anticipated to take place over an approximately three-year period. Therefore, assuming an even distribution of emissions over the three-year period, construction of the proposed scheme would contribute less than 1% of emissions within the RCBC region, based upon the most recent figures for 2018. It is acknowledged that some emissions sources considered in the assessment will take place outside of the RCBC administrative region, possibly even the UK, particularly embodied emissions within construction materials and construction vessel movements.

At a national scale, the fourth carbon budget for the UK for emissions between 2023 to 2027 is an average of 390 Mt CO_2e per year. Therefore, over the three-year construction period, emissions from the proposed scheme would comprise 0.006% of the national carbon budget. It is acknowledged that the UK carbon budgets are due to be updated in late 2020 following the adoption of the net zero target (2019 amendment to the 2008 Climate Change Act). However, the construction of the proposed scheme is not anticipated to compromise the ability of the UK to meet its targets in the fourth carbon budget. GHG emissions arising from the construction phase of the project are therefore not considered to be significant in terms of regional or national carbon budgets.

Mitigation measures and residual impact

At the time of preparing the GHG assessment, full construction phase logistics and strategies were not fully developed. However, potential mitigation measures to reduce GHG emissions from construction phase activities are provided below:

- reduce quantities of materials required during construction through efficient design, and use materials with a lower embodied GHG intensity where possible;
- ensure preference for materials that are locally sourced to minimise transport distances;
- implement a Construction Traffic Management Plan to minimise the number of journeys required during construction; and
- use electrical powered construction plant over fossil fuelled construction plant.

Furthermore, some of the mitigation measures to minimise air pollutant emissions during construction, listed in **Section 18**, will also reduce GHG emissions during construction. These include:

- Implement a Travel Plan that supports and encourages sustainable travel for contractor operatives and staff (public transport, cycling, walking, and car-sharing).
- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Implementation of energy conservation measures with respect to the use of NRMM and plant, including:
  - instructions to throttle down or switch off idle construction equipment;
  - switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded; and
  - ensure equipment is properly maintained to ensure efficient energy consumption.

The measures listed above have the potential to reduce GHG emissions arising from construction activities associated with the proposed scheme. However, some emission sources, such as embodied GHGs within construction materials, are unavoidable and there will be some residual construction-related emissions. It is however not considered likely that these emissions will results in a significant increase in regional GHG emissions, or compromise the ability of the UK to meet its targets as part of the fourth carbon budget.

22.6 Potential impacts during the operational phase

GHG emissions from the proposed operational phase of the proposed scheme which have been considered in the assessment are provided in **Table 22.11.**

Table 22.11 Predicted GHG emissions during operation of the proposed scheme

Source	CO_2e emissions (tonnes)
Emissions from vessels cruising	48,415
Emissions from vessels hotelling at the berth	1,397
Emissions from cranes	1,207
Total	**51,018**

Operational phase GHG emissions associated with vessels moving to and from the proposed scheme are anticipated to be 51,018 tonnes per year. The primary use of the proposed scheme is likely to be supporting the construction of offshore wind farms, which would be subject to a separate planning application and EIA. Without the implementation of the proposed scheme, construction vessels for the offshore wind farms would use alternative facilities on the east coast of England. Therefore, it is considered that the provision of the proposed scheme only displaces emissions that would be released as part of construction of other projects. Furthermore, the proposed scheme would be supporting the construction of offshore wind farms, which in itself would help to reduce the UK's carbon intensity of electrical generation. Therefore, impact of operational GHG emissions from the proposed scheme is considered to be not significant.

Mitigation measures and residual impact

The proposed scheme would provide shoreside power (termed 'cold ironing') and therefore vessels would not need to operate main or auxiliary engines whilst berthed. Whilst it is acknowledged that some vessels may not have the capability to utilise this technology, it is likely to lead to a significant reduction in emissions from berthed vessels. As shown in **Table 22.9**, emissions from vessels hotelling at the berth could be responsible for 1,397 tonnes per year. Therefore, a 50% reduction in auxiliary engine use could result in a saving of up to 698 tonnes per year, depending on the carbon intensity of the UK electricity network.

Reductions in emissions from shipping vessels will be largely driven by wider sector legislation changes, or the uptake or technological improvements within the industry. Until the shipping sector can be completely decarbonised, there will be emissions arising from the movement of vessels to the proposed scheme.

However, as the proposed scheme will only result in a displacement of emissions from elsewhere, and it will be supporting projects which will decarbonise the UK electricity network, it is not considered that emissions from operational activities will affect the ability of RCBC or the UK to meet their carbon reduction targets.