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18. Climate Change

18.1. Introduction

18.1.1. This chapter of the Environmental Statement (ES) considers the potential impacts and effects of the Proposed Development construction, operation (including maintenance) and decommissioning on the climate, as well as the impacts of climate change on the Proposed Development and surrounding environment.

18.1.2. In line with the requirements of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (HMSO, 2017), consideration has been given to the following aspects of climate change assessment:

- **Lifecycle greenhouse gas (GHG) impact assessment:** the impact of GHG emissions arising from the Proposed Development on the climate over its design life (Section 5(2)(c) and Schedule 4, paragraphs 4 and 5 of the EIA Regulations);
- **In-combination climate change impact (ICCI) assessment:** an in-combination climate change impact (ICCI) assessment identifies how the resilience of receptors in the surrounding environment are affected by the combined impact of future climate conditions and the Proposed Development (Section 5(2) of the EIA Regulations). The receptors have been identified by the relevant technical disciplines and includes receptors such as air quality, human health and groundwater conditions.
- **Climate change risk assessment (CCRA):** the resilience of the Proposed Development to future climate change impacts, including damage to the Proposed Development as a result of climate change (paragraph 5(f) of Schedule 4 of the EIA Regulations).

18.1.3. The main body of this chapter presents the findings from carrying out the Lifecycle GHG impact assessment on the Proposed Development.

18.1.4. **ES Volume II Appendix 18A**: Climate Change Risk Assessment (**Application Document Ref. 6.3**) presents the methodology and outcomes from undertaking the CCRA for the construction and operational phases of the Proposed Development. Appendix 18A also details the

Climate Change Risk Register that was completed while undertaking the CCRA.

18.1.5. **ES Volume II Appendix 18B**: In-combination Climate Change Impact Assessment (**Application Document Ref. 6.3**) presents the outcomes of the ICCI assessment which has been carried out for the Proposed Development, developed in collaboration with the other environmental disciplines included within this ES.

18.2. Legislation, Planning Policy and Guidance

18.2.1. This section identifies legislation, policy and guidance of relevance to the assessment of the potential GHG impacts associated with the Proposed Development. Legislation, policy and other relevant guidance has been considered on an international, national and local level.

International Law

United Nations Framework Convention on Climate Change Paris Agreement (UNFCCC) (HMSO, 2017)

18.2.2. The Paris Agreement is an agreement within the UNFCCC setting out an international framework for mitigation of greenhouse gas (GHG) emissions, the adaptation to climate change effects and the financing of such works. It requires all signatories to set a target, known as a nationally determined contribution (NDC), against which to commit their climate change mitigation efforts to keep global warming well below 2°C this century and pursue efforts to limit global warming to 1.5°C. The agreement contains a 'ratchet' mechanism by which NDCs must be strengthened every five years. The UK updated its NDC in the January 2025. Under Article 7, the Paris Agreement also requires all signatories to engage in adaptation planning and implementation.

18.2.3. Under Article 4 of the Paris Agreement, parties are required to communicate their intended domestic GHG mitigation targets. In 2020 the UK communicated a new NDC to the UNFCCC. Within this, the UK committed to reducing GHG emissions by at least 68% by 2030 compared to 1990 levels (UK Government, 2020a).

18.2.4. Since then, in January 2025, the UK Government has announced a new NDC to the UNFCCC of reducing emissions by 81% by 2035 (UK Government, 2025).

National Legislation

Climate Change Act 2008/ Climate Change Act (2050 Target Amendment Order 2019)

18.2.5. The Climate Change Act 2008 (UK Government, 2008) set a legally binding target for the UK to reduce its GHG emissions from 1990 levels by at least 80% by 2050. This target is supported by a system of legally binding five-year 'carbon budgets' and an independent body to monitor progress, the Climate Change Committee (CCC). The UK carbon budgets restrict the amount of GHG emissions the UK can legally emit in a defined five-year period.

18.2.6. The Act was amended in 2019 to revise the original 80% reduction target and legislate for 100% reduction relative to 1990 levels by 20250 (through the Climate Change Act 2008 (2050 Target Amendment) Order 2019) (UK Government, 2019).

18.2.7. In December 2020, the 6^{th} Carbon Budget (CCC, 2020), spanning the period from 2033 to 2037, was published by the CCC for consideration by government and is the first budget to reflect the amended trajectory to Net Zero by 2050.

18.2.8. The first six carbon budgets have been legislated and are legally binding, and the CCC has recently advised the UK Government on the level of its 7^{th} Carbon Budget (CCC, 2025), but this is yet to be approved by the UK Government and ratified in parliament.

18.2.9. However, beyond the 7^{th} Carbon Budget, which covers the period from 2038 to 2042, future carbon budgets have not yet been formally advised by the CCC. While the government continues to plan for subsequent carbon budgets in line with the 2050 net zero target, these will require formal approval and ratification in due course.

18.2.10. The existing UK carbon budgets are used to help determine the significance of GHG emissions from the Proposed Development, as described in Section 18.3 and determined in Section 18.6.

Planning Policy Context

National Planning Statements

18.2.11. National Planning Statements (NPSs) set out the UK Government's key objectives, policies and considerations to inform planning decisions. Use of the NPSs for decision making ensures that development of major infrastructure projects aligns with national priorities relating to sustainability, economic growth, and environmental protection, including the government position on the mitigation of, and adaptation to, climate change.

Overarching National Planning Statement for Energy (EN-1)

18.2.12. The Overarching EN-1 (Department for Energy Security and Net Zero (DESNZ, 2023b) is considered the most relevant NPS to the Proposed Development. However, it should be noted that, unlike in the case of most DCO applications for new generating stations, there is no NPS that sets out the exact approach to be followed for the Proposed Development, as there is no NPS that specifically addresses potential hydrogen-powered energy generation projects.

18.2.13. EN-1 does itself state (in paragraph 3.3.50) that "*Government is committed to provide more information on hydrogen to power, relevant to planning, including through guidance documents where appropriate. There is ongoing work from the government to address concerns about the planning processes for nationally significant hydrogen infrastructure, and we will continue to monitor and assess the value of a hydrogen NPS as policy develops over time.*"

18.2.14. Of particular relevance to the Proposed Development, EN-1 contains the following:

- Section 2.2 in respect of the UK's goals for net zero emissions and their relevance to energy infrastructure;
- Paragraph 3.3.17 states that "*new unabated natural gas generating capacity will also be needed as it currently plays a critical role in keeping the electricity system secure and stable.*"

- Paragraph 3.3.19 in relation to the need for a diverse mix of electricity infrastructure.
- Paragraph 3.3.20 states that "*a secure, reliable, affordable, net zero consistent system in 2050 is likely to be composed predominantly of wind and solar.*"
- Paragraph 3.3.49 states that "*Low carbon hydrogen could be capable of replicating the role of natural gas in the electricity system, including providing both firm, flexible capacity in the future and a decarbonisation route for unabated combustion power plants*".
- Paragraph 3.3.50 describes the government's commitment to provide more information on hydrogen to power, including through guidance documents where appropriate.
- Paragraph 3.4.13 states "*As set out in the UK Hydrogen Strategy, the government is committed to developing low carbon hydrogen, which will be critical for meeting the UK's legally binding commitment to achieve net zero by 2050, with the potential to help decarbonise vital UK industry sectors and provide flexible deployment across heat, power and transport.*"
- Paragraph 3.4.14 states that "*The British Energy Security Strategy doubles the ambition set out by the Hydrogen Strategy for up to 10GW of low carbon hydrogen production capacity by 2030, subject to affordability and value for money, at least half of which will come from electrolytic hydrogen, working with industry to develop a strong and enduring UK hydrogen economy. The Impact Assessment for CB6 shows an illustrative range for low carbon hydrogen of 85-125TWh in 2035 and 250- 460 TWh in 2050. This demand for hydrogen will need the infrastructure that supports it, including pipelines and storage.*"
- Paragraph 3.4.15 states that "*Hydrogen can be produced through water electrolysis with low carbon power ('green' hydrogen) or through methane reformation with CCS ('blue' hydrogen). The government's view is that a twin track approach of developing both green and blue hydrogen production will be needed to achieve the scale of low carbon hydrogen production required for net zero*."

Draft: Overarching National Policy Statement for Energy (EN-1)

18.2.15. Published in April 2025, the draft update to the Overarching National Policy Statement for energy (draft EN-1) (DESNZ, 2025a) maintains the position of the current EN-1 (DESNZ, 2023b), and further emphasises the importance of hydrogen to power (H2P) infrastructure to help meet the UK's decarbonisation goals.

18.2.16. Of particular relevance to the Proposed Development, the draft EN-1 contains the following:

- Paragraph 2.3.16 states that "*To accelerate deployment of hydrogen to power (H2P), government is implementing a H2P business model (H2P BM) to de-risk investment and mitigate our identified deployment barriers. We will deliver a H2P BM based on a Dispatchable Power Agreement style mechanism.*"
- Paragraph 3.3.50 states that "*Hydrogen to power can play a key role in our electricity system by providing low carbon dispatchable generation at a range of scales and a decarbonisation pathway for unabated gas generation. When connected to large-scale hydrogen storage, it can provide low carbon inter-seasonal storage. Our analysis indicates H2P is economic at lower load factors (below 30%), enabling it to be cost effective in a clean power system where flexible load factors are expected to fall as renewable generation increases*"
- Paragraph 3.4.12 goes on to state that "*There is an urgent need for all types of low carbon hydrogen infrastructure to allow hydrogen to play its role in the transition to net zero.*"
- Paragraph 4.2.2 states "*Ensuring the UK is more energy independent, resilient and secure requires the smooth transition to abundant, low-carbon energy. The UK's strategy to increase supply of low carbon energy is dependent on deployment of renewable and nuclear power generation, alongside hydrogen and CCUS. Our energy security and net zero ambitions will only be delivered if we can enable the development of new low carbon sources of energy at speed and scale.*"

Overarching National Planning Statement for Natural Gas Electricity Generating Infrastructure (EN-2)

18.2.17. The Overarching EN-2 (Department for Energy Security and Net Zero (DESNZ, 2023c) is also of relevance to the Proposed Development. EN-2 states "*This National Policy Statement (NPS), taken together with the Overarching NPS for Energy (EN-1), provides the primary policy for* *decisions by the Secretary of State on applications they receive for nationally significant natural gas electricity generating stations.*"

18.2.18. EN-2 also states "*This NPS does not seek to repeat the material set out in EN-1, which applies to all applications covered by this NPS unless stated otherwise.*"

18.2.19. Of relevance to the Proposed Development, EN-2 also contains the following:

- Paragraph 1.1.2 states "*The majority of new generating capacity will need to be low carbon. But new unabated natural gas generating capacity will also be needed during the transition to net zero. This will ensure that the system remains reliable and affordable.*"
- Paragraph 2.3.4 states: "*The resilience of the project to climate change should be assessed in the Environmental Statement (ES) accompanying an application. For example, climate change impacts on cooling water as a result of higher temperatures should be covered in the impact assessment section on water quality and resources.*"

The National Planning Policy Framework

18.2.20. The revised National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2024) sets out the government's planning policies for England. While the NPPF does not set specific policies for Nationally Significant Infrastructure Projects (NSIPs), its policies may be of relevance to decision making.

18.2.21. The policies of relevance to the climate change assessment include those achieving sustainable development and meeting the challenge of moving to a low carbon economy, climate change, flooding and coastal change. The NPPF states that the planning system should support this transition by supporting low carbon energy and associated infrastructure.

18.2.22. The sections of the framework particularly relevant to the Proposed Development are Paragraphs 161 to 169 in relation to the reduction of carbon dioxide (CO_2) emissions through low carbon energy use and design, as well as the importance of adapting to future climate change.

National Planning Policy Guidance on Climate Change

18.2.23. Guidance published by the Ministry of Housing, Communities and Local Government (2019) describes how to identify suitable mitigation and climate adaptation measures to incorporate into the planning process, stating that "*Effective spatial planning is an important part of a successful response to climate change as it can influence the emission of greenhouse gases. […] Planning can also help increase resilience to climate change impact through the location, mix and design of development.*"

Net Zero Strategy

18.2.24. The UK Government Net Zero Strategy (UK Government, 2021a) sets out policies and proposals for decarbonising all sectors of the UK economy to meet a net zero target by 2050. The strategy states that one of the key roles for the Hydrogen Sector in the UK is to support energy supply.

Net Zero - Opportunities for the Power Sector

18.2.25. 'Net Zero – Opportunities for the Power Sector' (National Infrastructure Commission, 2020) states that decarbonising the power sector is integral to achieving the goal of Net Zero by 2050. The National Infrastructure Commission (NIC), now part of the National Infrastructure and Service Transformation Authority (NISTA), provides impartial advice to the government on infrastructure requirements, strategic drivers and solutions.

18.2.26. Building on the role of the former NIC, NISTA identifies strategic priorities, assesses infrastructure and service delivery challenges, and recommends solutions to support sustainable economic growth and improved public outcomes. Its remit is set by government, and while its recommendations do not constitute government policy, the government is required to formally respond. NISTA's advice may shape policy development and guide investment decisions across infrastructure and public services.

18.2.27. Core to the recommendations (page 7) is the conclusion that "*a highly renewable power system, combined with flexible technologies including hydrogen powered generation, could be substantially cheaper than alternatives that rely heavily on a fleet of nuclear power plants*."

Local Planning Policy and Strategy

18.2.28. The North Lincolnshire Local Development Framework (North Lincolnshire Council, 2011) sets out the Council's spatial vision, strategy and policies to deliver the strategy up to 2026. The Core Strategy covers several policies related to climate change, including the following, which have been considered in the assessment:

- Policy CS16 North Lincolnshire Landscape, Greenspace and Waterscape;
- Policy CS17 Biodiversity;
- Policy CS18 Sustainable Resource Use and Climate Change;
- Policy CS19 Flood Risk; and
- Policy CS20 Sustainable Waste Management.

Other Standards and Guidance

European Union Commission Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment

18.2.29. This Guidance aims to help EU Member States improve the way in which climate change and biodiversity are integrated in EIAs undertaken across the EU (EU Commission, 2013). Although the UK is no longer a Member State of the EU, this guidance is still considered relevant in the context of EIA undertaken in respect of developments in the UK.

British Standards

18.2.30. The British Standards Institution BS EN ISO 14064-1:2019 and 14064-2:2019 (BSI, 2019a and 2019b, respectively) provide specifications for organisational-level and project-level guidance for the quantification and reporting of GHG emissions and removals. These are used within the GHG emissions calculation methodology, as described in Section 18.3.

IEMA: Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance

18.2.31. In 2022, the Institute of Environmental Management & Assessment (IEMA) published an update to their 2017 guidance on assessing the significance of GHG emissions in Environmental Impact Assessments (EIA).

18.2.32. One key update is the clear recognition that all GHG emissions are potentially significant in the context of achieving the UK's net-zero target. The guidance moves away from the previous threshold-based approach, emphasizing that even small-scale emissions contribute cumulatively to climate change. It urges assessors to take into account both the magnitude of emissions and the broader national and global decarbonisation context.

18.2.33. The 2022 update also encourages the use of climate scenarios, including alignment with the Paris Agreement, when evaluating a project's carbon footprint. It outlines specific criteria to consider when assessing the significance of a project's GHG impacts, including whether a project's GHG emissions are adequately mitigated, whether they are in line with local and national policy in relation to decarbonisation, and how they contribute to the UK's trajectory towards net zero.

18.2.34. This guidance is used within the GHG assessment methodology, as described in Section 18.3.

IEMA: Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation.

18.2.35. The IEMA Guidance for assessing climate change resilience and adaptation in EIA (2020) has also been followed. It provides guidance for consideration of the impacts of climate change within project design. The guidance sets out how to:

- define climate change concerns and environmental receptors vulnerable to climate factors;
- define the environmental baseline with changing future climate parameters; and
- determine the resilience of project design and define appropriate mitigation measures to increase resilience to climate change.

18.2.36. This guidance has been used to develop the CCRA and ICCI assessment methodologies, as described in **ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.3**) and **ES Volume II Appendix 18B**: ICCI Assessment (**Application Document Ref. 6.3**), respectively.

GHG Protocol

18.2.37. The World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD) GHG Protocol provides overarching guidance on developing GHG inventories and reporting standards (2015).

This guidance is used within the GHG emissions calculation methodology, as described in Section 18.3.

UK Hydrogen Strategy

18.2.38. The UK Hydrogen Strategy (Department for Business, Energy and Industrial Strategy (DESNZ, 2024a) sets an ambition for a thriving hydrogen economy by 2030. As a potential key offtaker for hydrogen, power generation is likely to play a strategic role in the hydrogen economy. Page 52 in the UK Hydrogen Strategy states:

"*Hydrogen is likely to play an important enabling role in a fully decarbonised power sector, through the system flexibility that electrolytic production and hydrogen storage can provide and the potential for flexible power generation using hydrogen as a fuel.*"

18.2.39. The standard states that to support the transition towards renewables there will be a requirement for "*flexible, low carbon generation and flexible technologies such as energy storage and demand-side response to manage demand peaks and to balance electricity supply and demand*." (Section 2.4.2, page 57).

18.2.40. Within the UK Hydrogen Strategy, it is suggested that system flexibility can be achieved "*through electrolysis and storage ('Power to Gas', 'Power to Gas to Power')*", and that "*electrolytic hydrogen can allow excess electricity to flow across different parts of the system, from power to gas, to transport or industry*" (Section 2.4.2, page 58).

Clean Power 2030 Action Plan: A New Era of Clean Electricity

18.2.41. The Clean Power 2030 Action Plan (UK Government, 2024) sets the current administration's vision for the future of the UK energy sector by 2030, estimating that 95% of Great Britain's electricity generation will come from clean sources. The Action Plan sets out the ambition for 43–50 GW of offshore wind, 27–29 GW of onshore wind, and 45–47 GW of solar power generation, complemented by 23–27 GW of battery storage and 4–6 GW of long-duration storage by 2030. The Action Plan does maintain, however, that natural gas power stations will be required as back-up to provide security of power supply, but that their use should not exceed 5% of generation by 2030.

18.2.42. The Action Plan also highlights the role of hydrogen-to-power generation in meeting energy requirements when renewables are unable to meet demand, stating: "*Where renewables alone are unable to meet demand for longer periods, we will enable a suite of technologies to be deployed* *and maintained to provide longer-duration power capacity. This could be a combination of pumped hydro storage, first-of-a-kind low carbon dispatchable technologies like gas CCUS or hydrogen to power (H2P), or innovative technologies like liquid air energy storage (LAES).*"

18.2.43. It goes on the state: "*Hydrogen to Power can play a key role in our electricity system at a range of scales and is the primary low carbon technology capable of providing low carbon inter-seasonal storage, whilst providing a decarbonisation pathway for unabated gas*."

18.2.44. However, the Action Plan also recognises that hydrogen-to-power generation depends on a reliable supply of low carbon hydrogen, which may be limited in the time period to 2030. To mitigate this, the UK government is "*developing a hydrogen to power business model to de-risk investment and bring forward hydrogen to power capacity at an accelerated rate*."

Low Carbon Hydrogen Standard

18.2.45. The Low Carbon Hydrogen Standard (LCHS) (DESNZ, 2023a) is a certification scheme introduced by the UK Government to define and promote the production of low carbon hydrogen. Its primary goal is to ensure that hydrogen used for energy and industrial applications aligns with the country's broader decarbonisation targets. Under this standard, hydrogen production is considered 'low carbon' if it emits less than 20 grams of carbon dioxide equivalent (gCO_2e) per megajoule (MJ) of hydrogen (LHV basis) at the point of production, taking into account the full lifecycle emissions, including production, processing, and transportation.

18.2.46. The standard applies to various methods of hydrogen production, including electrolysis (powered by renewable or other low-carbon electricity, e.g. 'green hydrogen' or 'pink hydrogen'[1]) and natural gas reforming (with carbon capture, utilization, and storage – CCUS, also known as 'blue hydrogen'). It sets stringent requirements for monitoring,

[1] 'Green hydrogen' refers to hydrogen produced via electrolysis using renewable energy, while 'pink hydrogen' refers to hydrogen produced via electrolysis using nuclear power.

reporting, and verifying emissions, ensuring transparency and accountability in hydrogen production.

18.2.47. The Low Carbon Hydrogen Standard is part of the UK's wider strategy to scale up hydrogen as a key energy source in the transition to net-zero by 2050.

18.3. Assessment Methodology

Consultation

18.3.1. The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised via the formal Scoping Opinion (**ES Volume II Appendix 1B**: Scoping Opinion (**Application Document Ref. 6.3**)) and in response to the formal consultation and other pre-application engagement, is summarised in Table 18.1 below.

Table 18.1 Consultation summary table

Consultee or Organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
Planning Inspectorate	June 2024 (Scoping Opinion)	ID 4.10.1. The Scoping Report suggests that potential GHG emissions can be avoided due to the low carbon approach and the Proposed Development may have a beneficial impact on carbon intensity of power generation in the UK. There is no detail provided in the Scoping Report regarding the differences between the respective emissions profiles and overall carbon impacts of the two main fuel options (natural gas versus hydrogen firing). The Planning Inspectorate considers that such detailed information should be provided in the assessment to enable a comparative impact assessment. It should clearly set out the worst-case scenario for each use of fuel option (i.e. natural gas (with or without carbon capture), or hydrogen, and blending of natural gas and hydrogen).	GHG emissions associated with a range of operating scenarios have been modelled as part of the GHG assessment. Please refer to the scenarios modelling presented in Section 18.6.

Consultee or Organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		The assessment should consider water supply and how this will be impacted by future climate conditions and the Proposed Development, covering water availability for the construction and operation stages. See comments from Anglian Water (Appendix 2) in this regard.	**ES Volume II Appendix 18B**: ICCI Assessment (**Application Document Ref. 6.3**) details the scope of the ICCI Assessment, which includes such impacts on water supply.
		ID 4.10.3. Fugitive hydrogen emissions - The Scoping Report does not address the potential for fugitive emissions of hydrogen. Failure to minimise fugitive hydrogen emissions could significantly affect GHG emission savings that can be made by using hydrogen. The ES should consider this impact pathway and assess the risks accordingly	Fugitive hydrogen emissions have been accounted for within the GHG modelling undertaken. Please refer to Section 18.3 for further information (with particular reference to the Hydrogen Fugitive Emission subsection)
		ID 4.10.4. CRA & ICCI assessment – Wind as a climate variable - The Applicant proposes to scope out wind as a climate variable in both the in-combination climate change impact	**ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.3**) summarises the current and likely future climate environment within the vicinity of the Site. Peer-reviewed evidence is

Consultee or Organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		assessment and the climate change resilience assessment, as the impacts of wind on receptors in the surrounding environment are likely to be no worse relative to baseline conditions. Provided these baseline conditions are evidenced and the data source is acknowledged, the Inspectorate is content to scope this matter out.	provided describing "*no compelling trends in storminess when considering maximum gust speeds over the last five decades*".
		ID 4.10.5. Decommissioning - The ES should provide a description of the activities and works (including the anticipated duration) which are likely to be required during decommissioning which could impact ecological receptors and highlight any differences between the construction and decommissioning phases.	Table 18.6 describes the decommissioning activities that are expected to result in GHG impacts. The methodology for estimating GHG emissions during decommissioning, and how they differ from construction emissions, is outlined in paragraph 18.3.75.
Lincolnshire Wildlife Trust	February 2025 statutory consultation responses	Objects to the increased use of fossil fuels in any new development, therefore notes concern over the unrestricted use of natural gas prior to	This is discussed in paragraph 18.6.61. The use of natural gas only is considered to be highly unlikely given the clear policy ambitions for hydrogen supply to be available in the future.

Consultee or Organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		the establishment of a local hydrogen supply chain. Requests that consideration of upstream and downstream emission consequences based on the differing supply chain scenarios are included within the DCO.	Even still, the Proposed Development would likely only be operational using natural gas if there is higher-carbon electricity on the grid for it to replace (e.g. electricity generated by older, less efficient, unabated CCGTs to meet periods of peak demand). Upstream emissions have been included within the GHG assessment, as appropriate and relevant to each fuel type considered. Downstream emissions have been included within the GHG assessment as appropriate and relevant – in particular relating to disposal of waste across the lifecycle of the Proposed Development.
Local community	February 2025 statutory consultation responses	Doubt that net zero will be achieved by 2050, and claim that the Proposed Development won't help to address global warming as the UK's contribution to carbon emissions is low in relation to global emissions.	In line with relevant guidance, the scope of this chapter does not assess the likelihood of the UK government's net zero target being achieved, or the contribution of the Proposed

Consultee or Organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
			Development towards the reduction of emissions on a global scale. However, the Proposed Development is considered to be aligned to existing and emerging policy related to the achievement of the UK's net zero target (see section 18.2 Legislation, Planning Policy and Guidance). For example, EN-1 states "*As set out in the UK Hydrogen Strategy, the government is committed to developing low carbon hydrogen, which will be critical for meeting the UK's legally binding commitment to achieve net zero by 2050, with the potential to help decarbonise vital UK industry sectors and provide flexible deployment across heat, power and transport.*"

Overview

18.3.2. This section sets out the scope and methodology for the preliminary assessment of the impacts of the Proposed Development on climate change.

Study Area

Lifecycle GHG Impact Assessment

18.3.3. The Study Area for the GHG impact assessment covers all direct GHG emissions arising from activities undertaken within the Site boundary during the construction, operation, maintenance and decommissioning phases of the Proposed Development. It also includes indirect emissions arising outside the Site , for example emissions embedded within the construction materials arising as a result of the energy used for their production, and upstream emissions associated with the production and transmission of fuels to the Site during operation (including fugitive emissions on the transmission network).

Climate Change Risk Assessment

18.3.4. The Study Area for the CCRA is described in Section 3.2 of **ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.3**).

In-combination Climate Change Impact Assessment

18.3.5. The Study Area for the ICCI assessment is described in Section 3.2 of **ES Volume II Appendix 18B**: ICCI Assessment (**Application Document Ref. 6.3**).

Sources of Information

18.3.6. In preparation of this chapter, the sources of information described below have been referenced.

Lifecycle GHG Impact Assessment

18.3.7. Where available, the project team provided data required to undertake the lifecycle GHG impact assessment and analysed this using the methodology outlined below from paragraph 18.3.11.

18.3.8. Where data was unavailable, reasonable assumptions have been made based on professional judgement.

Climate Change Risk Assessment

18.3.9. Sources of Information for the CCRA is described in Section 3.3 of **ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.3**).

In-combination Climate Change Impact Assessment

18.3.10. Sources of Information for the ICCI assessment is described in Section 3.3 of **ES Volume II Appendix 18B**: ICCI Assessment (**Application Document Ref. 6.3**)

Methodology

Lifecycle GHG Impact Assessment

18.3.11. The GHG assessment follows a project lifecycle approach to calculate estimated GHG emissions arising from the construction, operation and maintenance phases of the Proposed Development and to identify GHG 'hot spots' (i.e. emissions sources likely to generate the largest amount of GHG emissions). This enables the identification of priority areas for mitigation in line with the principles set out in IEMA guidance (IEMA, 2022).

18.3.12. In line with the WRI GHG Protocol guidelines (WRI, 2001), the GHG assessment is reported as tonnes of carbon dioxide equivalent (tCO_2e) and considers 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).

18.3.13. While hydrogen is not a recognised GHG within the Kyoto Protocol, it does have an indirect warming effect on the climate and has therefore also been factored into the GHG assessment. More information is provided from paragraph 18.3.45 below.

18.3.14. These GHGs are broadly referred to in this chapter under an encompassing definition of 'GHG emissions', with the unit of tCO_2e or $MtCO_2e$.

18.3.15. Table 18.2 summarises the key anticipated GHG emissions sources associated to the Proposed Development by lifecycle stage, in line with Publicly Available Standard (PAS) 2080:2023 – carbon management infrastructure (BSI, 2023).

Table 18.2: Potential Sources of GHG Emissions

Lifecycle Stage	Activity	Primary Emission Sources
Production phase	Raw material extraction and manufacturing of products required to build the equipment and infrastructure for the Proposed Development.	Embodied GHG emissions from energy use in the extraction of materials and manufacture of components and equipment.
	Transportation of materials for processes/ manufacturing (where available).	GHG emissions from transportation of equipment and materials during their processing and manufacture. Due to the nature of the equipment, this could require shipment of certain aspects over significant distances. Transport of materials from the manufacturing facility to the Site is included under construction phase.

Lifecycle Stage	Activity	Primary Emission Sources
Construction phase	On-site construction activity including emissions from construction compounds.	Energy (electricity, fuel, etc.) consumption from plant, vehicles and generators on-site.
	Transportation of construction materials to the Site. Due to the nature of the equipment required, this could require shipment of certain aspects over significant distances.	GHG emissions from transportation of materials to and from the Site.
	Transportation of construction workers to and from the Site.	GHG emissions from transportation of workers to and from the Site.
	Disposal of any waste generated by the construction phase.	GHG emissions from disposal of waste.
	Water use.	Provision of potable water, and treatment of wastewater.
Operation and maintenance phase	Operation of the Proposed Development.	GHG emissions from electricity consumption, provision of potable water, treatment of wastewater, and worker transportation. GHG emissions from fuel consumption during operation (both direct emissions to the atmosphere from the Proposed Development, and also indirect, upstream emissions from the natural gas and hydrogen supply chains). Emissions from leakage of hydrogen on the

Lifecycle Stage	Activity	Primary Emission Sources
		transmission network[2] and within the gas turbines (non-GHG impact).
	Maintenance of the Proposed Development.	GHG emissions from energy consumption, transportation of maintenance workers and materials, material use and waste generation as a result of site maintenance.
Decommissioning phase	On-site decommissioning activities.	Energy (electricity, fuel, etc.) consumption from plant, vehicles and generators within the Site Boundary.
	Transportation and disposal of waste materials.	GHG emissions from disposal and transportation of waste.
	Transportation of workers.	GHG emissions from transportation of workers to and from the Site.

18.3.16. Expected GHG emissions arising from the construction, operation and decommissioning phases of the Proposed Development, have been quantified using a calculation-based methodology as per the following equation, and aligned with the GHG Protocol (WRI, 2001):

Activity data × GHG emissions factor = GHG emissions

18.3.17. DESNZ 2025 conversion factors (DESNZ, 2025b) and embodied carbon data from the University of Bath Inventory of Carbon and Energy (ICE)

[2] The equivalent leakage of natural gas on the transmission network is also considered within the assessment, but is included within the indirect, upstream emissions from the natural gas supply chain. Hydrogen leakage is considered separately as it is a non-GHG impact (i.e. it contributes to climate change but is not one of the seven Kyoto Protocol GHGs).

(University of Bath, 2019) have been used as the primary data sources for calculating GHG emissions.

18.3.18. The sensitivity of the receptor (i.e. the global climate) to increases in GHG emissions is always defined as high, as any additional GHG impacts could compromise the UK's ability to reduce its GHG emissions and therefore meet its future 5-year carbon budgets. Also, the extreme importance of limiting global warming to below 2°C this century is broadly asserted by the International Paris Agreement (UN, 2015) and the climate science community.

18.3.19. When evaluating the significance of the GHG emissions, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its design life, which may be positive, negative or negligible. The IEMA guidance on assessing the significance of GHG emissions (IEMA, 2022) states: "*The crux of significance therefore is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*."

Significance Criteria

18.3.20. For the GHG impact assessment, the magnitude of impact considers the output of the GHG quantification process, i.e. the Proposed Development's lifecycle GHG footprint, in the context of its contribution to the UK's carbon budgets and the possible impact of the Proposed Development on the UK meeting its net-zero target. Emissions from the Proposed Development will be presented as a percentage of the carbon budget period under which they fall.

18.3.21. It is important to note that this project is being developed as a key hydrogen offtaker to help stimulate the development of low carbon hydrogen production and transport infrastructure, so its decarbonisation benefits align with what is achievable through government policy and business model support to the wider hydrogen industry.

18.3.22. The IEMA guidance describes five distinct levels of significance which are not solely based on whether a project emits GHG emissions, but how the project makes a relative contribution towards achieving a science-based 1.5°C aligned transition towards Net Zero.

18.3.23. A 'minor adverse' or 'negligible' non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral (i.e. zero on balance); but refers to the likelihood of avoiding severe climate change, aligning project emissions with a science-based 1.5°C compatible trajectory and achieving Net Zero by 2050.

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

18.3.25. Table 18.3 presents the different significance levels as per the latest version of the IEMA guidance, which emphasises that "…*a project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with the UK's net zero trajectory, or accepted aligned practice or area-based transition targets, results in a significant adverse effect. It is down to the practitioner to differentiate between the 'level' of significant adverse effects e.g. 'moderate' or 'major' adverse effects*."

Table 18.3: Definition of Levels of Significance

Significance Level	Effects	Description in the IEMA Guidance	Example in the IEMA Guidance
Significant adverse	Major adverse	A project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with the UK's net zero trajectory or accepted aligned practice or area-based transition targets, results in a significant adverse effect. It is down to the practitioner to differentiate between the 'level' of significant adverse effects e.g. 'moderate' or 'major' adverse effects.	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
	Moderate adverse	As above	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, has a minor adverse effect that is not significant.	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

Significance Level	Effects	Description in the IEMA Guidance	Example in the IEMA Guidance
		It may have residual emissions but is doing enough to align with and contribute to the relevant transition scenario, keeping the UK on track towards net zero by 2050 with at least a 78% reduction by 2035[3] and thereby potentially avoiding significant adverse effects.	necessary to achieve the UK's trajectory towards net zero.
	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, is assessed as having a negligible effect that is not significant. 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 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

[3] Or other science-based 1.5°C compatible trajectory as may be defined for a specific sector or local area, as applicable.

Significance Level	Effects	Description in the IEMA Guidance	Example in the IEMA Guidance
			exceeds net zero requirements with a positive climate impact.

18.3.26. IEMA guidance (IEMA, 2022) also states it is down to the professional judgement of the practitioner to determine how best to contextualise a project's GHG impact and assign the level of significance. It is suggested that sectoral, local, or national carbon budgets can be used, as available and appropriate, to contextualise a project's GHG impact and determine the level of significance. The approach adopted for the purposes of this assessment is outlined below.

18.3.27. Where available, UK national carbon budgets (UK Government, 2021b) have been used for the purposes of this assessment to represent future emissions inventory scenarios for the UK. These legally binding targets, which outline the total amount of GHGs that the UK can emit over a 5-year period, are currently available up to the 6th Carbon Budget period (2033-2037). The UK is currently in the 4th Carbon Budget period, which runs from 2023 to 2027. The 3rd, 4th and 5th Carbon Budgets reflect the previous 80% reduction target by 2050. The 6th Carbon Budget is the first that aligns with the legislated 2050 net zero target.

18.3.28. The construction programme of the Proposed Development (anticipated to be 2027 to 2030 spans the 5th Carbon Budget (2028 to 2032). The annual average GHG impact of the Proposed Development has been compared against the annualised Carbon Budget for the period in which the emissions arise to allow separate assessment of each lifecycle stage.

18.3.29. Operation and maintenance GHG emissions as a result of the Proposed Development (assumed to be fully operational by 2030 at the earliest, with 2031 expected to be the earliest first full year of operation) have been compared to all the appropriate and available carbon budgets within the design life of the Proposed Development: the 5th and 6th Carbon Budgets (2028 to 2032 and 2033 to 2037, respectively).

18.3.30. The CCC has recently advised the UK Government on the level of its 7th Carbon Budget (CCC, 2025), but it is yet to be approved by the UK Government and ratified in parliament. The CCC have advised a carbon budget of 535 $MtCO_2e$ over the 5-year budget period, up slightly from the 526 $MtCO_2e$ used for the GHG assessment presented in the Preliminary Environmental Information Report published for statutory consultation on the Proposed Development in January 2025. The advised carbon budget of 535 $MtCO_2e$ has been used here.

18.3.31. In order to illustrate the Proposed Development trajectory towards net-zero by 2050, the CCC Balanced Net Zero Pathway (CCC, 2025) is utilised post-2037, in the absence of any nationally legally binding or advised carbon budgets after the 7th Carbon Budget. Beyond 2050, it is implied that the UK will remain at net zero.

18.3.32. The CCC Balanced Net Zero Pathway is divided into 5-year periods to 2050 to match the time period of the legally binding UK National Carbon Budgets (except the 9th Carbon Budget, which is 3 years from 2048 to 2050). The indicative carbon budgets up to 2050 are in line with the UK's 1.5-degree trajectory (as detailed in Table 18.4).

18.3.33. However, it should be noted that the CCC has not proposed Budgets beyond 2042, nor have these been formally adopted by the government or legislated for by parliament beyond 2037. Any pathway beyond 2037 can therefore only be used as an indicative measure to contextualise the Proposed Development against progress toward the national net-zero trajectory.

18.3.34. It is noted that the contribution of most individual projects to national-level budgets will be small and so the UK context will have limited value, particularly in the near-term. This GHG assessment therefore uses the IEMA guidance to assess the significance of effects (IEMA, 2022), with the UK carbon budgets being used to provide context to the GHG emissions.

Table 18.4: UK Carbon Budgets and Indicative Carbon Budgets Based Upon the CCC's Balanced Net Zero Pathway (CCC, 2025)

Carbon Budget	Cumulative UK Carbon Budgets, including the CCC's advised 7th Carbon Budget[4] ($MtCO_2e$)	Cumulative Indicative Carbon Budget Totals Based Upon the CCC's Balanced Net-Zero Pathway ($MtCO_2e$)
5th (2028-2032)	1,725	-
6th (2033-2037)	965	-
7th (2038-2042)	535	-

[4] The CCC has recently advised the UK Government on the level of its 7th Carbon Budget (CCC, 2025), but it is yet to be approved by the UK Government and ratified in parliament.

Carbon Budget	Cumulative UK Carbon Budgets, including the CCC's advised 7th Carbon Budget[4] ($MtCO_2e$)	Cumulative Indicative Carbon Budget Totals Based Upon the CCC's Balanced Net-Zero Pathway ($MtCO_2e$)
8th (2043-2047)	-	220
9th (2048-2050)		23

18.3.35. In addition to providing advice that underpins setting National Carbon Budgets, the CCC also provides sector-specific decarbonisation pathways (CCC, 2025). The 'Balanced Net Zero Pathway' modelled breaks the indicative budgets presented in Table 18.4 down into smaller carbon budgets for various subsectors, including electricity supply and fuel supply.

18.3.36. Table 18.5 presents the indicative sub-sector carbon budgets for electricity supply (relevant to the direct scope 1 emissions associated with the Proposed Development) and fuel supply (relevant to the upstream scope 3 emissions associated with the fuel supply to the Proposed Development). However, it should be noted that these are not legislated like the national-level budgets, and are presented here for context only.

Table 18.5: Indicative Sub-sector Carbon Budgets for Electricity Supply and Fuel Supply, Based on the CCC's Balanced Net Zero Pathway (CCC, 2025)

Carbon Budget Period	Electricity Supply Indicative Carbon Budget ($MtCO_2e$)	Fuel Supply Indicative Carbon Budget ($MtCO_2e$)
2028 - 2032	67.6	81.5
2033 - 2037	29.2	43.0
2038 - 2042	21.9	25.7
2043 - 2047	10.2	12.4
2048 - 2050	3.5	5.3

18.3.37. The Balanced Net Zero Pathway modelled by CCC (2025), as presented in Table 18.5, assumes unabated gas[5] use is rapidly phased out, with its occasional use acting to balance the system and ensure security of supply (less than 2% of 2040 generation). The pathway therefore maintains a reserve of unabated gas capacity into at least the 2040s which can be drawn on if needed. Given the time and scope to sufficiently develop alternatives, unabated gas use is phased out by 2050 under this pathway.

18.3.38. The Pathway also assumes 80% of electricity produced from renewable sources by 2040, while also assuming dispatchable low-carbon generation will instead be met by some gas and bioenergy with CCS, and some hydrogen, stating "*Hydrogen also has an important role within the electricity supply sector as a source of long-term storable energy that can be dispatched when needed and as a feedstock for synthetic fuels*."

18.3.39. While the CCC's Balanced Net Zero Pathway states that unabated gas should be phased out by the 2040s, it is not consistent with national energy planning policy, as described in paragraph 18.2.12. NPS EN-1 (DESNZ, 2023b) states that "*As […] CCGTs using natural gas and equipped with CCS are unable to provide the quick start peaking capacity which is required in a low carbon system, new unabated natural gas generating capacity will also be needed*".

18.3.40. NPS EN-1 als*o states: "Low carbon hydrogen could be capable of replicating the role of natural gas in the electricity system, including providing both firm, flexible capacity in the future and a decarbonisation route for unabated combustion power plants",* demonstrating the role of projects such as the Proposed Development in decarbonising the UK's energy sector*.*

18.3.41. Also, while the future supply of hydrogen in the UK is currently uncertain, hydrogen-ready projects such as the Proposed Development are essential for driving up the demand for hydrogen to stimulate investment in its production and infrastructure. The sooner the demand for hydrogen exists, the sooner the supply is likely to become more readily available. This is discussed in more detail in **ES Volume I Chapter 4**: The Proposed Development (**Application Document Ref. 6.2**).

[5] Unabated gas energy production refers to the generation of power from natural gas without capturing or offsetting associated carbon emissions.

Scope

18.3.42. Table 18.6 shows the scope of potential GHG Emissions Sources from the Proposed Development.

Table 18.6: Scope of Potential GHG Emission Sources from the Proposed Development

Lifecycle Stage	Activity	Primary Emission Sources	Scoped In/Out
Enabling Works	Any enabling works	GHG emissions from any activities required onsite prior to construction	In
	Land clearance	Loss of carbon sink.	In
Construction Process	On-site construction activity Transport of construction workers	Energy (electricity, fuel, etc.) consumption from plant and vehicles, generators on site, and construction workers commuting. GHG emissions from fuel consumption for transportation of construction workers	In
	Transportation and disposal of construction waste	GHG emissions from energy use and from fuel consumption for transportation of waste	In
	Provision and treatment of water	GHG emissions from the supply of potable water, and the disposal and treatment of wastewater	In
	Raw material extraction and manufacturing of products/ materials Transport of products/ materials to site.	Embodied GHG emissions. GHG emissions from fuel consumption for transportation of materials.	In
	Operation of the Proposed Development	GHG emissions from electricity generation (including upstream emissions from the fuel supply chain).	In

Lifecycle Stage	Activity	Primary Emission Sources	Scoped In/Out
Operations (including Maintenance)		Fugitive hydrogen emissions.	
	Operation of the Proposed Development	GHG emissions from electricity use on site.	Out[6]
	Use of vehicles i.e. cars and motorcycles	GHG emissions from vehicle use from worker journeys to and from the Site. GHG emissions from fuel consumption for transportation of raw materials to Site.	In
	Disposal of operational waste	GHG emissions from disposal of process waste and domestic waste.	In
	Provision and treatment of water	GHG emissions from the supply of potable water, and the disposal and treatment of wastewater.	In
	Building/ infrastructure maintenance	GHG emissions from maintenance of buildings and infrastructure/assets in the operational stage.	In
Decommissioning	Raw material extraction and manufacturing of products/ materials	Embodied GHG emissions. GHG emissions from fuel consumption for transportation of materials.	In

[6] It is assumed that this will be a small proportion of overall operational emissions and that electricity required is expected to be accounted for within the net electricity output calculations.

Lifecycle Stage	Activity	Primary Emission Sources	Scoped In/Out
	Transport of products/ materials to site		
	On-site decommissioning activity Transportation of workers	Energy (electricity, fuel, etc.) consumption from plant and vehicles, generators on site, and workers commuting. GHG emissions from fuel consumption for transportation of workers.	In
	Transportation and disposal of waste	GHG emissions from energy use and from fuel consumption for disposal of waste.	In
	Provision and treatment of water	GHG emissions from the supply of potable water, and the disposal and treatment of wastewater.	In

Climate Change Risk Assessment

18.3.43. The Methodology for the CCRA is described in Section 3.4 of **ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.3**).

In-combination Climate Change Impact Assessment

18.3.44. The Methodology for the ICCI assessment is described in Section 3.4 of **ES Volume II Appendix 18B**: ICCI Assessment (**Application Document Ref. 6.3**).

Assessment Assumptions and Limitations

Lifecycle GHG Impact Assessment

Hydrogen Fugitive Emission

18.3.45. Hydrogen is not a recognised GHG within the Kyoto Protocol but has an indirect effect on the climate due to its effect on hydroxyl radicals leading to lengthening the atmospheric lifetime of CH_4 (Warwick, et al., 2022). As hydrogen is itself not a recognised GHG, its direct GHG impact on the climate has not been accounted for within the GHG emissions intensity reported within the Low Carbon Hydrogen Standard (DESNZ, 2023a)[7], which is the maximum intensity required to be compliant with the Standard.

18.3.46. To account for these indirect GHG impacts, a global warming potential (GWP)[8] of 11 has been applied to estimated hydrogen leakage quantities (both in the gas turbines themselves, and upstream leakage on the

[7] The GHG emissions intensity threshold reported in the Low Carbon Hydrogen Standard (20.0 gCO_2e/MJ_{LHV}) has been used in the GHG calculations to estimate upstream emissions from hydrogen production.

[8] GWP is a measure used to express the warming potential of different greenhouse gases, relative to that of CO_2. In this, CO_2 has a GWP of 1, so for hydrogen to have a GWP of 11 indicates that a given mass of hydrogen will have 11 times the warming effect of the same mass of CO_2 over a specific timespan.

transmission network), in line with the GWP estimated by Warwick et al. (2022).

18.3.47. Hydrogen leakage rate estimates produced by Frazer-Nash Consultancy (2022) have been used for the GHG assessment to estimate hydrogen leakage on the national transmission network and within the gas turbines. The 99% confidence level has been used, which effectively represents the worst-case estimate. GHG emissions from hydrogen leakage account for a maximum of 2.2% of GHG emissions from fuel consumption during operation (with variation depending on the assessment scenario).

Short Lived GHG Gases

18.3.48. CH_4 and hydrogen are both gases that break down relatively quickly in the atmosphere, compared to the 100-year standard timespan used for global warming analyses. This means that the effects of fugitive emissions are far higher if considered on a shorter time horizon such as 20 years.

18.3.49. The IPCC estimates CH_4 to have a GWP of 56 over a 20-year timespan, as opposed to 21 over 100 years (IPCC, 2023), while a UK Government study suggests hydrogen would have a GWP of 33 over 20 years instead of 11 over 100 years (Warwick, et al., 2022). This suggests that the impact of large increases in hydrogen emissions (e.g. from leakage on the transmissions network or within the gas turbines), and CH_4 leakage from upstream extraction, may be higher when considered over the 20-year time horizon to 2050.

18.3.50. A key difference between these gases and CO_2, however, is that the short-term lifespan means that the global warming effect is more related to the rate of change of emissions i.e. if CH_4 emissions stay constant for 13 years (the atmospheric lifespan of CH_4) then there would not be any increased global warming effect (Allen et al., 2018).

18.3.51. However, for the purposes of this assessment, the 100-year timespan (GWP100) has been used. GWP100 is a common metric used by the IPCC, the Kyoto Protocol, the Paris Agreement, and for the UK carbon budgets. GWP100 represents a middle ground that captures significant short-term and long-term GHG impacts, and provides a standard approach to compare the impacts of different GHGs over a single timeframe, simplifying discussions and making cross-study comparisons feasible.

Upstream Natural Gas GHG Emissions and Decarbonisation

18.3.52. Upstream GHG emissions occurring within the natural gas fuel supply chain have been accounted for within the GHG assessment. These upstream emissions are driven by venting, flaring and fugitive emissions of CH_4 in the supply chain, along with other associated emissions from the natural gas production process (Bauer et al., 2022). There is a degree of uncertainty in how much leakage from natural gas is likely, and whether it can be reduced in the future. Whilst studies suggest it is possible that this leakage may be reduced over time, which would reduce the operational GHG associated with the Proposed Development, there are no reliable projections to base this on currently.

18.3.53. For unabated natural gas approximately 14% of the GHG emissions from fuel consumption during operation of the Proposed Development are from upstream well-to-tank emissions in the natural gas supply chain. For the purposes of the GHG assessment, the current UK Government well-to-tank conversion factor for natural gas (DESNZ, 2025b) has been applied across the whole assessment period to 2050, assuming no decarbonisation of the supply chain over time. This is considered to represent a conservative approach.

Operational GHG emissions from fuel consumption

18.3.54. GHG emissions have been modelled for a 100% natural gas scenario and a 100% hydrogen scenario, based on the quantity of each fuel required for the reference grid export capacity of 892 MWe, assuming a 63% lower heating value (LHV) efficiency rate for each (and therefore a reference input of 1,416 MW_{TH}).

18.3.55. GHG emissions were then modelled for the various natural gas and hydrogen fuel mixes required to calculate the lifetime GHG emissions for each of the assessment scenarios, accounting for the different volumetric energy densities between the two fuel types. Specifically, the energy content (LHV) of natural gas is 3.46 times greater than hydrogen per unit volume, according to GasVLe software (DNV, 2024). As a result, the total volume of hydrogen required for the same energy output as natural gas is 3.46 times greater.

18.3.56. Scope 1 (direct) and scope 3 (upstream) emissions from natural gas consumption have been estimated using the UK Government's conversion factor for natural gas and the associated 'well-to-tank' factor (DESNZ, 2025b), respectively[9].

18.3.57. Due to uncertainties surrounding the future supply of hydrogen in the UK, it is not possible to know at this stage how the hydrogen fuel for the Proposed Development will be produced, and therefore what level of upstream GHG emissions will be associated with it. However, the Low Carbon Hydrogen Standard (DESNZ, 2023a), introduced as part of the UK's Hydrogen Strategy, states that to be compliant with the standard, hydrogen must have a carbon intensity of no more than 20 gCO_2e/MJ_{LHV}. This maximum carbon intensity has been used for the GHG assessment to estimate scope 3 emissions associated with hydrogen consumption.

18.3.58. This represents a conservative, worst-case approach as some hydrogen sources may have a lower carbon intensity, particularly in the future as supply chains decarbonise and lower carbon forms of hydrogen are expected to be available. For example, green hydrogen is produced by electrolysis using renewable energy, so has considerably lower associated scope 3 emissions. As other forms of hydrogen (such as green hydrogen) are produced, the average mix of available hydrogen is expected to have lower scope 3 emissions than this maximum threshold currently set by the Low Carbon Hydrogen Standard. Blue hydrogen is produced through methane reformation with CCS, so although it would have higher emissions than green hydrogen, it would also produce lower scope 3 emissions than this maximum threshold currently set by the Low Carbon Hydrogen Standard.

18.3.59. EN-1 (DESNZ, 2023b) states that "*The British Energy Security Strategy doubles the ambition set out by the Hydrogen Strategy for up to 10GW of low carbon hydrogen production capacity by 2030, subject to affordability*

[9] In the DESNZ 2025 conversion factors:

- scope 1 is 2.0891 $kgCO_2e/m^3$;
- scope 3 is 0.3366 $kgCO_2e/m^3$.

and value for money, at least half of which will come from electrolytic hydrogen". If at least half the hydrogen supply is from electrolytic hydrogen (e.g. 'green hydrogen'), the average carbon intensity of hydrogen supply would be considerably lower than the Low Carbon Hydrogen Standard threshold in the future.

18.3.60. There are no scope 1 (direct) GHG emissions resulting from the combustion of hydrogen.

18.3.61. The impact of fugitive hydrogen emissions (at the site of the Proposed Development, and within the upstream hydrogen supply chain) on the climate has also been quantified, as explained in the Hydrogen Fugitive Emission section above[10].

Other GHG Emissions

18.3.62. Downstream emissions have been included within the GHG assessment as appropriate and relevant – in particular relating to disposal of waste across the lifecycle of the Proposed Development.

18.3.63. GHG emissions associated with the production of the materials required for the Proposed Development have been calculated by multiplying the material quantities (provided by the project design team) by the appropriate emissions factors within the ICE v4.0 emissions factors database (Circular Ecology, 2024).

18.3.64. The manufacture and installation of the hydrogen supply pipeline has been assessed. The diameter of the 4 km connection to the main pipeline is not known at this stage, so the diameter of the main pipeline itself (1050 mm) has been assumed as a worst case. However, it is likely to be smaller in reality.

18.3.65. For transportation distances of construction materials to the Proposed Development, the default transportation distance assumptions from the

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[10] Please note, the impact of hydrogen fugitive emissions is not accounted for in the Low Carbon Hydrogen Standard carbon intensity figure as hydrogen is not a recognised GHG under the Kyoto Protocol, as explained in more detail in the Hydrogen Fugitive Emission section above.

RICS guidance on Whole Life Carbon Assessment (RICS, 2023) have been used. These distances, in combination with the material quantities required for the Proposed Development, have been multiplied by the UK Government conversion factor (DESNZ, 2025b) for an average Rigid HGV to estimate transportation emissions.

18.3.66. For construction workers' transportation to and from the Proposed Development, estimated worker movements over the construction period, as presented in **ES Volume II Appendix 10A**: Transport Statement (**Application Document Ref. 6.3**), have been used. The UK Government conversion factor for 'Average car, unknown fuel' has been applied, assuming a journey distance of 50 km each way.

18.3.67. GHG emissions from waste disposal have been estimated based on the waste quantity estimates produced for the Keadby CCS assessment. Default assumptions for the waste disposal method of each waste type (e.g. the percentage recycled, incinerated or sent to landfill) have been taken from the RICS guidance on Whole Life Carbon Assessment (RICS, 2023). The appropriate UK Government conversion factors for the various waste type and disposal methods have then been applied.

18.3.68. Packaging waste has also been estimated based on the benchmark provided in the RICS guidance on Whole Life Carbon Assessment (RICS, 2023) of 32% of the construction waste total. The UK Government conversion factor for 'average construction waste' has been applied, assuming 100% is sent to landfill as a worst-case assumption.

18.3.69. It is assumed that each person on site uses 69 litres of water per day – half of the average daily water use in England and Wales (Water UK et al., 2025). The UK Government conversion factor for water supply has been applied to this quantity, and the conversion factor for wastewater treatment has been applied to 90% of this quantity, assuming that is the proportion that is subsequently wasted. This approach has been taken to estimate emissions associated with water use during both construction and operation.

18.3.70. GHG from construction activities (e.g. plant fuel use, electricity use on site, etc.) have been estimated using the benchmark for construction site emissions per £100k project value listed in the RICS guidance on Whole Life Carbon Assessment (RICS, 2017). As this benchmark is from the previous version of the RICS guidance from 2017, the project value was first adjusted to account for inflation that has taken place since the guidance was published.

18.3.71. Relevant operational waste quantities estimated for the GHG assessment of the Keadby CCS project have been used here in the absence of more accurate data, as the Proposed Development is expected to produce similar levels of waste as both projects are of similar scale and nature. However, the waste quantities associated with the carbon capture plant for the Keadby CCS project have not been used as they are not relevant to the Proposed Development. The appropriate UK Government conversion factors for waste disposal have been applied.

18.3.72. GHG emissions associated with operational maintenance and repair of assets have been estimated using benchmarks from the RICS guidance on Whole Life Carbon Assessment (RICS, 2023) in the absence of any more detailed maintenance and repair information. As such, maintenance emissions over the operational lifetime of the Proposed Development are estimated to equate to 1% of the embodied carbon and emissions from transportation and construction activities during the construction stage. Repair emissions are estimated to equate to 10% of embodied carbon emissions.

18.3.73. There are not expected to be any material GHG emissions associated with replacement of whole assets during operation, as none of the assets associated with the Proposed Development are expected to be replaced during the 25-year design life beyond those already accounted for under maintenance and repair or plant optimisation. Any replacements of whole assets made after this time would be made beyond 2050, by which time supply chains, transportation and construction activities are expected to be considerably decarbonised in line with the UK's net zero targets. This is outside the direct control of the Proposed Development, and will be driven by the success of government policy in this area.

18.3.74. For worker commuting during operation of the Proposed Development, an average of 50 workers per day has been assumed. The UK Government conversion factor for 'Average car, unknown fuel' has been applied, assuming a journey distance of 50 km each way.

18.3.75. Emissions from the decommissioning process at the end of the Proposed Development's operational life are very difficult to estimate due to the substantial uncertainty surrounding decommissioning methodologies and approaches so far into the future. It has been assumed that GHG emissions from activities during the decommissioning phase (e.g. on-site fuel use and employee commuting) will be equivalent to those required for construction. This is considered to reflect a worst-case scenario, as future developments in methodologies and technological advances are likely to reduce the carbon impact of decommissioning activities considerably in line with UK Government decarbonisation commitments.

Climate Change Risk Assessment

18.3.76. Assessments, Assumptions and Limitations for the CCRA are described in Section 3.5 of **ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.3**).

In-combination Climate Change Impact Assessment

18.3.77. Assessments, Assumptions and Limitations for the ICCI assessment are described Section 3.7 of **ES Volume II Appendix 18B**: ICCI Assessment (**Application Document Ref. 6.3**).

18.4. Baseline Conditions

18.4.1. This section describes the baseline environmental characteristics for the Proposed Development and surrounding areas with specific reference to GHG emissions.

Current Baseline - GHG Assessment

18.4.2. As described in **ES Volume I Chapter 3**: Site and Surrounding Area (**Application Document Ref. 6.2**), the Site includes the ‘Main Site’ which is occupied by improved grassland, with a drain on each boundary (four drains in total). The Site is bisected by overhead electricity transmission lines associated with the existing National Grid 400 kV Substation to the east of the Site. In the vicinity of the overhead lines a swathe of unmanaged semi-improved grassland and pockets of scattered scrub occur within the Site. To the south of these areas, existing land within the Site comprises extensive hardstanding areas associated with Keadby 2 Power Station laydown.

18.4.3. For the purposes of determining net changes in GHG emissions as a consequence of the Proposed Development, the baseline emissions are considered to be zero and all project emissions are considered as additional. Use of this precautionary principle approach provides a conservative assessment, as not all activities (and therefore GHG emissions) will be additional activities given the nature of existing land-use on Site.

Future Baseline – GHG Impact Assessment

18.4.4. This section considers those changes to the baseline conditions, described above, that might occur in the absence of the Proposed Development and during the time period over which the Proposed Development would have been in place.

18.4.5. The future baseline for the GHG assessment is a business-as-usual position whereby the Proposed Development is not implemented. This includes the operational emissions from the generation of electricity that would occur should the Proposed Development not go ahead, but which will be displaced in the case of the Proposed Development being delivered.

18.4.6. Due to uncertainties around the type of power generation to be replaced by the energy generated by the Proposed Development, the baseline GHG emissions from the Proposed Development have not been subtracted from the GHG emissions associated with the alternative generation option (or vice versa, to calculate the net GHG impact). Instead, the GHG emissions intensity of the Proposed Development (i.e. the lifetime GHG emissions per kWh of energy produced) has been compared to that of various alternative forms of energy generation, including fossil fuels, renewable power, and the current UK grid average.

18.4.7. However, it is considered that electricity produced by the Proposed Development would most likely displace electricity generated using unabated natural gas initially, in particular that combusted within older, less efficient Combined Cycle Gas Turbine (CCGT) power stations. As such, even if the Proposed Development operates using unabated gas initially, this is still expected to result in a GHG saving compared to existing, less efficient CCGT generation.

18.4.8. CCGTs are primarily used for baseload and mid-merit generation, providing flexible, reliable power. CCGT plants can also adjust output to complement intermittent renewable energy sources, making them a key part of the UK's energy transition.

18.4.9. By replacing older, higher-carbon unabated gas CCGT power, the Proposed Development would continue to provide flexibility and security of electricity supply, while also helping to decarbonise the UK's energy mix.

18.4.10. The current land use within the Site will have negligible levels of associated GHG emissions. Therefore, for the purpose of the GHG assessment, associated GHG emissions are considered zero in the future baseline.

Climate Change Risk Assessment

18.4.11. Baseline Conditions for the CCRA are described in Section 4 of **ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.3**).

In-combination Climate Change Impact Assessment

18.4.12. Baseline Conditions for the ICCI assessment are described in Section 4 of **ES Volume II Appendix 18B**: ICCI Assessment (**Application Document Ref. 6.3**).

18.5. Development Design and Impact Avoidance

18.5.1. The Proposed Development throughout the detailed design phase, will be designed, as far as practicable, to avoid and reduce impacts and effects on climate change through the process of design development, and by embedding measures into the Proposed Development design. In addition, how the Proposed Development is constructed, operated, maintained and decommissioned would be appropriately controlled in order to manage and minimise potential environmental effects (required as a result of legislative requirements and/or standard sectoral practices).

18.5.2. These embedded measures are taken into account prior to the assessment of effects in order to avoid considering assessment scenarios that are unrealistic in practice i.e. effects do not take account of measures even though they are likely to be standard practice and/or form part of the Proposed Development design. These have been followed through into the assessment to ensure that realistic likely environmental effects have been identified.

18.5.3. The Proposed Development itself will also inherently contribute to the decarbonisation of the UK energy sector. For example, as outlined above, to achieve decarbonisation in line with the Balanced Net Zero Pathway, projects such as the Proposed Development must be built to provide a lower carbon alternative for quicker start dispatchable generation capacity.

18.5.4. Also, hydrogen-ready projects such as the Proposed Development are essential for driving up the demand for hydrogen to stimulate investment in its production and infrastructure. The sooner the demand for hydrogen exists, the sooner the supply is likely to become more readily available. The Applicant considers that the Proposed Development will provide an additional driver to accelerate and provide certainty to hydrogen production, storage and transportation infrastructure in the Humber, due to being a hydrogen-capable large-scale offtaker and potential customer.

18.5.5. Therefore, the Proposed Development is considered to be fundamental to the UK Government achieving its ambitions to increase hydrogen availability in the UK (as outlined in EN-1 and the Net Zero Strategy, described in Section 18.2), and ultimately achieving its 2050 net zero target.

Measures Embedded into the Proposed Development Design

18.5.6. The Proposed Development is being developed through an iterative EIA and design process which involves seeking to avoid or reduce and, where practicable, offset potential environmental effects. These measures are incorporated into the form or design of the Proposed Development, for example through the appropriate routing and placement of infrastructure.

18.5.7. Once these measures are incorporated into the design, they are termed ‘embedded measures’. For the operation and maintenance phase, such embedded measures will be represented primarily in the design, for example through the choice of infrastructure components and the layout and position of the power plant. Embedded measures are therefore either incorporated into the design from the outset or identified through the assessment process.

18.5.8. The delivery of embedded mitigation measures (and any additional mitigation measures, should they be required) during construction will be secured through a Construction Environmental Management Plan (CEMP). An **Outline CEMP** has been prepared to accompany the DCO application (**Application Document Ref. 7.4**). This will be developed into a final CEMP by the appointed Contractor as a Requirement of the **Draft DCO** (**Application Document Ref. 3.1**).

18.5.9. Mitigation measures regarding the operation of the Proposed Development will be driven by environmental permits that will control operational emissions in accordance with the use of Best Available Techniques (BAT). Any mitigation measures that are required during the decommissioning phase will be included within a Decommissioning Environmental Management Plan (DEMP) to be developed at the required point (secured by a Requirement in the **Draft DCO** (**Application Document Ref. 3.1**).

GHG Mitigation Measures

18.5.10. As required by EN-1 (DESNZ, 2023b) , a **GHG Reduction Statement** (**Application Document Ref. 7.8**) has been produced which outlines GHG mitigation measures, the carbon management approach to be adopted for the Proposed Development, and details further carbon reduction opportunities currently being explored for the Proposed Development.

18.5.11. Mitigation measures in relation to GHG emissions arising from the Proposed Development have been embedded within the design and material choices. The following good practice GHG mitigation measures will be included within the Proposed Development design:

- Newer, more efficient gas turbines will be adopted within the development to maximise the fuel efficiency and ensure the maximum energy output in order to reduce the GHG intensity of the power generated;
- Where practicable, the use of alternative materials with lower embodied GHG emissions such as locally sourced products and materials with a higher recycled content; and
- Low carbon design specifications, such as energy-efficient lighting and durable construction materials to reduce maintenance and replacement cycles.
- Although the Proposed Development will have beneficial impacts on the global climate, further embedded mitigation measures will be secured through various environmental management plans such as the CEMP and DEMP. This document identifies various mitigation

measures to be embedded within the Proposed Development to reduce GHG impact, including:

- Adopting the Considerate Constructors Scheme to assist in reducing pollution, including GHGs, from the Proposed Development by employing good industry practice measures which go beyond statutory compliance;
- Encouraging all construction staff to use lower carbon modes of transport by identifying and communicating local bus and rail connections and pedestrian and cycle access routes to/from the Proposed Development and providing appropriate facilities for the safe storage of cycles;
- Liaising with personnel on the potential to implement staff minibuses and car sharing options;
- Switching vehicles and plant off when not in use and ensuring construction vehicles conform to European Union (EU) vehicle emissions standards for the types of plant vehicles to be used;
- Increasing recyclability by segregating construction waste to be re-used and recycled where reasonably practicable;
- Designing, constructing and implementing the Proposed Development in such a way as to minimise the creation of waste; and
- Where practicable, maximise the use of alternative materials with lower embodied carbon such as locally sourced products and materials with a higher recycled content.

Climate Change Risk Assessment

18.5.12. Development Design and Impact Avoidance for the CCRA is described in Section 5 of **ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.3**).

In-combination Climate Change Impact Assessment

18.5.13. Development Design and Impact Avoidance for the ICCI assessment is described in Section 5 of **ES Volume II Appendix 18B**: ICCI Assessment (**Application Document Ref. 6.3**).

18.6. Likely Impacts and Effects

Lifecycle GHG Impact Assessment

18.6.1. The Proposed Development has the potential to affect climate change (positively or negatively), during construction, operation and during decommissioning, due to the impact of GHG emissions arising over the lifetime of the Proposed Development.

18.6.2. Within this section, GHG emissions arising as a result of the Proposed Development are first identified and assessed individually for each lifecycle stage (construction, operation and decommissioning).

18.6.3. It is important to understand the GHG impacts at each individual lifecycle stage, but it is also important to understand the net lifecycle GHG impact of the Proposed Development due to the long-term, cumulative nature of GHG emissions over their lifetime.

18.6.4. Therefore, the net impact of the Proposed Development is also considered, taking into account energy generation and its benefits in the context of the wider energy generation sector and the National Grid average GHG intensity. The overall assessment, which accounts for all GHG emissions over the lifetime of the Proposed Development, also compares the GHG intensity of the Proposed Development with the GHG intensity of alternative energy generation sources to contextualise the GHG impact of the Proposed Development.

GHG Assessment – Construction

18.6.5. Total GHG emissions from the construction phase (2027 to 2030) are estimated to equate to approximately 104,846 tCO_2e. Table 18.7 summarises the overall construction emissions from various emissions sources.

Table 18.7: GHG emissions resulting from the construction phase

Emissions source	Embodied emissions (tCO_2e)	Proportion of total embodied emissions
Raw materials supply and manufacture	84,918	81%
Material Transport	6,647	6.3%
Construction activities	6,081	5.8%
Waste	547	0.5%
Worker transport	6,653	6.3%
Construction total	**104,846**	**100%**

18.6.6. The majority of construction emissions are embodied carbon emissions associated with the production of the raw materials used for the construction of the Proposed Development.

18.6.7. Table 18.8 provides a further breakdown of these embodied carbon emissions.

Table 18.8: Embodied emissions from the manufacture of materials and components

Emissions source	Embodied emissions (tCO_2e)	Proportion of total embodied emissions
Concrete	5,951	7%
Steelwork	7,098	8.4%
Cabling	426	0.5%
BOP (Balance of Plant) piping	1,275	1.5%
Car Park Sub-base and base layer	239	0.3%
Car Parks Asphalt top layer	1,266	1.5%
Earthworks	28	<0.1%
Turbines, generators and equipment	42,186	49.7%
Hydrogen Supply Pipeline	26,449	31.1%
Embodied emissions total	**84,918**	**100%**

18.6.8. The GHG emissions from construction have been compared to the 5th Carbon Budget (2028 to 2032) in Table 18.9, as this carbon budget period covers the anticipated construction period for the Proposed Development.

18.6.9. Some construction emissions are expected to be emitted during 2027 (which falls outside the 5th Carbon Budget period). However, it is not known what proportion of emissions, so all construction emissions have been compared to the 5th Carbon Budget here, representing a worst-case approach.

18.6.10. Also, some of the materials and components are expected to be imported from outside the UK, which would fall outside the scope of the UK carbon budgets. However, all emissions have been included here, representing a worst-case approach.

Table 18.9: UK Carbon Budgets Relevant to the Construction Period

Relevant UK Carbon Budget Period	Cumulative UK Carbon Budget (tCO_2e)	Construction emissions during Carbon Budget period (tCO_2e)	Construction emissions as a proportion of Carbon Budget
5th (2028 to 2032)	1,725,000,000	104,846	0.006%

18.6.11. Overall significance of GHG emissions in the context of the UK carbon budgets and the national policy environment has been assessed in Table 18.12.

GHG Assessment - Operation

18.6.12. The operational phase of the Proposed Development is assumed to be 2031-2055 (25 years) for the purposes of the GHG assessment, where 2031 is the first full year of operation.

18.6.13. GHG emissions sources within the scope of the operational emissions include fuel consumption during operation, as well as fuel used for the transportation of workers and maintenance activities. Maintenance and transportation cover the following:

- Embodied carbon in replacement parts;
- Plant and machinery requirements;

- Fuel and water use during maintenance activities;
- Transportation of materials and workers to and from the Site; and
- Waste disposal.

Operational Scenarios

18.6.14. The following section describes seven hypothetical operational scenarios for the Proposed Development. The scenarios presented look at a range of potential operating scenarios, from the best-case scenario of 100% hydrogen fuel from year 1 (scenario A), while also responding to the Planning Inspectorate's request in the Scoping Opinion to present "*the worst case scenario for each use of fuel option*" by presenting a 100% unabated gas 'worst-case' option (scenario G).

18.6.15. Greenhouse gas emissions have been calculated for the whole of the Proposed Development's lifetime. In some cases, very conservative assumptions for both the period of time before decarbonisation of the Proposed Development and the maximum annual running hours across the lifetime create very unlikely "worst-case" scenarios for the lifecycle greenhouse gas emissions.

18.6.16. The Applicant emphasises that these slower decarbonisation scenarios are presented for comparison and are not expected to represent the actual lifetime emissions (or associated impacts) for two principal reasons:

- The 'Late Full Decarbonisation', 'Late Partial Decarbonisation' and 'Natural Gas Full Lifetime' scenarios (scenarios E, F and G) are extremely unlikely, given UK Government Policy on decarbonisation of the electricity sector and the Proposed Development's aim to switch to operation on hydrogen fuel as and when a commercially viable and reliable hydrogen supply chain option is available to the Site.
- The annual operating hours profile modelled has been selected to provide a realistic worst case of the long term GHG emissions over the lifetime of the Proposed Development, rather than the average annual operating hours across the Proposed Development lifetime. The scenarios therefore present a conservative view in accordance with the Scoping Opinion.

18.6.17. In accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, the direct and indirect significant effects of the Proposed Development on the climate are set out in this chapter. It should be noted, however, that there are considerable uncertainties with the calculation of the indirect effects (Scope 3 emissions).

18.6.18. In accordance with PINS request to show "*the worst-case scenario for each use of fuel option*", the GHG calculations have used the emissions intensity of hydrogen reported in the Low Carbon Hydrogen Standard as an assumption for the GHG emissions associated with hydrogen fuel. This standard requires hydrogen producers to meet a maximum GHG emissions intensity of 20g CO_2e/MJ_{LHV} of hydrogen produced. However, as outlined in Section 18.3, it should be noted that this is considered to be an extremely conservative assumption for the carbon intensity of hydrogen for the whole lifetime emissions. This is supported by the Applicant's knowledge of expected blue hydrogen carbon intensity values and the anticipated evolution of hydrogen supply from blue to green throughout the operational lifetime of the Proposed Development.

18.6.19. The seven operational scenarios that form the basis of this assessment are presented below. All scenarios assume operating hours of 3,500 hours for the first 15 years of operation, and 1,500 hours thereafter. This stepped operating hours forecast is considered to represent a reasonable worst case, reflecting the expected reduction in dispatchable plant use over time. However, in reality, the Proposed Development is expected to operate below this level for many of the years of operation.

- **Scenario A – H_2 Full Lifetime:** 25 years of operation with 100% hydrogen.
- **Scenario B – Early Full Decarbonisation:** 2 years of operation with 100% natural gas, followed by 23 years of 100% hydrogen.
- **Scenario C – Full Decarbonisation by 2035:** 5 years of operation with 100% natural gas, followed by 20 years with 100% hydrogen.
- **Scenario D – Blending Ramp-up:** 3 years of operation with 100% natural gas, followed by 2 years of 20% hydrogen, then 10 years with 50% hydrogen, and 10 years with 100% hydrogen.
- **Scenario E – Late Full Decarbonisation:** 15 years of operation with 100% natural gas, followed by 10 years with 100% hydrogen.
- **Scenario F – Late Partial Decarbonisation:** 15 years of operation with 100% natural gas, followed by 10 years with 50% hydrogen.

- **Scenario G – Natural Gas Full Lifetime:** 25 years of operation with 100% natural gas.

18.6.20. In the event that sufficient hydrogen is not available, for example due to issues with upstream supply, it could be necessary to operate the Proposed Development using a blend of natural gas and hydrogen or using unabated natural gas alone, as represented in the scenarios presented above.

18.6.21. However, use of the lowest carbon option available will be driven in part by the UK Emissions Trading Scheme (ETS), and the effect this will have on the merit order of electricity. The merit order ranks power generation sources by their marginal cost, with the lowest-cost sources being used first to meet demand. In the future, higher carbon electricity generation sources will face increasing costs under the ETS, encouraging adoption of lower carbon fuel sources and technologies, with higher carbon generation sources being at risk of becoming economically unviable as carbon prices rise. As lower carbon options become more economically viable, they are likely to be prioritised within the merit order. Therefore, so long as hydrogen becomes available as a commercially viable option, it is expected to be used by the Proposed Development.

18.6.22. In addition to these financial and government policy drivers, decarbonisation of the Proposed Development will also be driven by SSE's own corporate policies and ambitions. SSE's Net Zero Acceleration Programme (NZAP) includes a focus on hydrogen as a key part of its decarbonisation strategy. SSE plans to integrate low-carbon hydrogen into its new and existing power generation infrastructure, particularly in its newer Combined Cycle Gas Turbine (CCGT) plants (such as the Proposed Development), to accommodate hydrogen blending and/or full switchover once the fuel and necessary infrastructure become available.

18.6.23. Also, in accordance with the requirements of the Environmental Permitting Regulations, the Applicant will be obligated to reassess and formally restate the Decarbonisation Readiness of the Proposed Development at least every two years throughout the operational phase. This periodic reassessment will involve a review of both the technical and economic feasibility of transitioning to hydrogen fuel. By maintaining regular evaluations, the process is intended to help keep the facility aligned with emerging decarbonisation technologies and market developments. This mechanism is designed to facilitate the earliest practicable uptake of hydrogen as a primary fuel source, once it becomes commercially and operationally viable.

18.6.24. Therefore, given these financial and policy drivers, and the commitment of UK Government to a future clean power system, which will include deployment of hydrogen-fired generation, the slower decarbonisation scenarios are not considered likely scenarios. They are considered worst-case scenarios whereby current UK Government policy objectives regarding hydrogen supply in the UK are not met.

18.6.25. GHG emissions for the seven operating scenarios, and their resulting GHG intensities, are provided in Table 18.10. These are broken down into emissions considered to be in the direct control of the Proposed Development (mostly associated with operational fuel use, plus construction, maintenance and decommissioning emissions[11]), and those considered to be outside the control of the Proposed Development (scope 3 emissions associated with the fuel supply chains).

[11] It should be noted here that many of the construction, maintenance and decommissioning emissions fall under scope 3, so are beyond the direct control of the Proposed Development. However, they have been presented in the ‘direct lifecycle GHG emissions’ category below for ease, which represents a worst case.

Table 18.10: GHG emissions and GHG emissions intensities of each scenario, broken down by those in the direct control of the Proposed Development, and total lifecycle GHG emissions including those outside the direct control of the Proposed Development

Operating scenario	Description	Construction, maintenance & decommissioning GHG emissions (tCO_2e)	Scope 1 operational GHG emissions (tCO_2e) – operational fuel use	Scope 1 operation, construction, maintenance and decommissioning emissions		Scope 3 operational GHG emissions (tCO_2e) – operational fuel supply	Scope 1 + Scope 3 operational, and construction, maintenance and decommissioning emissions	
				Direct lifecycle GHG emissions (tCO_2e)	Direct Lifecycle GHG emissions intensity (tCO_2e/GWh)		Total Lifecycle GHG emissions (tCO_2e)	Total Lifecycle GHG emissions intensity (tCO_2e/GWh)
A	H_2 Full Lifetime	162,229	3,041	165,270	3	7,027,112	7,030,153	119
B	Early Full Decarbonisation	162,229	2,033,413	2,195,642	36	6,625,570	8,658,983	147
C	Full Decarbonisation by 2035	162,229	5,078,972	5,241,200	87	6,023,255	11,102,227	187
D	Blending Ramp-up	162,229	12,817,300	12,979,529	216	4,492,861	17,310,161	290
E	Late Full Decarbonisation	162,229	15,230,832	15,393,061	256	4,015,541	19,246,373	322
F	Late Partial Decarbonisation	162,229	18,605,910	18,768,139	312	3,348,058	21,953,968	367
G	Natural Gas Full Lifetime	162,229	19,581,630	19,743,859	328	3,155,092	22,736,722	380

18.6.26. The lifecycle GHG intensity of the seven assessment scenarios are presented in Plate 18.1: with the 2025 UK grid average emissions intensity added for comparison.

18.6.27. This grid average equivalent has been modelled using the DESNZ grid average emissions factors for 2025, including the emissions factor for electricity generation, and well as well-to-tank and transmission & distribution emissions factors.

18.6.28. The 2024 grid average emissions factors have been applied across the whole project lifetime. This is assumed to represent a conservative approach as it is expected that this low carbon, dispatchable electricity would in fact replace electricity produced using existing unabated gas as the UK moves away from this higher-carbon form of electricity generation.

18.6.29. While the UK grid average is expected to decarbonise over time, the 2025 grid average[12] is considered to represent an appropriate comparison, as without the development of low carbon electricity generation projects such as the Proposed Development, the grid will not decarbonise, and older,

[12] The 2025 grid average emissions factor, as published by DESNZ in 2025, has been used. The well-to-tank factor has also been factored in, to account for emissions associated with the upstream extraction, refining and transportation of fuels for electricity generation prior to the point of combustion. This provides a like-for-like comparison with the scope of the emissions quantified for the Proposed Development (with the exception of construction, maintenance and decommissioning emissions in the calculations for the Proposed Development; however, these only account for a small proportion of lifecycle emissions).

less efficient unabated gas plants may still be required to meet the UK's energy demands.

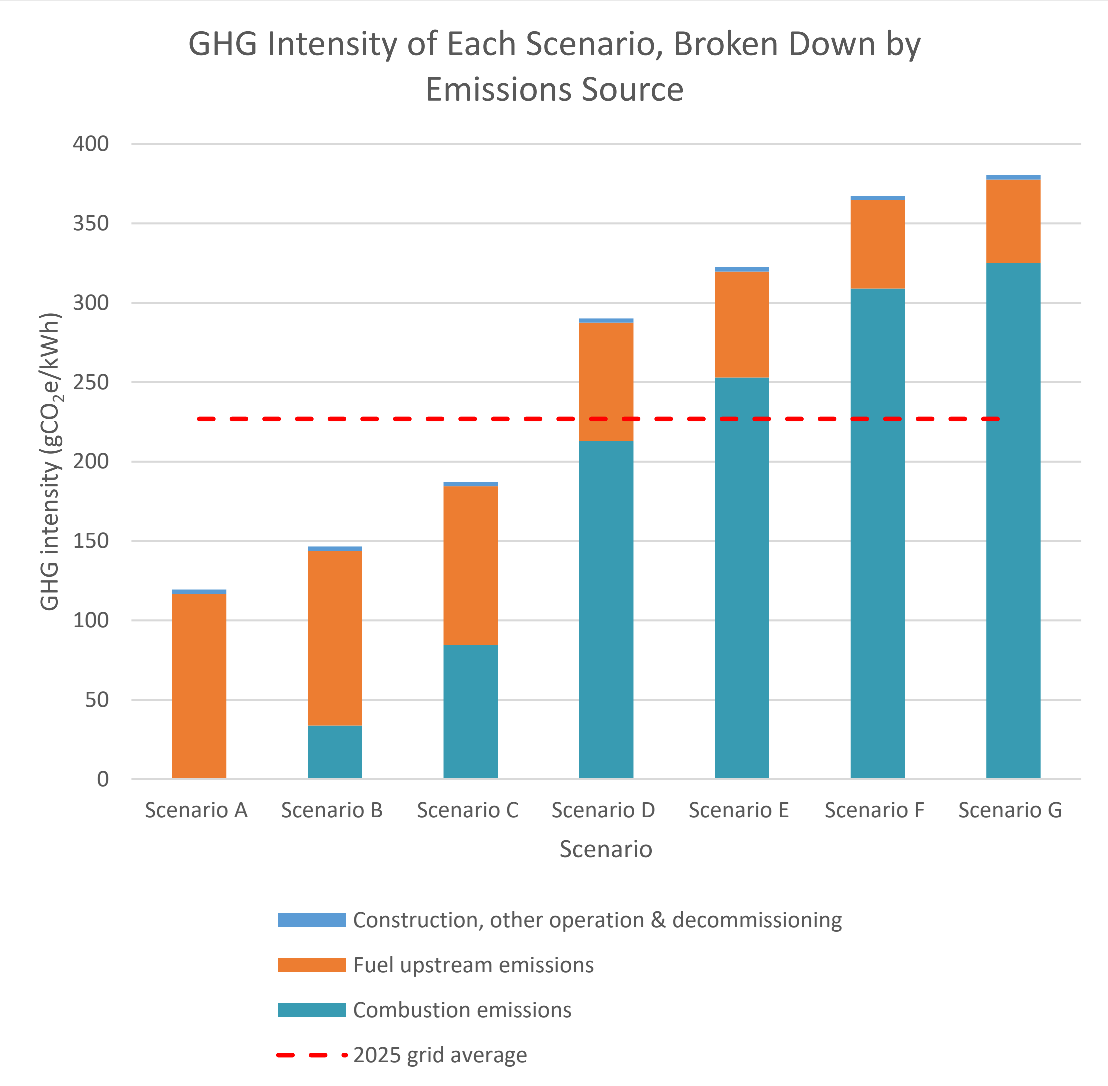

Plate 18.1: GHG Emission Intensities of the Modelled Operating Scenarios for the Proposed Development Broken Down by Emissions Source

18.6.30. Scenarios A, B and C represent improvements on the current grid average GHG intensity over the lifetime of the Proposed Development, and would therefore help to decarbonise the grid. Still, this is considered to represent a very conservative approach as this GHG intensity has been modelled based on the maximum GHG intensity for future hydrogen supply (as defined by the LCHS), and assuming reasonable worst-case operating hours. In reality, hydrogen supply is expected to decarbonise considerably beyond this as average hydrogen production moves from blue to green hydrogen.

18.6.31. While Scenarios D, E, F and G have higher GHG intensities than the current grid average, it is not expected that electricity generated by the Proposed Development would replace grid average electricity. Instead, it is expected that this dispatchable electricity would in fact initially replace electricity produced using existing, less efficient (and therefore higher-carbon) unabated gas. By replacing less efficient CCGT, the Proposed Development would help to decarbonise the grid slightly, even under Scenario G, albeit not as much as scenarios with a higher hydrogen use.

GHG intensity comparison of different electricity generation options

18.6.32. The intended benefit of the Proposed Development will be to supply low carbon electricity to the UK grid and therefore displace higher-carbon electricity (e.g. electricity produced from fossil fuel sources including older, less efficient CCGT), while also providing flexibility and security to the UK electricity supply.

18.6.33. Plate 18.2 and Plate 18.3 present the GHG intensities of alternative forms of electricity generation, which can be compared to the GHG intensities for the Proposed Development under each assessment scenario, as presented in Plate 18.1. Please note the different scales on the y axes (in relation to the GHG intensity), which have been used to present the split between the combustion emissions, upstream fuel emissions, and other lifecycle emissions more clearly.

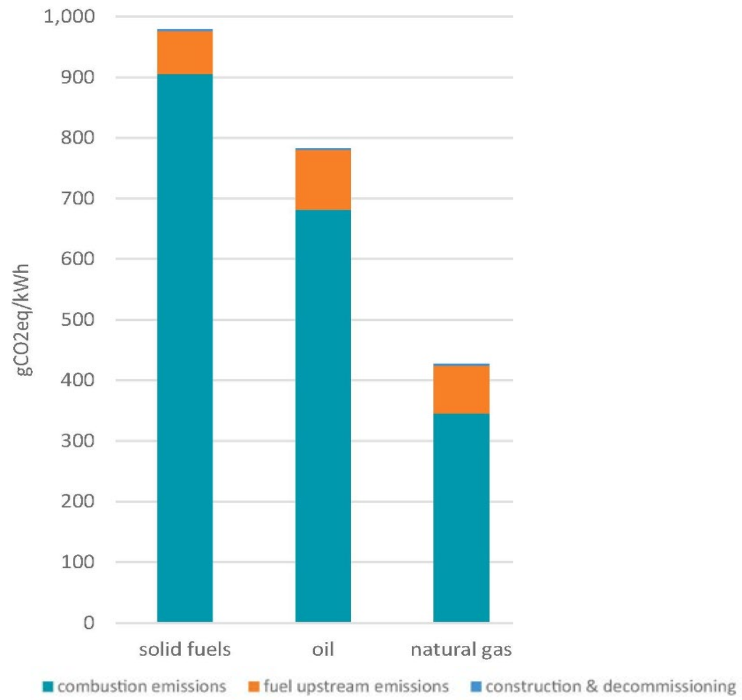

Plate 18.2: GHG Intensities of Electricity Generation from Fossil fuels (Scarlat et al., 2022)

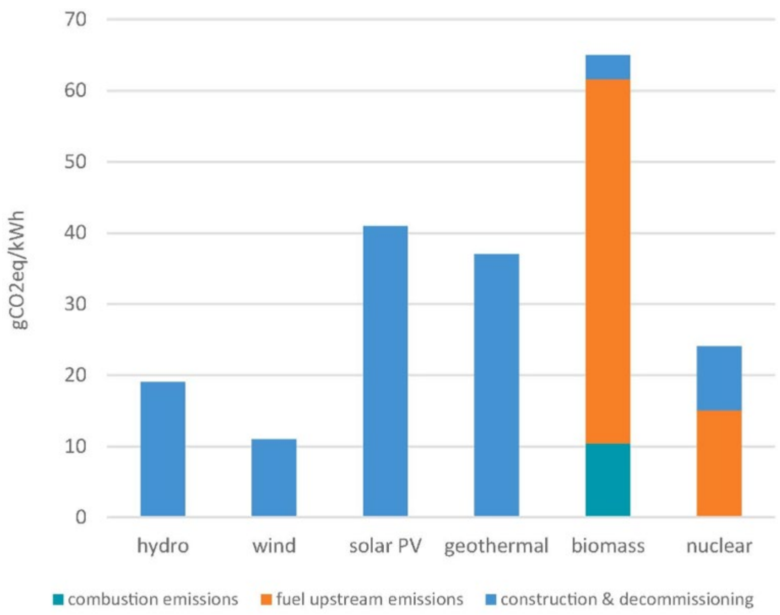

Plate 18.3: GHG Intensities of Electricity Generation from Renewables (Scarlat et al., 2022)

18.6.34. The Proposed Development, under all assessment scenarios, has a lower GHG intensity than the average for solid fuels, oil and natural gas presented in Plate 18.2.

18.6.35. Also, the GHG intensity for scenario G (unabated gas; 380 gCO_2e/kWh) is lower than the GHG intensity for natural gas power generation modelled by Scarlat et al (2022). The is due to the newer, more efficient gas turbines modelled for the Proposed Development, compared to the current stock of CCGTs.

18.6.36. All scenarios, however, have a higher GHG intensity than the renewables presented in Plate 18.3. Comparison of the Proposed Development against renewable energy sources, though, is not necessarily a like-for-like comparison. As outlined in EN-1, renewables have a huge part to play in decarbonising the grid, and are expected to make up the majority of the energy grid in a net zero future. However, EN-1 recognises that there will still be a requirement for secure, dispatchable electricity generation to complement renewables: "*Low carbon hydrogen could be capable of replicating the role of natural gas in the electricity system, including* *providing both firm, flexible capacity in the future and a decarbonisation route for unabated combustion power plants*".

UK GHG reduction trajectory

18.6.37. The UK electricity grid is in the process of being decarbonised as the UK transitions toward Net Zero by 2050. The CCC (2025) provides a Balanced Net Zero Pathway for the UK for sub-sectors including electricity supply and fuel supply (as outlined in Section 18.3). The indicative pathways for electricity supply and fuel supply have been amalgamated to represent the emissions pathway for all GHG emissions relevant to the supply and combustion of fuel for the Proposed Development.

18.6.38.

18.6.39. Plate 18.4 presents the GHG emissions of energy generation from the Proposed Development for all seven assessment scenarios against CCCs amalgamated indicative Balanced Net Zero Pathway for electricity supply and fuel supply, from 2030 to 2055.

18.6.40. CCCs Balanced Net Zero Pathway models a potential pathway to decarbonising the grid in line with the UK Government's net zero commitments, based on a changing mix of electricity generation sources over time. This pathway is indicative only and does not form part of any legislation.

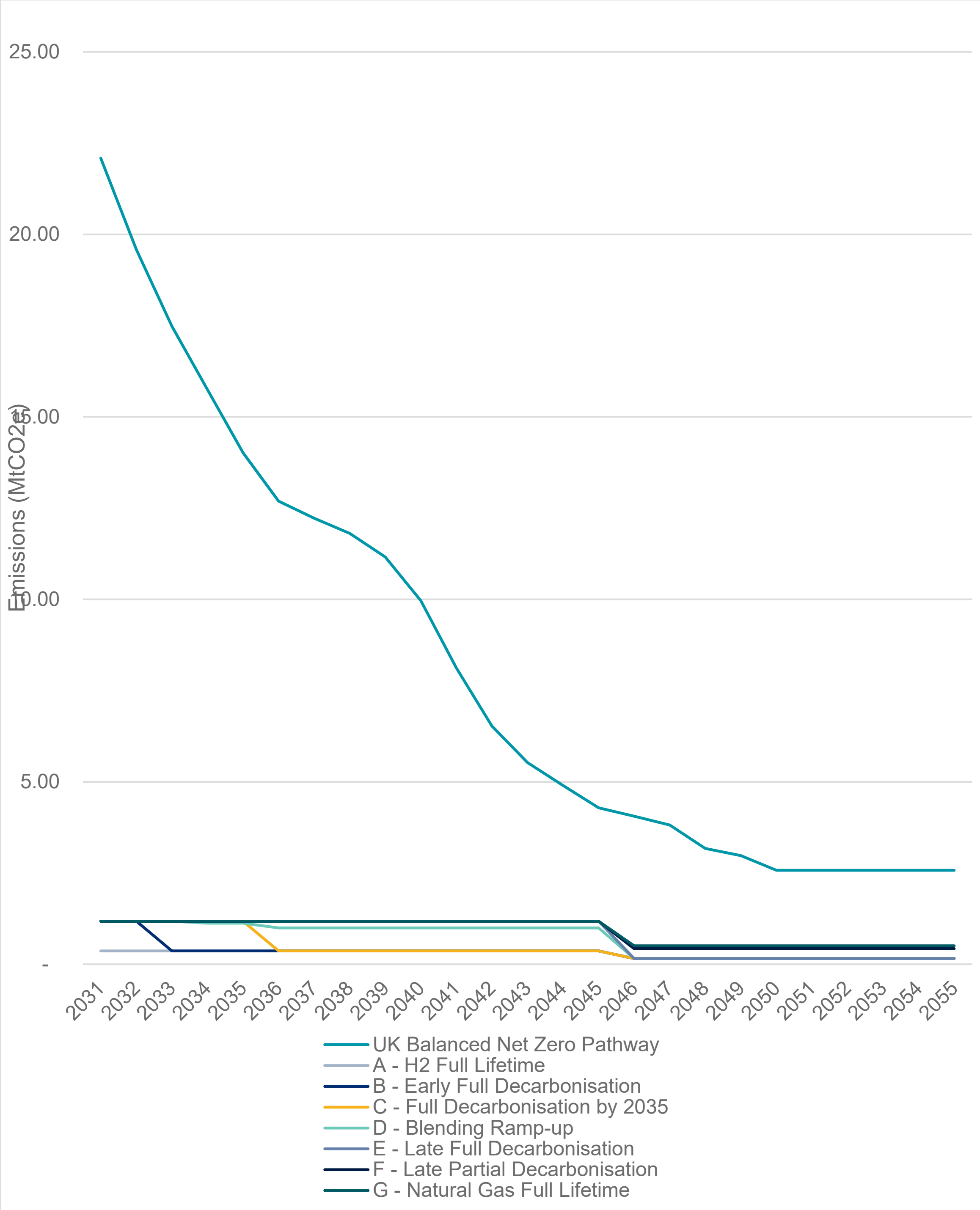

Plate 18.4: CCC's Balanced Net Zero Pathway for Electricity and Fuel Supply vs. Operational scenarios for the Proposed Development

18.6.41. The minimum and maximum contributions to the UK net zero emissions pathway in 2030 are 2% and 5% (represented by scenarios A and G, respectively).

18.6.42. By 2045, scenarios A to C account for 9% of the UK net zero emissions pathway, as all scenarios assume 100% hydrogen fuel by this point, and the net zero pathway emissions are considerably lower than in 2030. This drops to 4% of the UK net zero emissions pathway in 2046 as GHG emissions are lower from 2046 due to the lower assumed operating hours. The contribution of scenarios A to C then increase over time, to 6% by 2055 as the UK net zero emissions pathway emissions continue to decrease.

18.6.43. In comparison, scenarios D and E account for 5% of the UK net zero emissions pathway in 2031, increasing to 23% and 28% in 2045, respectively. This then decreases to 4% for scenarios D and E in 2046 due to decreased operating hours, then increases to 6% for each by 2055.

18.6.44. Scenarios F and G account for 5% of the UK net zero emissions pathway in 2031, both increasing to 28% in 2045. This then decreases to 11% and 12% for scenarios F and G, respectively, in 2046 due to decreased operating hours, then increases to 17% and 20%, respectively, by 2055.

18.6.45. In all cases, therefore, the operational GHG emissions associated with each scenario would likely need to reduce to fully align with the UK's trajectory to net zero as presented by the CCC. Some operational emissions, particularly those from upstream fuel production, are expected to reduce over time as supply chains decarbonise in line with UK Government commitments. However, decarbonisation of the supply chain is largely outside the control of the Proposed Development.

18.6.46. It should be noted, however, that the modelling undertaken has various worst-case scenarios built into it as described above (e.g. the LCHS GHG intensity used for hydrogen fuel, conservative operating hours assumptions and no decarbonisation of fuel supply chains over time), so these numbers are very worst case.

18.6.47. Also, the CCC's Balanced Net Zero Pathway (CCC, 2025) is not a legislated requirement, and is presented for context only. As outlined above (paragraph 18.3.37), there is a disparity between the assumptions built into the UK Balanced Net Zero Pathway (which assumes phase out of gas turbines by 2035) and the NPS EN-1 (DESNZ, 2023b) policy, which states the need for new unabated gas to meet demand for fast dispatchable energy (see paragraph 18.3.39).

18.6.48. It should also be noted that decarbonisation in line with these net zero trajectories is not guaranteed, and will not happen without lower carbon power generation options, such as the Proposed Development, being built.

Decommissioning

18.6.49. In order to assess the magnitude of the climate change impacts through GHG emissions associated with decommissioning of the Proposed Development, the GHG emissions that would be associated with the Proposed Development decommissioning activities could include those associated with:

- Demolition of all buildings and infrastructure, as required;
- Disposal and treatment of all wastes; and
- Return of the Site to an industrial brownfield use under hardstanding (i.e. no change in land use from the baseline).

18.6.50. At this stage, details regarding these activities have not been developed, however they are assumed to be commensurate with emissions generated from construction activities and transportation emissions – i.e. of the approximate magnitude of 19,928 tCO_2e. This is considered a conservative estimate as such activities are expected to decarbonise over time.

Summary of GHG Impacts

18.6.51. The receptor for the GHG assessment is the global climate, and the UK's carbon budgets have been used here as a proxy to contextualise the magnitude of GHG impacts associated with the Proposed Development. These emissions for the most likely assessment scenarios are detailed in Table 18.11.

18.6.52. However, it should be noted that no carbon budgets beyond the 6th Carbon Budget have been formally adopted by the government, or legislated for by parliament. The indicative 7th, 8th and 9th Carbon Budgets presented here are derived from the CCC's Balanced Net Zero pathway, using the dataset included with the CCC's 7th Carbon Budget submission

(CCC, 2025). Any pathway beyond 2037 can therefore only be used as an indicative measure to contextualise the Proposed Development against progress toward the national net-zero trajectory.

18.6.53. The calculations assume three years of construction and two years of operation occurring during the 5th Carbon Budget, five years of operation during each of the 6th, 7th and 8th Carbon Budgets, and three years of operation for the 9th Carbon Budget, as there are only three years in this budget (2048 to 2050).

Table 18.11: Proposed Development Expected GHG Emissions from 100% Natural Gas Fuel and 100% Hydrogen Fuel Compared to the UK Carbon Budget

Operating Scenario	UK Carbon Budget[13]	Total Budget ($MtCO_2e$)	Estimated Project Emissions ($MtCO_2e$)	Percentage Contribution of Emissions
A - H2 Full Lifetime	5th (2028-2032)	1,765	0.83 (three years' construction, two years' operations)	0.05%
	6th (2033-2037)	965	1.82 (five years' operations)	0.19%
	7th (2038-2042)	535	1.82 (five years' operations)	0.34%

[13] The CCC has recently advised the UK Government on the level of its 7th Carbon Budget (CCC, 2025), which has been used here. But it is yet to be approved by the UK Government and ratified in parliament. The 8th and 9th UK Carbon Budgets are derived from the CCC's indicative Balanced Net Zero pathway, using the dataset included with the CCC advice on the 7th Carbon Budget (CCC, 2025).

Operating Scenario	UK Carbon Budget[13]	Total Budget ($MtCO_2e$)	Estimated Project Emissions ($MtCO_2e$)	Percentage Contribution of Emissions
	8th (2043-2047)	220	1.41 (five years' operations)	0.64%
	9th (2048-2050)	23	0.47 (three years' operations)	2.04%
B - Early Full Decarbonisation	5th (2028-2032)	1,765	2.46 (three years' construction, two years' operations)	0.14%
	6th 2033-2037	965	1.82 (five years' operations)	0.19%
	7th (2038-2042)	535	1.82 (five years' operations)	0.34%
	8th (2043-2047)	220	1.41 (five years' operations)	0.64%
	9th (2048-2050)	23	0.47 (three years' operations)	2.04%
C - Full Decarbonisation by 2035	5th (2028-2032)	1,765	2.46 (three years' construction, two years' operations)	0.14%

Operating Scenario	UK Carbon Budget[13]	Total Budget ($MtCO_2e$)	Estimated Project Emissions ($MtCO_2e$)	Percentage Contribution of Emissions
	6th 2033-2037	965	4.26 (five years' operations)	0.44%
	7th (2038-2042)	535	1.82 (five years' operations)	0.34%
	8th (2043-2047)	220	1.41 (five years' operations)	0.64%
	9th (2048-2050)	23	0.47 (three years' operations)	2.04%
D - Blending Ramp-up	5th (2028-2032)	1,765	2.46 (three years' construction, two years' operations)	0.14%
	6th 2033-2037	965	5.42 (five years' operations)	0.56%
	7th (2038-2042)	535	4.98 (five years' operations)	0.93%
	8th (2043-2047)	220	3.30 (five years' operations)	1.50%
	9th (2048-2050)	23	0.47 (three years' operations)	2.04%

Operating Scenario	UK Carbon Budget[13]	Total Budget ($MtCO_2e$)	Estimated Project Emissions ($MtCO_2e$)	Percentage Contribution of Emissions
E - Late Full Decarbonisation	5th (2028-2032)	1,765	2.46 (three years' construction, two years' operations)	0.14%
	6th 2033-2037	965	5.89 (five years' operations)	0.61%
	7th (2038-2042)	535	5.89 (five years' operations)	1.10%
	8th (2043-2047)	220	3.85 (five years' operations)	1.75%
	9th (2048-2050)	23	0.47 (three years' operations)	2.04%
F - Late Partial Decarbonisation	5th (2028-2032)	1,765	2.46 (three years' construction, two years' operations)	0.14%
	6th 2033-2037	965	5.89 (five years' operations)	0.61%
	7th (2038-2042)	535	5.89 (five years' operations)	1.10%

Operating Scenario	UK Carbon Budget[13]	Total Budget ($MtCO_2e$)	Estimated Project Emissions ($MtCO_2e$)	Percentage Contribution of Emissions
	8th (2043-2047)	220	4.39 (five years' operations)	2.00%
	9th (2048-2050)	23	1.28 (three years' operations)	5.57%
G - Natural Gas Full Lifetime	5th (2028-2032)	1,765	2.44 (three years' construction, two years' operations)	0.14%
	6th 2033-2037	965	5.89 (five years' operations)	0.61%
	7th (2038-2042)	535	5.89 (five years' operations)	1.10%
	8th (2043-2047)	220	4.54 (five years' operations)	2.07%
	9th (2048-2050)	23	1.51 (three years' operations)	6.59%

18.6.54. For scenarios A, B, and C, the total GHG emissions associated with the Proposed Development exceed 1% of the corresponding UK carbon budget limits at the indicative 9th Carbon Budget. For scenarios A, B, and

C, at the 9th Carbon Budget, GHG emissions associated with the Proposed Development make up 2.04% of the national carbon budget.

18.6.55. For scenarios D and E, the total GHG emissions associated with the Proposed Development exceed 1% of the corresponding UK carbon budget limits at the indicative 8th and 7th Carbon Budgets, respectively. For the same scenarios, at the indicative 9th Carbon Budget, GHG emissions associated with the Proposed Development makes up 2.04% of the national carbon budget.

18.6.56. For scenarios F, and G, the total GHG emissions associated with the Proposed Development exceed 1% of the corresponding UK carbon budget limits at the indicative 7th Carbon Budget. For scenarios F, and G, at the indicative 9th Carbon Budget, GHG emissions associated with the Proposed Development makes up 5.57% and 6.59% of the national carbon budget, respectively.

18.6.57. It should be noted that, as outlined throughout this chapter, the GHG emissions presented here represent a worst-case assessment in terms of expected hours of operation over the lifetime of the Proposed Development, and in terms of the GHG intensity of hydrogen used for the modelling. Also, the supply chain is expected to decarbonise over time in line with government policy, and the hydrogen mix available in the UK is expected to decarbonise over time as lower carbon hydrogen becomes available (such as green hydrogen). Therefore, in the event that green hydrogen from the electrolysis of water by 100% renewable electricity supply makes up a significant share of the UK hydrogen supply, GHG emissions associated with the Proposed Development are expected to be considerably lower than those presented here.

18.6.58. In Table 18.12 below, the various methods of contextualising the GHG emissions associated with the assessment scenarios for the Proposed Development are summarised. The definitions of significance outlined in the IEMA guidance (IEMA, 2022), as presented in Table 18.3, are then applied to justify the significance rating assigned to each assessment scenario.

Table 18.12: Summary of Most Likely Scenarios GHG Likely Impacts and Effects

Scenario	Significance Rating	Justification
A - H2 Full Lifetime: 25 years of operation with 100% hydrogen.	Minor adverse (Not Significant)	• The GHG emissions intensity of the Proposed Development under this scenario is below the GHG intensity of fossil fuel production (as modelled by Scarlat et al, 2022). • The GHG emissions intensity is also below that of the current grid average. Therefore, the Proposed Development under this scenario would help the grid to decarbonise. • As outlined in EN-1 (DESNZ, 2023b), some unabated natural gas or hydrogen plants are likely to be needed to meet peak energy demand when renewable energy (e.g. from wind and solar) is not available. Under this assessment scenario, the Proposed Development presents a much lower carbon option than unabated gas. • Annual emissions are projected to be below the CCC's indicative Balanced Net Zero pathway for the electricity and fuel supply sector across the whole project lifetime. However, from 2050, annual emissions make up 6% of the UK electricity and fuel supply sectoral emissions modelled under this pathway. The majority of these emissions are scope 3 emissions outside the direct control of the Proposed Development, which are expected to decarbonise over time. Therefore, these emissions are considered to be conservative.

Scenario	Significance Rating	Justification
		• The percentage contribution of emissions is below 1% for the 5th, 6th, 7th and 8th UK Carbon Budgets at 0.05%, 0.19%, 0.34%, and 0.64%, respectively. The percentage contribution of emissions exceeds 1% for the 9th UK Carbon Budget at 2.04%.[14] • In reference to paragraph 3.3.49 of EN-1 (DESNZ, 2023b), hydrogen could provide a firm and flexible future electricity capacity and offer a decarbonisation route for unabated combustion power plants. In conclusion, under this scenario the Proposed Development is considered to meet existing and emerging policy requirements, and is considered to be fully in line with measures necessary to achieve the UK's trajectory towards net zero. Therefore, it is considered to be Minor adverse.
B - Early Full Decarbonisation: 2 years of operation	Minor adverse (Not Significant)	• The GHG emissions intensity of the Proposed Development under this scenario is below the GHG intensity of fossil fuel production (as modelled by Scarlat et al, 2022).

[14] The 8th and 9th UK Carbon Budgets are derived from the CCC's indicative Balanced Net Zero pathway, using the dataset included with the CCC advice on the 7th Carbon Budget (CCC, 2025).

Scenario	Significance Rating	Justification
with 100% natural gas, followed by 23 years of 100% hydrogen.		• The GHG emissions intensity is also below that of the current grid average. Therefore, the Proposed Development under this scenario would help the grid to decarbonise. • As outlined in EN-1 (DESNZ, 2023b), some unabated natural gas or hydrogen plants are likely to be needed to meet peak energy demand when renewable energy (e.g. from wind and solar) is not available. Under this assessment scenario, the Proposed Development presents a much lower carbon option than unabated gas. • Annual emissions are projected to be below the CCC's indicative Balanced Net Zero pathway for the electricity and fuel supply sector across the whole project lifetime. However, from 2050, annual emissions make up 6% of the UK electricity and fuel supply sectoral emissions modelled under this pathway. The majority of these emissions are scope 3 emissions outside the direct control of the Proposed Development, which are expected to decarbonise over time. Therefore, these emissions are considered to be conservative. • The percentage contribution of emissions is below 1% for the 5th, 6th, 7th and 8th, UK Carbon Budgets at 0.14%, 0.19%, 0.34%, and 0.64%,

Scenario	Significance Rating	Justification
		respectively. The percentage contribution of emissions exceeds 1% for the 9th UK Carbon Budget at 2.04%.[15] • In reference to paragraph 3.3.49 of EN-1 (DESNZ, 2023b), hydrogen could provide a firm and flexible future electricity capacity and offer a decarbonisation route for unabated combustion power plants. In conclusion, under this scenario the Proposed Development is considered to meet existing and emerging policy requirements, and is considered to be fully in line with measures necessary to achieve the UK's trajectory towards net zero. Therefore, it is considered to be Minor adverse.
C - Full Decarbonisation by 2035: 5 years of operation with 100% natural gas, followed	Minor adverse (Not Significant)	• The GHG emissions intensity of the Proposed Development under this scenario is below the GHG intensity of fossil fuel production (as modelled by Scarlat et al, 2022).

[15] The 8th and 9th UK Carbon Budgets are derived from the CCC's indicative Balanced Net Zero pathway, using the dataset included with the CCC advice on the 7th Carbon Budget (CCC, 2025).

Scenario	Significance Rating	Justification
by 20 years with 100% hydrogen.		• The GHG emissions intensity is also below that of the current grid average. Therefore, the Proposed Development under this scenario would help the grid to decarbonise. • As outlined in EN-1 (DESNZ, 2023b), some unabated natural gas or hydrogen plants are likely to be needed to meet peak energy demand when renewable energy (e.g. from wind and solar) is not available. Under this assessment scenario, the Proposed Development presents a much lower carbon option than unabated gas. • Annual emissions are projected to be below the CCC's indicative Balanced Net Zero pathway for the electricity and fuel supply sector across the whole project lifetime. However, from 2050, annual emissions make up 6% of the UK electricity and fuel supply sectoral emissions modelled under this pathway. The majority of these emissions are scope 3 emissions outside the direct control of the Proposed Development, which are expected to decarbonise over time. Therefore, these emissions are considered to be conservative. • The percentage contribution of emissions is below 1% for the 5^{th}, 6^{th}, 7^{th} and 8^{th}, UK Carbon Budgets at 0.14%, 0.44%, 0.34%, and 0.64%,

Scenario	Significance Rating	Justification
		respectively. The percentage contribution of emissions exceeds 1% for the 9th UK Carbon Budget at 2.04%.[16] • In reference to paragraph 3.3.49 of EN-1 (DESNZ, 2023b), hydrogen could provide a firm and flexible future electricity capacity and offer a decarbonisation route for unabated combustion power plants. In conclusion, under this scenario the Proposed Development is considered to meet existing and emerging policy requirements, and is considered to be fully in line with measures necessary to achieve the UK's trajectory towards net zero. Therefore, it is considered to be Minor adverse.
D - Blending Ramp-up: 3 years of operation with 100% natural gas, followed by 2 years of 20%	Minor adverse (Not Significant)	• The GHG emissions intensity of the Proposed Development under this scenario is below the GHG intensity of fossil fuel production (as modelled by Scarlat et al, 2022). • The GHG emissions intensity is above that of the current grid average. Therefore, the Proposed Development under this scenario would only help

[16] The 8th and 9th UK Carbon Budgets are derived from the CCC's indicative Balanced Net Zero pathway, using the dataset included with the CCC advice on the 7th Carbon Budget (CCC, 2025).

Scenario	Significance Rating	Justification
hydrogen, then 10 years with 50% hydrogen, and 10 years with 100% hydrogen.		the grid to decarbonise if it replaces higher-carbon electricity generation (e.g. existing inefficient unabated natural gas). • As outlined in EN-1 (DESNZ, 2023b), some unabated natural gas or hydrogen plants are likely to be needed to meet peak energy demand when renewable energy (e.g. from wind and solar) is not available. As this scenario would only occur if hydrogen supply does not become a commercially viable option in the UK before 2045 (and to a lesser degree by 2035 to allow a 50% fuel blend), this is considered to align with EN-1. • Annual emissions are projected to be below the CCC's indicative Balanced Net Zero pathway for the electricity and fuel supply sector across the whole project lifetime. However, from 2050, annual emissions make up 6% of the UK electricity and fuel supply sectoral emissions modelled under this pathway. The majority of these emissions are scope 3 emissions outside the direct control of the Proposed Development, which are expected to decarbonise over time. Therefore, these emissions are considered to be conservative. • The percentage contribution of emissions is below 1% for the 5th, 6th and 7th UK Carbon Budgets at 0.14%, 0.56% and 0.93%, respectively. The

Scenario	Significance Rating	Justification
		percentage contribution of emissions exceeds 1% for the 8th and 9th UK Carbon Budget at 1.50% and 2.04%, respectively[17]. In conclusion, under this scenario the Proposed Development is considered to meet existing and emerging policy requirements, and is considered to be fully in line with measures necessary to achieve the UK's trajectory towards net zero. Therefore, it is considered to be Minor adverse.
E - Late Full Decarbonisation: 15 years of operation with 100% natural gas, followed by 10 years with 100% hydrogen.	Minor adverse (Not Significant)	• The GHG emissions intensity of the Proposed Development under this scenario is below the GHG intensity of fossil fuel production (as modelled by Scarlat et al, 2022). • The GHG emissions intensity is above that of the current grid average. Therefore, the Proposed Development under this scenario would only help the grid to decarbonise if it replaces higher-carbon electricity generation (e.g. existing inefficient unabated natural gas).

[17] The 8th and 9th UK Carbon Budgets are derived from the CCC's indicative Balanced Net Zero pathway, using the dataset included with the CCC advice on the 7th Carbon Budget (CCC, 2025).

Scenario	Significance Rating	Justification
		• As outlined in EN-1 (DESNZ, 2023b), some unabated natural gas or hydrogen plants are likely to be needed to meet peak energy demand when renewable energy (e.g. from wind and solar) is not available. As this scenario would only occur if hydrogen supply does not become a commercially viable option in the UK by 2045, this is considered to align with EN-1. • Annual emissions are projected to be below the CCC's indicative Balanced Net Zero pathway for the electricity and fuel supply sector across the whole project lifetime. However, from 2050, annual emissions make up 6% of the UK electricity and fuel supply sectoral emissions modelled under this pathway. The majority of these emissions are scope 3 emissions outside the direct control of the Proposed Development, which are expected to decarbonise over time. Therefore, these emissions are considered to be conservative. • The percentage contribution of emissions is below 1% for the 5th and 6th UK Carbon Budgets at 0.14% and 0.61%, respectively. The percentage

Scenario	Significance Rating	Justification
		contribution of emissions exceeds 1% for the 7th, 8th and 9th UK Carbon Budgets at 1.10%, 1.75% and 2.04%, respectively[18]. In conclusion, under this scenario the Proposed Development is considered to meet existing and emerging policy requirements, and is considered to be fully in line with measures necessary to achieve the UK's trajectory towards net zero. Therefore, it is considered to be Minor adverse.
F - Late Partial Decarbonisation: 15 years of operation with 100% natural gas, followed by 10 years with 50% hydrogen.	Moderate adverse (Significant)	• The GHG emissions intensity of the Proposed Development under this scenario is below the GHG intensity of fossil fuel production (as modelled by Scarlat et al, 2022). • The GHG emissions intensity is above that of the current grid average. Therefore, the Proposed Development under this scenario would only help the grid to decarbonise if it replaces higher-carbon electricity generation (e.g. existing inefficient unabated natural gas).

[18] The 8th and 9th UK Carbon Budgets are derived from the CCC's indicative Balanced Net Zero pathway, using the dataset included with the CCC advice on the 7th Carbon Budget (CCC, 2025).

Scenario	Significance Rating	Justification
		• As outlined in EN-1 (DESNZ, 2023b), some unabated natural gas or hydrogen plants are likely to be needed to meet peak energy demand when renewable energy (e.g. from wind and solar) is not available. As this scenario would only occur if hydrogen supply does not become a commercially viable option in the UK by 2045, this is considered to align with EN-1. • Annual emissions are projected to be below the CCC's indicative Balanced Net Zero pathway for the electricity and fuel supply sector across the whole project lifetime. However, from 2050, annual emissions make up 17% of the UK electricity and fuel supply sectoral emissions modelled under this pathway. • The percentage contribution of emissions is below 1% for the 5th and 6th UK Carbon Budgets at 0.14% and 0.61%, respectively. The percentage contribution of emissions exceeds 1% for the 7th, 8th and 9th UK Carbon Budgets at 1.10%, 2.00% and 5.57%, respectively[19].

[19] The 8th and 9th UK Carbon Budgets are derived from the CCC's indicative Balanced Net Zero pathway, using the dataset included with the CCC advice on the 7th Carbon Budget (CCC, 2025).

Scenario	Significance Rating	Justification
		In conclusion, under this scenario the GHG impacts of the Proposed Development are partially mitigated, and the Proposed Development is considered to partially meet existing and emerging policy requirements, insofar as it is hydrogen-ready and this scenario would only be realised in the unlikely event that hydrogen supply in the UK is not a widely available, commercially viable option in the future. It is not considered to be fully aligned to the UK's net zero trajectory. However, it should be noted that the Proposed Development will only be operational so long as it is replacing higher carbon energy generation on the grid (e.g. from existing, less efficient CCGT), so would result in a GHG reduction compared to the baseline scenario. Therefore, it is considered to be Moderate adverse.
G - Natural Gas Full Lifetime: 25 years of operation with 100% natural gas.	Moderate adverse (Significant)	• The GHG emissions intensity of the Proposed Development under this scenario is below the GHG intensity of fossil fuel production (as modelled by Scarlat et al, 2022). • The GHG emissions intensity is above that of the current grid average. Therefore, the Proposed Development under this scenario would only help the grid to decarbonise if it replaces higher-carbon electricity generation

Scenario	Significance Rating	Justification
		(e.g. existing inefficient unabated natural gas), which is expected to be the case. • As outlined in EN-1 (DESNZ, 2023b), some unabated natural gas or hydrogen plants are likely to be needed to meet peak energy demand when renewable energy (e.g. from wind and solar) is not available. As this scenario would only occur if hydrogen supply does not become a commercially viable option in the UK, this is considered to align with EN-1. • Annual emissions are projected to be below the CCC's indicative Balanced Net Zero pathway for the electricity and fuel supply sector across the whole project lifetime. However, from 2050, annual emissions make up 20% of the UK electricity and fuel supply sectoral emissions modelled under this pathway. • The percentage contribution of emissions is below 1% for the 5th and 6th UK Carbon Budgets at 0.14% and 0.61%, respectively. The percentage

Scenario	Significance Rating	Justification
		contribution of emissions exceeds 1% for the 7th, 8th and 9th UK Carbon Budgets at 1.10%, 2.07% and 6.59%, respectively[20]. In conclusion, under this scenario the GHG impacts of the Proposed Development are partially mitigated, and the Proposed Development is considered to partially meet existing and emerging policy requirements, insofar as it is hydrogen-ready and this scenario would only be realised in the unlikely event that hydrogen supply in the UK is not a commercially viable option in the future. It is not considered to be fully aligned to the UK's net zero trajectory. However, it should be noted that the Proposed Development will only be operational so long as it is replacing higher carbon energy generation on the grid (e.g. from existing, less efficient CCGT), so would result in a GHG reduction compared to the baseline scenario. Therefore, it is considered to be Moderate adverse.

[20] The 8th and 9th UK Carbon Budgets are derived from the CCC's indicative Balanced Net Zero pathway, using the dataset included with the CCC advice on the 7th Carbon Budget (CCC, 2025).

Overall Summary of GHG Impacts

18.6.59. It is clear within key government policies outlined in Section 18.2 that hydrogen is expected to play a large and crucial role in helping the energy sector decarbonise in the future as the UK moves towards its net zero target. It is therefore expected that the UK will have a sufficient supply of low carbon hydrogen in the future.

18.6.60. If these policy ambitions are realised, and there is sufficient supply of low carbon hydrogen in the future, the Proposed Development would switch to hydrogen as soon as it is economically viable to do so. As a result, the Proposed Development would operate somewhere between scenarios A to E, and would therefore result in a Minor adverse impact. In fact, the electricity generated by the Proposed Development would only replace higher-carbon electricity on the grid, and would therefore actively help the grid to decarbonise.

18.6.61. While under scenarios F and G the Proposed Development would result in a Moderate adverse impact, these scenarios would only be realised if sufficient hydrogen supply is not available in time for the lower-carbon scenarios to be realised. Scenarios F and G are considered to be highly unlikely given the clear policy ambitions for hydrogen supply to be available in the future. Even still, the Proposed Development would only be operational under scenarios F and G if there is higher-carbon electricity on the grid for it to replace (e.g. electricity generated by older, less efficient, unabated CCGTs to meet periods of peak demand).

18.6.62. Hydrogen-ready projects such as the Proposed Development are essential for driving up the demand for hydrogen to stimulate investment in its production and infrastructure. The sooner the demand for hydrogen exists, the sooner the supply is likely to become more readily available. Therefore, the Proposed Development has a crucial part to play in helping UK Government meet its policy ambitions for a low carbon future.

18.6.63. Overall, the Proposed Development is considered to be fully aligned with current and emerging government policy and has a crucial part to play in helping the UK's energy grid decarbonise in line with the UK's net zero trajectory.

Climate Change Risk Assessment

18.6.64. Likely Impacts and Effects for the CCRA are described in Section 6 of **ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.3**).

In-combination Climate Change Impact Assessment

18.6.65. Likely Impacts and Effects for the ICCI assessment are described in Section 6 of **ES Volume II Appendix 18B**: ICCI Assessment (**Application Document Ref. 6.3**).

18.7. Mitigation, Monitoring and Enhancement Measures

Lifecycle GHG Impact Assessment

18.7.1. No specific mitigation measures have been identified to reduce the significance of effects described in Table 18.12. However, the majority of the GHG impacts are outside the direct control of the Applicant and have been assessed on a very conservative basis.

18.7.2. Furthermore, future supply of economically viable hydrogen would reduce the GHG impact of the Proposed Development (and therefore the UK's energy mix). While this hydrogen supply is outside the direct control of the Applicant, the Proposed Development is considered to influence and stimulate the hydrogen production market, which would in effect help to mitigate against the higher-carbon scenarios assessed (which assume a lower uptake of hydrogen).

18.7.3. No monitoring requirements have been identified.

Climate Change Risk Assessment

18.7.4. Mitigation, Monitoring and Enhancement Measures for the CCRA are described in **ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.**).

In-combination Climate Change Impact Assessment

18.7.5. Mitigation, Monitoring and Enhancement Measures for the ICCI assessment are described in **ES Volume II Appendix 18B**: ICCI Assessment (**Application Document Ref. 6.3**).

18.8. Limitations or Difficulties

Lifecycle GHG Impact Assessment

18.8.1. While potential significant effects have been identified in relation to the GHG assessment (under scenarios F and G), this is largely due to the highly conservative approach taken for the GHG assessment as a result of the uncertainties around the future hydrogen supply in the UK.

18.8.2. For example, the GHG intensity of future hydrogen supply is considered to represent the worst case scenario as the Low Carbon Hydrogen Standard threshold has been used. This represents the absolute upper limit for low carbon hydrogen in the UK. However, future supply is expected to be lower carbon as the future mix of hydrogen to the UK is expected to decarbonise beyond this, particularly as green hydrogen is expected to be introduced to the mix.

18.8.3. Also, worst case scenarios have been assessed in terms of the fuel mix to be used by the Proposed Development. However, there are many drivers in place which make these fuel mix scenarios unlikely, as described in more detail throughout this chapter. For example, the effect of the UK ETS on the merit order, existing and expected future government policy around low carbon energy production, environmental permits that the Proposed Development will be required to adhere to, and the Applicant’s own environmental policies. These will all discourage the use of natural gas, and will lead to the use of the lowest carbon hydrogen that is commercially viable for the Proposed Development.

18.8.4. The Proposed Development is considered to be aligned with government policy, including EN-1 (DESNZ 2023), in that it will facilitate low carbon, dispatchable energy to replace existing unabated CCGT electricity. As such, the Proposed Development is itself considered to represent GHG mitigation for the national energy grid.

18.8.5. Also, hydrogen-ready projects such as the Proposed Development are considered essential for driving up the demand for hydrogen to stimulate investment in its production and infrastructure. The sooner the demand for hydrogen exists, the sooner the supply is likely to become more readily available.

Climate Change Risk Assessment

18.8.6. Limitations or Difficulties for the CCRA are described in Section 7 of **ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.3**).

In-combination Climate Change Impact Assessment

18.8.7. Limitations or Difficulties for the ICCI assessment are described in Section 7 of **ES Volume II Appendix 18B**: ICCI Impact Assessment (**Application Document Ref. 6.3**).

18.9. Summary of Likely Significant Residual Effects

Lifecycle GHG Impact Assessment

18.9.1. As no specific mitigation measures have been identified to reduce the significance of effects described in Table 18.12, the residual effects remain as reported in Section 18.6.

Cumulative Effects

18.9.2. Most development results in GHG emissions, and consequently has the potential to result in a cumulative effect on GHG emissions. The receptor for the GHG assessment is the global climate and effects are therefore not geographically constrained. As such, it is not possible to define a study area for the assessment of cumulative effects of GHG emissions, nor to undertake a cumulative effects assessment.

18.9.3. This is set out by the IEMA guidance (IEMA, 2022), which states: "*As GHG emission impacts and resulting effects are global rather than affecting one localised area, the approach to cumulative effects assessment for GHGs differs from that for many EIA topics*", and that "*Effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed*".

18.9.4. Moreover, as the GHG assessment uses the UK carbon budgets as a proxy for the global climate to contextualise GHG emissions, the assessment is considered to incorporate the cumulative contributions of other GHG sources within the UK context.

Climate Change Risk Assessment

18.9.5. Summary of Likely Significant Residual Effects for the CCRA are described in Section 8 of **ES Volume II Appendix 18A**: CCRA (**Application Document Ref. 6.3**).

In-combination Climate Change Impact Assessment

18.9.6. Summary of Likely Significant Residual Effects are described in Section 8 of **ES Volume II Appendix 18B**: ICCI Assessment (**Application Document Ref. 6.3**).

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